approaches, continuously in the indicated language (steps 446 and 456). Help text and program guide text may, for example, be stored initially as part of the program guide and updated using a suitable client-server based approach.

In still another suitable approach, main facility 12 may provide program guide data text in those languages in which audio for related programming is available. If a program has audio in only one language, main facility 12 may only provide program guide data text in that language. This may simplify the selection process that may take place at television distribution facility 12 when, for example, the program guide requests program guide data text. Any other suitable approach for readying help text or program guide data text or any suitable combination of these approaches, may be used.

The program guide may ready program guide text at step 460. On suitable approach may involve extracting program guide text in the selected or default program guide language that is normally stored by the program guide (step 462). Another suitable approach may involve downloading program guide text from television distribution facility 16 on demand at step 460 using, for example, any suitable client-server or peer-to-peer approach (step 464). Any other suitable approach for readying program guide text may be used. At step 468, the display screen text may be

decompressed. Providing display screen text in compressed form may tend to minimize the bandwidth requirements of link and 20 and the memory requirements of user television equipment 22.

At step 470, the program guide displays the program guide display screen text in the selected, the default program guide, or the default program language using user television equipment 22. Displaying program guide display screen text in a selected language may also include displaying text in a date format, time format, currency format, parental rating format or other format particular to a selected language or country that uses a selected language.

FIG. 14 is a flowchart of illustrative steps involved in providing analog audio on different analog audio tracks using the program guide of the present invention. Initially, the program guide may provide the user with an opportunity to select a language in which the user would like television program audio played by user television equipment 22. This opportunity may be provided to the user by the program guide at 400-415. At step 420, the program guide may store language attributes for the selected or default languages. Steps 400-420 were discussed with respect to FIG. 13 and for brevity will not be re-explained here.

An analog audio track is selected using the program guide (step 500). At step 502, the program guide may determine which analog track carries audio in a desirable language (e.g., the primary, alternate, default program guide, or default program language) using, for example, an analog audio track map such as a SAP map. At step 510, the program guide may pass an analog track identifier for the desired track to analog

audio selector 59 (FIG. 4). This step may occur with any suitable frequency. The program guide may pass an analog track identifier to analog audio selector 59, for example, each time the user changes channels, each time a programming change occurs, or with any other suitable frequency. At step 512, the identified audio track is selected by analog audio selector 59. The selected audio track is played for the user by user television equipment 22 at step 515.

It may be desirable, however, to select analog audio tracks without activity from the program guide, as performed at step 505. This may involve, for example, passing an analog track map and language identifiers for the selected and default languages to analog audio selector 59 using the program guide (step 507). Analog audio selector 59 may determine which analog track is desirable based on the analog track map and the language identifiers. In a system in which SAP is used, for example, only one language identifier need be included in the SAP map sent to analog audio selector because there are only two available tracks. If audio in the selected language is not available on the indicated track, then the other track may automatically be used. Alternatively, the SAP map may include the languages of both tracks.

At step 509, analog audio selector 59 selects the desirable analog audio track without any further activity by the program guide directed towards selecting analog audio. Step 509 may be performed, for example, each time the user changes channels, each time programming changes on a channel, or with any other suitable frequency. Analog audio from the selected track is played by user television equipment 22 at step 515.

FIG. 15 is a flowchart of illustrative steps involved in providing digital audio, data, or other information using the program guide of the present invention. Initially, the program guide may provide the user with an opportunity to select a language. This opportunity may be provided to the user by the program guide at steps 400-415. At step 417, the program guide may select an alternate language based on the primary language. At step 420, the program guide may store language attributes for the selected and default program guide languages. Steps 400-420 were discussed with respect to FIG. 13 and for brevity will not be re-explained here.

A digital audio, data, or other information track is selected using the program guide at step 550. At step 552, the program guide determines which digital tracks carry audio, data, or other information in a desirable (the selected or default) language using, for example, a PID map. At step 555, PIDs for the desirable tracks may be passed to packet filter 55 (FIG. 4) using the program guide. This step may be performed with any suitable frequency. The program guide may pass PIDs to packet filter 55, for example, each time the user changes channels, each time a programming change occurs, or with any other suitable frequency. At step 557, packet filter 55 filters out unwanted packets and the contents of the selected tracks are played by user television equipment 22 at step 560.

It may be desirable, however, to select digital tracks without activity from the program guide directed towards digital track selection, as performed at step 540. This may involve, for example, passing a PID map and language identifiers for the selected and

default languages to digital component selector 53 (FIG. 4) using the program guide (step 545). Digital component selector 53 may determine which tracks are desirable based on the PID map and the language identifiers, and may select the desirable tracks at step 547. Selecting desirable tracks may involve, for example, passing PIDs to packet filter 55 which, in turn, filters out undesirable packets. The contents of the selected digital tracks are played by user television equipment 22 at step 560.

FIG. 16 is a flowchart of illustrative steps involved in coordinating the language in which program guide display screen text is displayed with languages available for television programming when the television programming is broadcasted. Initially, the program guide may provide the user with an opportunity to select a language. This opportunity may be provided to the user by the program guide at steps 400-415. At step 417, the program guide may select an alternate language based on the primary language. At step 420, the program guide may store language attributes for the selected and default languages. Steps 400-420 were discussed with respect to FIG. 13 and for brevity will not be re-explained here.

Coordinating display screen text with available languages may involve any suitable scheme for providing display screen text in one or more languages (step 603). Main facility 12 may only provide program guide display screen text in languages in which audio is available for programs (step 605). For example, main facility 12 may only provide program listings in the languages in which their associated programs have audio. Alternatively, distribution equipment 21 or program guide server 25 of television distribution

facility 16 may only store program guide display screen text in languages available for programs (step 607). In still another approach, user television equipment 22 may only store program guide display screen text in languages available for programs (step 609).

At step 600, the program guide provides the user with an opportunity to access a program guide function. This may involve, for example, displaying main menu screen 100 of FIG. 5 and providing the user with the opportunity to select one of selectable features 106 (FIG. 5). Once the user indicates a desire to access a particular function (by, for example, selecting a feature 106), the program guide determines if providing the function to the user involves displaying program guide display screen text that is related to a television program (step 610). This may be accomplished, for example, by programming the program guide to recognize that certain fields in which program guide data text is displayed involve displaying television program related information, such as by examining an attribute associated with each field. Television program related information may include, for example, program listing information, additional program information, music information, pay-per-view ordering information, or any other information related to basic, premium, pay-per-view, music, or other types of programs. If the program guide function does not involve displaying program guide display screen text that is related to a television program, the program guide may display the program guide display screen text in the selected language at step 620. If program guide display screen text is not available in the selected language, then the program guide may

display the text, for example, in accordance with the illustrative hierarchy shown in FIG. 13.

If the program guide determines at step 610 that the program guide function does involve displaying program guide display screen text that is related to a television program, the program guide may then determine if a selected (primary or alternate) language is a language that is associated with the television program; that is, the program guide determines if the selected language is one of the languages that the audio, data, or other information for a television program will be broadcasted in. This may be accomplished, for example, by examining a track map database that is provided as part of the program guide data stream (e.g., a SAP track map database, a PID map database, etc.).

How the program guide determines whether a television program will be broadcasted with audio, data, or other information in a selected language may depend on how the track map database is structured. If, for example, the track map database associates available languages with channel numbers, the program guide may cross-reference the channel number for the television program as indicated in the program guide data stream with the channel numbers in the track map database. Alternatively, if the track map database associates available languages with individual programs, the program guide may cross-reference the program name (or other program identifier) with the program names (or identifiers) in the track map database.

A particular program guide function may include displaying program guide display screen text that relates to a number of television programs.

Providing the user with program listings information, such as is displayed in program listings screens 130 and 135 of FIGS. 6a and 6b, is an example of such a function. When generating screens 130 or 135, for example, the program guide may perform step 615 for each listing and determine that each listing 150 is a field in which program guide display screen text is displayed that relates to a television program. The program guide may determine if each program that is associated with each listing 150 will be broadcasted with audio, data, or other information in the selected language by, for example, cross referencing each listing with the contents of the track map database.

If the program guide determines that a television program will be broadcasted with audio, data, or other information in a selected language, the program guide may display the program guide display screen text that is related to that television program in the selected language, as indicated by step 620. If, however, the program guide determines that the television program will not be broadcasted with audio, data, or other information in one of the selected languages, the program guide will display the program guide display screen text related to the television program in the default program language, or the default program guide language as indicated by step 625.

Steps 620 and 625 may be performed for each program guide display screen display element such as, for example, each listing 150 of program listings screens 130 and 135 of FIGS. 6a and 6b. It should be further noted that displaying program guide display screen text in the selected or the default languages may require first readying the program guide display screen text, as discussed with respect to FIG. 13.

The foregoing is merely illustrative of the principles of this invention and various modifications can be made by those skilled in the art without departing from the scope and spirit of the present invention.

What is claimed is:

1. A system in which a television program having a plurality of associated tracks having content is distributed to a plurality of users, and wherein the content of each track is in a language and the content of at least two different tracks are in different languages, the system comprising:

an interactive television program guide having various functions and implemented on interactive television program guide equipment having user television equipment, wherein:

the interactive television program guide displays program guide display screen text for each of the various functions in at least one program guide display screen on the user television equipment; and

the user television equipment plays the television program and one or more of the plurality of associated tracks;

means for providing program guide display screen text in one or more languages to the interactive television program guide;

means for providing a user with an opportunity to select a language using the interactive television program guide;

means for displaying program guide display screen text on the user television equipment using the interactive television program guide in the language selected by the user; and

means for selecting one or more tracks having content in the language selected by the user for playing by the user television equipment.

2. The system defined in claim 1 wherein:

the means for providing program guide display screen text in one or more languages to the interactive television program guide comprises means for providing program guide display screen text to the interactive television program guide in a continuous data stream having program guide display screen text in the language selected by the user and program guide display screen text in a language other than the language selected by the user; and

the system further comprises means for filtering the program guide display screen text in a language other than the language selected by the user out of the continuous data stream.

3. The system defined in claim 1 wherein:

the means for providing program guide display screen text in one or more languages to the interactive television program guide comprises means for providing program guide display screen text to the interactive television program guide in response to a demand generated by the interactive television program guide, the program guide display screen text having program guide display screen text in the language selected by the user and program guide display screen text in a language other than the language selected by the user; and

the system further comprises means for filtering the program guide display screen text in a language other than the language selected by the user out of the program guide display screen text provided to the interactive television program guide by the means for providing program guide display screen text.

4. The system defined in claim 1 wherein the means for providing program guide display screen text in one or more languages to the interactive television program guide comprises means for providing program guide display screen text only in the language selected by the user to the interactive television program guide in response to a demand generated by the interactive television program guide.

5. The system defined in claim 1 wherein:

the system further comprises means for indicating a language to the means for providing program guide display screen text using the interactive television program guide; and

the means for providing program guide display screen text in one or more languages to the interactive television program guide comprises means for providing program guide display screen text to the interactive television program guide only in the language indicated to the means for providing program guide display screen text.

6. The system defined in claim 5 wherein the language indicated to the means for providing program guide display screen text is the language selected by the user.

7. The system defined in claim 5 wherein the language indicated to the means for providing program guide display screen text is a default program guide language.

8. The system defined in claim 1 wherein:

the interactive television program guide is programmed with program guide display screen text in one or more languages of which at least one of the one or more languages is the language selected by the user; and

the system further comprises means for extracting the program guide display screen text that is programmed into the interactive program guide in the language selected by the user.

9. The system defined in claim 1 wherein:

the interactive television program guide is programmed with compressed program guide display screen text in one or more languages of which at least one of the one or more languages is the language selected by the user; and

the system further comprises means for decompressing the compressed program guide display screen text that is programmed into the interactive program guide in the language selected by the user.

10. The system defined in claim 1 wherein:

the system further comprises means for providing a user with the opportunity to access a program guide function; and

the means for displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises means for displaying program guide display screen text that is not related to the television program in the language selected by the user.

11. The system defined in claim 10 wherein:

the system further comprises means for providing a television program having a plurality of associated languages to the user television equipment; and

the means for displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises means for displaying program guide display screen text that is related to the television program in one of the associated languages when the language selected by the user is not one of the languages associated with the television program.

12. The system defined in claim 11 wherein the means for displaying program guide display screen text using the interactive television program guide in the language selected by the user further comprises means for displaying program guide display screen text that is related to the television program in the language selected by the user when the language selected by the user is also one of the languages associated with the television program.

13. The system defined in claim 1 wherein the means for providing a user with an opportunity to select a language comprises means for providing the user with the opportunity to confirm the user's selection of a language.

14. The system defined in claim 1 wherein:

each track associated with the television program is an analog audio track carrying analog audio; and

the means for selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises means for selecting one or more analog tracks having content in the language selected by the user using the interactive television program guide.

15. The system defined in claim 14 further comprising:

means for determining which of the one or more analog audio tracks carry analog audio in the language selected by the user using the interactive television program guide; and

means for indicating to the means for selecting one or more analog tracks having content in the language selected by the user using the interactive television program guide which of the one or more analog audio tracks carry analog audio in the language selected by the user using the interactive television program guide.

16. The system defined in claim 1 wherein:

each track associated with the television program is an analog audio track carrying analog audio; and

the means for selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises means for selecting one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide.

17. The system defined in claim 16 further comprising means for passing a track map and a language identifier using the interactive television program guide to the means for selecting one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide that are used by the means for selecting one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide in selecting one or more analog tracks having content in the language selected by the user.

18. The system defined in claim 1 wherein:

each track associated with the television program is a digital audio track carrying digital audio; and

the means for selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises means for selecting one or more digital tracks having content in the language selected by the user using the interactive television program guide.

19. The system defined in claim 18 further comprising:

means for determining which of the one or more digital audio tracks carry digital audio in the language selected by the user using the interactive television program guide; and

means for indicating to the means for selecting one or more digital tracks having content in the language selected by the user using the interactive television program guide which of the one or more

digital audio tracks carry digital audio in the language selected by the user using the interactive television program guide.

20. The system defined in claim 1 wherein:

each track associated with the television program is an digital audio track carrying digital audio; and

the means for selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises means for selecting one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide.

21. The system defined in claim 20 further comprising means for passing a track map and a language identifier using the interactive television program guide to the means for selecting one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide that are used by the means for selecting one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide in selecting one or more digital tracks having content in the language selected by the user.

22. The system defined in claim 1 wherein the means for displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises means for

displaying currency in a currency format associated with the language selected by the user.

23. The system defined in claim 1 wherein the means for displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises means for displaying time in a time format associated with the language selected by the user.

24. The system defined in claim 1 wherein the means for displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises means for displaying dates in a date format associated with the language selected by the user.

25. The system defined in claim 1 wherein the means for displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises means for displaying parental ratings in a parental rating format associated with the language selected by the user.

26. The system defined in claim 1 further comprising:

means for displaying program information for a program with the interactive television program guide on the user television equipment when the user indicates a desire to view information about the program; and

means for displaying languages in which audio for the program is available with the interactive

television program guide on the user television equipment.

27. The system defined in claim 1 wherein the means for providing a user with an opportunity to select a language using the interactive television program guide comprises means for providing a user with an opportunity to select an alternate language using the interactive television program guide; and

the means for displaying program guide display screen text on the user television equipment using the interactive television program guide in the language selected by the user comprises means for displaying program guide display screen text on the user television equipment using the interactive television program guide in the alternate language selected by the user.

28. The system defined in claim 1 further comprising:

means for selecting an alternate language using the interactive television program guide based on the language selected by the user; and

means for displaying program guide display screen text on the user television equipment using the interactive television program guide in the alternate language.

29. The system defined in claim 1 wherein:

the means for providing a user with an opportunity to select a language using the interactive television program guide comprises means for providing a user with an opportunity to select an alternate

language using the interactive television program guide; and

the means for selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises means for selecting one or more tracks having content in the alternate language selected by the user for playing by the user television equipment.

30. The system defined in claim 1 further comprising:

means for selecting an alternate language using the interactive television program guide based on the language selected by the user; and

means for selecting one or more tracks having content in the alternate language for playing by the user television equipment.

31. The system defined in claim 1 wherein the means for selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises means for selecting a subtitle track having subtitles in the language selected by the user for playing by the user television equipment.

32. The system defined in claim 1 wherein:

the means for providing program guide display screen text in one or more languages to the interactive television program guide comprises means for providing program guide display screen text in a first language and program guide display screen text in a second language;

at least a first portion of the program guide display screen text in the first language is similar to a first portion of the program guide display screen text in the second language;

at least a second portion of the program guide display screen text in the first language is different from a second portion of the program guide display screen text in the second language; and

the means for providing program guide display screen text in the first language and the program guide display screen text in the second language provides the first and second portions of the program guide display screen text in the first language, and the second portion of the program guide display screen text in the second language.

33. A method in a system in which an interactive television program guide is implemented on interactive television program guide equipment having user television equipment, and in which a television program having a plurality of associated tracks having content is distributed to a plurality of users, and wherein the content of each track is in a language and the content of at least two different tracks are in different languages, the method comprising the steps of:

providing program guide display screen text in one or more languages to the interactive television program guide;

providing a user with an opportunity to select a language using the interactive television program guide;

selecting one or more tracks having content in the language selected by the user for playing by user television equipment;

displaying program guide display screen text on the user television equipment using the interactive television program guide in the language selected by the user; and

playing one or more of the selected one or more tracks having content in the language selected by the user on the user television equipment.

34. The method defined in claim 33 wherein:

the step of providing program guide display screen text in one or more languages to the interactive television program guide comprises providing program guide display screen text to the interactive television program guide in a continuous data stream having program guide display screen text in the language selected by the user and program guide display screen text in a language other than the language selected by the user; and

the method further comprises the step of filtering the program guide display screen text in a language other than the language selected by the user out of the continuous data stream.

35. The method defined in claim 33 wherein:

the step of providing program guide display screen text in one or more languages to the interactive television program guide comprises providing program guide display screen text to the interactive television program guide in response to a demand generated by the interactive television program guide, the program guide display screen text having

program guide display screen text in the language selected by the user and program guide display screen text in a language other than the language selected by the user; and

the method further comprises the step of filtering the program guide display screen text in a language other than the language selected by the user out of the program guide display screen text provided to the interactive television program guide.

36. The method defined in claim 33 wherein the step of providing program guide display screen text in one or more languages to the interactive television program guide comprises providing program guide display screen text only in the language selected by the user to the interactive television program guide in response to a demand generated by the interactive television program guide.

37. The method defined in claim 33 wherein:

the method further comprises the step of indicating a language for providing program guide display screen text using the interactive television program guide; and

the step of providing program guide display screen text in one or more languages to the interactive television program guide comprises providing program guide display screen text to the interactive television program guide only in the indicated language.

38. The method defined in claim 37 wherein:

the indicated language for providing program guide display screen text is the language selected by the user; and

the step of providing program guide display screen text in one or more languages to the interactive television program guide comprises providing program guide display screen text to the interactive television program guide only in the language selected by the user.

39. The method defined in claim 37 wherein:

the indicated language for providing program guide display screen text is a default program guide language; and

the step of providing program guide display screen text in one or more languages to the interactive television program guide comprises providing program guide display screen text to the interactive television program guide only in the default program guide language.

40. The method defined in claim 33 further comprising the steps of:

programming the interactive television program guide with program guide display screen text in one or more languages of which at least one of the one or more languages is the language selected by the user; and

extracting the program guide display screen text that is programmed into the interactive program guide in the language selected by the user.

41. The method defined in claim 33 further comprising the steps of:

programming the interactive television program guide with compressed program guide display screen text in one or more languages of which at least one of the one or more languages is the language selected by the user; and

decompressing the compressed program guide display screen text that is programmed into the interactive program guide in the language selected by the user.

42. The method defined in claim 33 wherein:

the method further comprises the step of providing a user with the opportunity to access a program guide function; and

the step of displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises displaying program guide display screen text that is not related to the television program in the language selected by the user.

43. The method defined in claim 42 wherein:

the method further comprises the step of providing a television program having a plurality of associated languages to the user television equipment; and

the step of displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises displaying program guide display screen text that is related to the television program in one of the associated languages when the language selected by the user is not one of the languages associated with the television program.

44. The method defined in claim 43 wherein the step of displaying program guide display screen text using the interactive television program guide in the language selected by the user further comprises displaying program guide display screen text that is related to the television program in the language selected by the user when the language selected by the user is also one of the languages associated with the television program.

45. The method defined in claim 33 wherein the step of providing a user with an opportunity to select a language comprises providing the user with the opportunity to confirm the user's selection of a language.

46. The method defined in claim 33 wherein:

each track associated with the television program is an analog audio track carrying analog audio; and

the step of selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises selecting one or more analog tracks having content in the language selected by the user using the interactive television program guide.

47. The method defined in claim 46 further comprising the steps of:

determining which of the one or more analog audio tracks carry analog audio in the language selected by the user using the interactive television program guide;

indicating which of the one or more analog audio tracks carry analog audio in the language selected by the user using the interactive television program guide, and wherein:

the step of selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises selecting each analog track having content in the indicated language using the interactive television program guide.

48. The method defined in claim 33 wherein each track associated with the television program is an analog audio track carrying analog audio; and

the step of selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises selecting one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide.

49. The method defined in claim 48 wherein the step of selecting one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide comprises selecting one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide according to a track map and a language identifier.

50. The method defined in claim 33 wherein:

each track associated with the television program is a digital audio track carrying digital audio; and

the step of selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises selecting one or more digital tracks having content in the language selected by the user using the interactive television program guide.

51. The method defined in claim 50 further comprising the steps of:

determining which of the one or more digital audio tracks carry digital audio in the language selected by the user using the interactive television program guide;

indicating which of the one or more digital audio tracks carry digital audio in the language selected by the user using the interactive television program guide, and wherein:

the step of selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises selecting each digital track having content in the indicated language using the interactive television program guide.

52. The method defined in claim 33 wherein

each track associated with the television program is an digital audio track carrying digital audio; and

the step of selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises

selecting one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide.

53. The method defined in claim 52 wherein the step of selecting one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide comprises selecting one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide according to a track map and a language identifier.

54. The method defined in claim 33 wherein the step of displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises displaying currency in a currency format associated with the language selected by the user.

55. The method defined in claim 33 wherein the step of displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises displaying time in a time format associated with the language selected by the user.

56. The system defined in claim 33 wherein the step of displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises displaying dates in a date format associated with the language selected by the user.

57. The method defined in claim 33 wherein the step of displaying program guide display screen text using the interactive television program guide in the language selected by the user comprises displaying parental ratings in a parental rating format associated with the language selected by the user.

58. The method defined in claim 33 further comprising the steps of:

displaying program information for a program with the interactive television program guide on the user television equipment when the user indicates a desire to view information about the program; and

displaying languages in which audio for the program is available with the interactive television program guide on the user television equipment.

59. The method defined in claim 33 wherein:

the step of providing a user with an opportunity to select a language using the interactive television program guide comprises providing a user with an opportunity to select an alternate language using the interactive television program guide; and

the step of displaying program guide display screen text on the user television equipment using the interactive television program guide in the language selected by the user comprises displaying program guide display screen text on the user television equipment using the interactive television program guide in the alternate language selected by the user.

60. The method defined in claim 33 further comprising the steps of:

selecting an alternate language based on the language selected by the user using the interactive television program guide; and

displaying program guide display screen text on the user television equipment using the interactive television program guide in the alternate language for playing by the user television equipment.

61. The method defined in claim 33 wherein:

the step of providing a user with an opportunity to select a language using the interactive television program guide comprises providing a user with an opportunity to select an alternate language using the interactive television program guide; and

the step of selecting one or more tracks having content in the language selected by the user for playing by the user television equipment comprises selecting one or more tracks having content in the alternate language selected by the user for playing by the user television equipment.

62. The method defined in claim 33 further comprising the steps of:

selecting an alternate language using the interactive television program guide; and

selecting one or more tracks having content in the alternate language for playing by the user television equipment.

63. The method defined in claim 33 wherein the step of selecting one or more tracks having content in the language selected by the user for playing by the

user television equipment comprises selecting a subtitle track having subtitles in the language selected by the user for playing by the user television equipment.

64. The method defined in claim 33 wherein:

the step of providing program guide display screen text in one or more languages to the interactive television program guide comprises providing program guide display screen text in a first language and program guide display screen text in a second language;

at least a first portion of the program guide display screen text in the first language is similar to a first portion of the program guide display screen text in a second language;

at least a second portion of the program guide display screen text in the first language is different from a second portion of the program guide display screen text in the second language; and

the step of providing program guide display screen text in the first language and the program guide display screen text in a second language comprises providing the first and second portions of the program guide display screen text in the first language, and providing the second portion of the program guide display screen text in the second language.

65. A system in which a television program having a plurality of associated tracks having content is distributed by a television distribution facility for display by the user television equipment of a plurality of users, and wherein the content of each

track is in a language and the content of at least two different tracks are in different languages, the system comprising:

interactive program guide equipment having user television equipment;

an interactive television program guide implemented on the interactive program guide equipment having user television equipment, wherein the interactive television program guide is configured to:

provide a user with an opportunity to select a language using the interactive television program guide;

display program guide display screen text on the user television equipment using the interactive television program guide in the language selected by the user; and

a main facility configured to provide program guide display screen text in one or more languages to the interactive program guide equipment, wherein:

the user television equipment comprises an audio selector configured to select one or more tracks having content in the language selected by the user for playing by the user television equipment.

66. The system defined in claim 65 wherein:

the interactive program guide equipment comprises a television distribution facility configured to provide program guide display screen text to the user television equipment in a continuous data stream having program guide display screen text in the language selected by the user and program guide display screen text not in the language selected by the user; and

the interactive televison program guide is further configured to filter the program guide display screen text not in the language selected by the user out of the continuous data stream.

67. The system defined in claim 65 wherein:

the interactive program guide equipment comprises a television distribution facility configured to provide program guide display screen text to the user television equipment in response to a demand generated by the interactive television program guide, the program guide display screen text having program guide display screen text in the language selected by the user and program guide display screen text not in the language selected by the user; and

the interactive television program guide is further configured to filter the program guide display screen text not in the language selected by the user out of the program guide display screen text provided to the interactive television program guide.

68. The system defined in claim 65 wherein the interactive program guide equipment further comprises a television distribution facility configured to provide program guide display screen text only in the language selected by the user to the user television equipment in response to a demand generated by the interactive television program guide.

69. The system defined in claim 65 wherein:

the interactive television program guide is configured to indicate a language to the television distribution facility; and

the interactive program guide equipment further comprises a television distribution facility configured to provide program guide display screen text to the user television equipment only in the language indicated to the means for providing program guide display screen text.

70. The system defined in claim 69 wherein the language indicated to the television distribution facility by the interactive television program guide is the language selected by the user.

71. The system defined in claim 69 wherein the language indicated to the television distribution facility by the interactive television program guide is a default program guide language.

72. The system defined in claim 65 wherein:

the interactive television program guide is programmed with program guide display screen text in one or more languages wherein at least one of the one or more languages is the language selected by the user; and

the interactive television program guide is further configured to extract the program guide display screen text in the language selected by the user.

73. The system defined in claim 65 wherein:

the interactive television program guide is programmed with compressed program guide display screen text in one or more languages of which at least one of the one or more languages is the language selected by the user; and

the interactive television program guide is further configured to decompress the compressed program guide display screen text in the language selected by the user.

74. The system defined in claim 65 wherein:

the interactive program guide equipment comprises a television distribution facility configured to provide a television program having a plurality of associated languages to the user television equipment; and

the interactive television program guide is configured to provide a user with the opportunity to access a program guide function and to display program guide display screen text that is not related to the television program in the language selected by the user.

75. The system defined in claim 74 wherein the interactive television program guide is further configured to display program guide display screen text that is related to the television program in one of the one or more languages when the language selected by the user is not one of the one or more languages.

76. The system defined in claim 75 wherein the interactive television program guide is further configured to display program guide display screen text that is related to the television program in the language selected by the user when the language selected by the user is also one of the languages associated with the television program.

77. The system defined in claim 65 wherein the interactive television program guide is further configured to provide a user with the opportunity to select a language from a list of languages and to confirm the user's selection of a language from the list of languages.

78. The system defined in claim 65 wherein:

each track associated with the television program is an analog audio track carrying analog audio;

the audio selector is an analog audio selector; and

the interactive television program guide is further configured to determine which of the one or more analog audio tracks carry analog audio in the language selected by the user according to a track map and to indicate to the analog audio selector which of the one or more analog audio tracks carry analog audio in the language selected by the user.

79. The system defined in claim 65 wherein:

the audio selector is an analog audio selector;

each track associated with the television program is an analog audio track carrying analog audio; and

the analog audio selector is configured to select one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide.

80. The system defined in claim 79 wherein the interactive television program guide is configured

to pass a track map and a language identifier to the analog audio selector that are used by the analog audio selector to select one or more analog tracks having content in the language selected by the user without activity from the interactive television program guide.

81. The system defined in claim 65 wherein:

at least one track associated with the television program is a digital track carrying digital audio;

the audio selector is a digital audio selector; and

the interactive television program guide is further configured to determine which of the one or more digital audio tracks carry digital audio in the language selected by the user according to a track map and to indicate to the digital audio selector which of the one or more digital audio tracks carry digital audio in the language selected by the user.

82. The system defined in claim 81 wherein:

each track associated with the television program is an digital audio track carrying digital audio;

the audio selector is a digital audio selector; and

the digital audio selector is configured to select one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide.

83. The system defined in claim 65 wherein the interactive television program guide is configured to pass a track map and a language identifier to the

digital audio selector that are used by the digital audio selector to select one or more digital tracks having content in the language selected by the user without activity from the interactive television program guide.

84. The system defined in claim 83 wherein the interactive television program guide is further configured to display currency in a currency format associated with the language selected by the user.

85. The system defined in claim 65 wherein the interactive television program guide is further configured to display time in a time format associated with the language selected by the user.

86. The system defined in claim 65 wherein the interactive television program guide is further configured to display dates in a time format associated with the language selected by the user.

87. The system defined in claim 65 wherein the interactive television program guide is further configured to display parental ratings in a parental rating format associated with the language selected by the user.

88. The system defined in claim 65 wherein:

the interactive television program guide is further configured to display program information for a program on the user television equipment when the user indicates a desire to view information about the program; and

the interactive television program guide is further configured to display languages in which audio for the program is available on the user television equipment.

89. The system defined in claim 65 wherein the interactive television program guide is further configured to display program information for a program and languages in which audio for a program is available on the user television equipment when the user indicates a desire to view information about the program.

90. The system defined in claim 65 wherein the interactive television program guide is further configured to:

provide a user with an opportunity to select an alternate language; and

display program guide display screen text on the user television equipment in the alternate language selected by the user.

91. The system defined in claim 65 wherein the interactive television program guide is further configured to:

select an alternate language based on the language selected by the user; and

display program guide display screen text on the user television equipment in the alternate language.

92. The system defined in claim 65 wherein:

the interactive television program guide

is further configured to provide a user with an opportunity to select an alternate language; and

the audio selector is further configured to select one or more tracks having content in the alternate language selected by the user for playing by the user television equipment.

93. The system defined in claim 65 wherein:

the interactive television program guide is further configured to select an alternate language using the interactive television program guide; and

the audio selector is further configured to select one or more tracks having content in the alternate language for playing by the user television equipment.

94. The system defined in claim 65 wherein:

at least one of the one or more tracks is a subtitle track; and

the audio selector is further configured to select the subtitle track having subtitles in the language selected by the user for playing by the user television equipment.

95. The system defined in claim 65 wherein:

the main facility is further configured to provide program guide display screen text in a first language and program guide display screen text in a second language;

at least a first portion of the program guide display screen text in the first language is similar to a first portion of the program guide display screen text in a second language;

at least a second portion of the program guide display screen text in the first language is different from a second portion of the program guide display screen text in the second language; and

the main facility provides the first and second portions of the program guide display screen text in the first language, and the second portion of the program guide display screen text in the second language.

96. A system in which a television program having a plurality of associated analog tracks carrying analog audio is distributed to a plurality of users, and wherein the analog audio carried on each analog track is in a language and the audio of at least two different analog tracks are in different languages, the system comprising:

means for providing a user with an opportunity to select a language;

means for selecting at least one analog track having audio in the language selected by the user; and

means for playing the television program and audio from the selected audio track.

97. A method for use in a system in which a television program having a plurality of associated analog tracks carrying analog audio is distributed to a plurality of users, and wherein the analog audio carried on each analog track is in a language and the audio of at least two different analog tracks are in different languages, the method comprising the steps of:

providing a user with an opportunity to select a language;

selecting at least one analog track having audio in the language selected by the user; and

playing the television program and audio from the selected audio track on user television equipment.

98. A system in which a television program having a plurality of associated analog tracks carrying analog audio is distributed to a plurality of users, and wherein the analog audio carried on each analog track is in a language and the audio of at least two different analog tracks are in different languages, the system comprising:

an interactive television program guide configured to provide a user with an opportunity to select a language;

an analog audio selector configured to select at least one analog track having audio in the language selected by the user; and

user television equipment configured to play the television program and audio from the selected audio track.

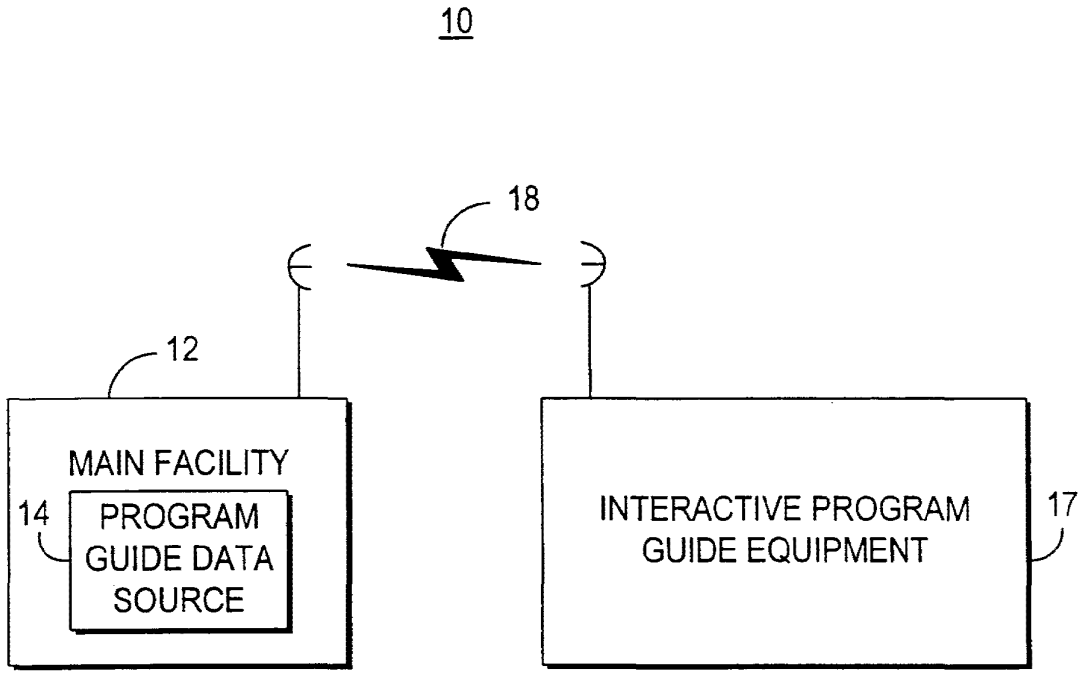

10
18
12
MAIN FACILITY
14
PROGRAM GUIDE DATA SOURCE
INTERACTIVE PROGRAM GUIDE EQUIPMENT
17

FIG. 1

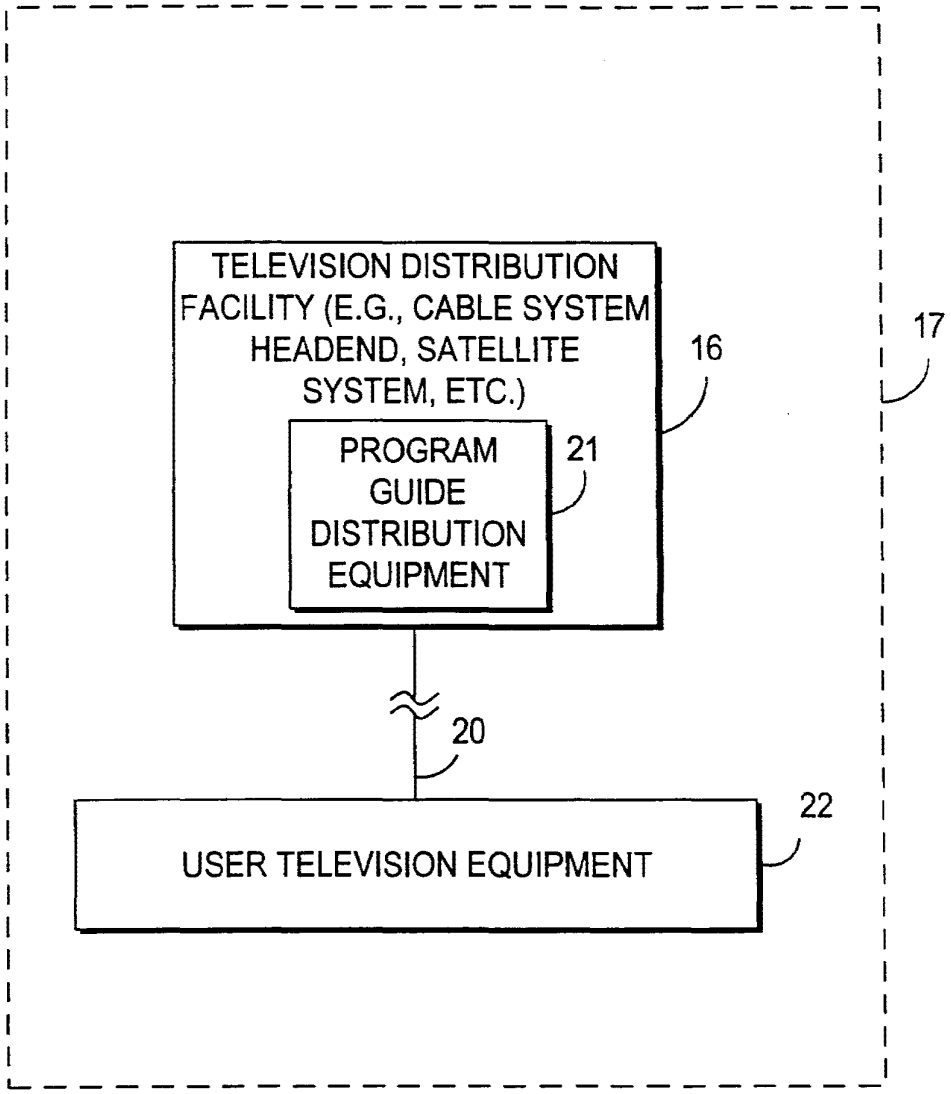

TELEVISION DISTRIBUTION FACILITY (E.G., CABLE SYSTEM HEADEND, SATELLITE SYSTEM, ETC.)
16
PROGRAM GUIDE DISTRIBUTION EQUIPMENT
21
17
20
22
USER TELEVISION EQUIPMENT

FIG. 2a

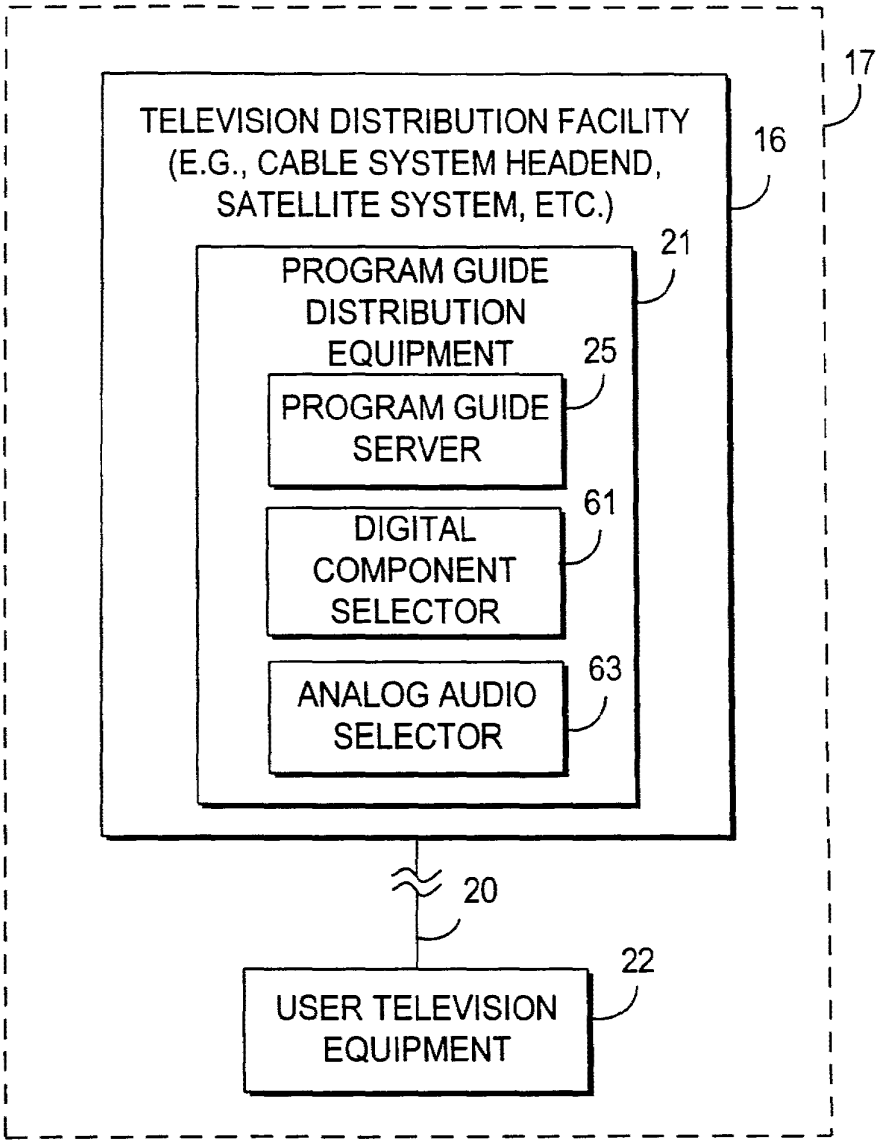

17
TELEVISION DISTRIBUTION FACILITY
(E.G., CABLE SYSTEM HEADEND,
SATELLITE SYSTEM, ETC.)
16
21
PROGRAM GUIDE
DISTRIBUTION
EQUIPMENT
25
PROGRAM GUIDE
SERVER
61
DIGITAL
COMPONENT
SELECTOR
63
ANALOG AUDIO
SELECTOR
20
22
USER TELEVISION
EQUIPMENT

FIG. 2b

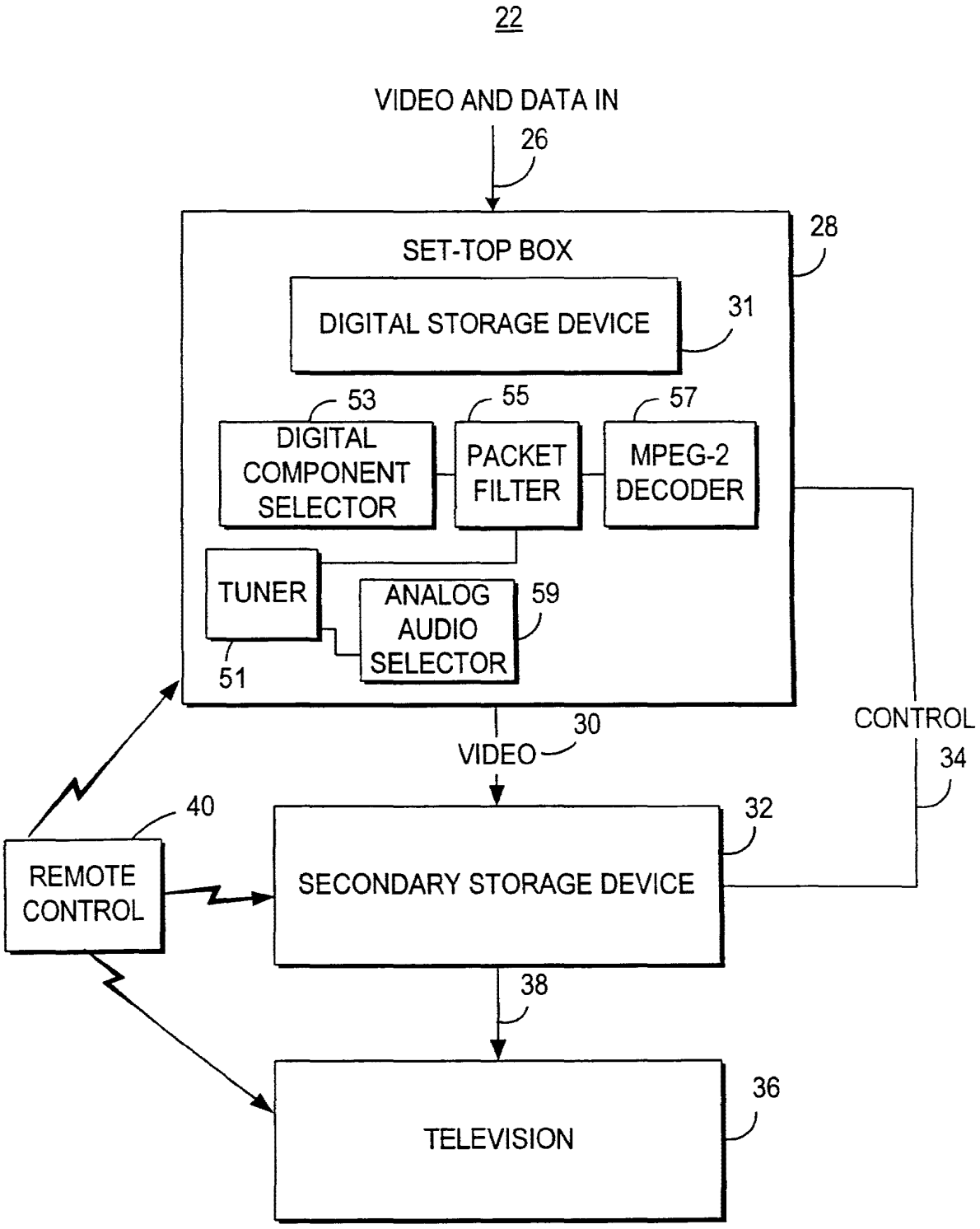

22
VIDEO AND DATA IN
26
SET-TOP BOX
28
DIGITAL STORAGE DEVICE
31
53
DIGITAL COMPONENT SELECTOR
55
PACKET FILTER
57
MPEG-2 DECODER
TUNER
ANALOG AUDIO SELECTOR
59
51
CONTROL
34
VIDEO
30
40
REMOTE CONTROL
SECONDARY STORAGE DEVICE
32
38
TELEVISION
36

FIG. 3

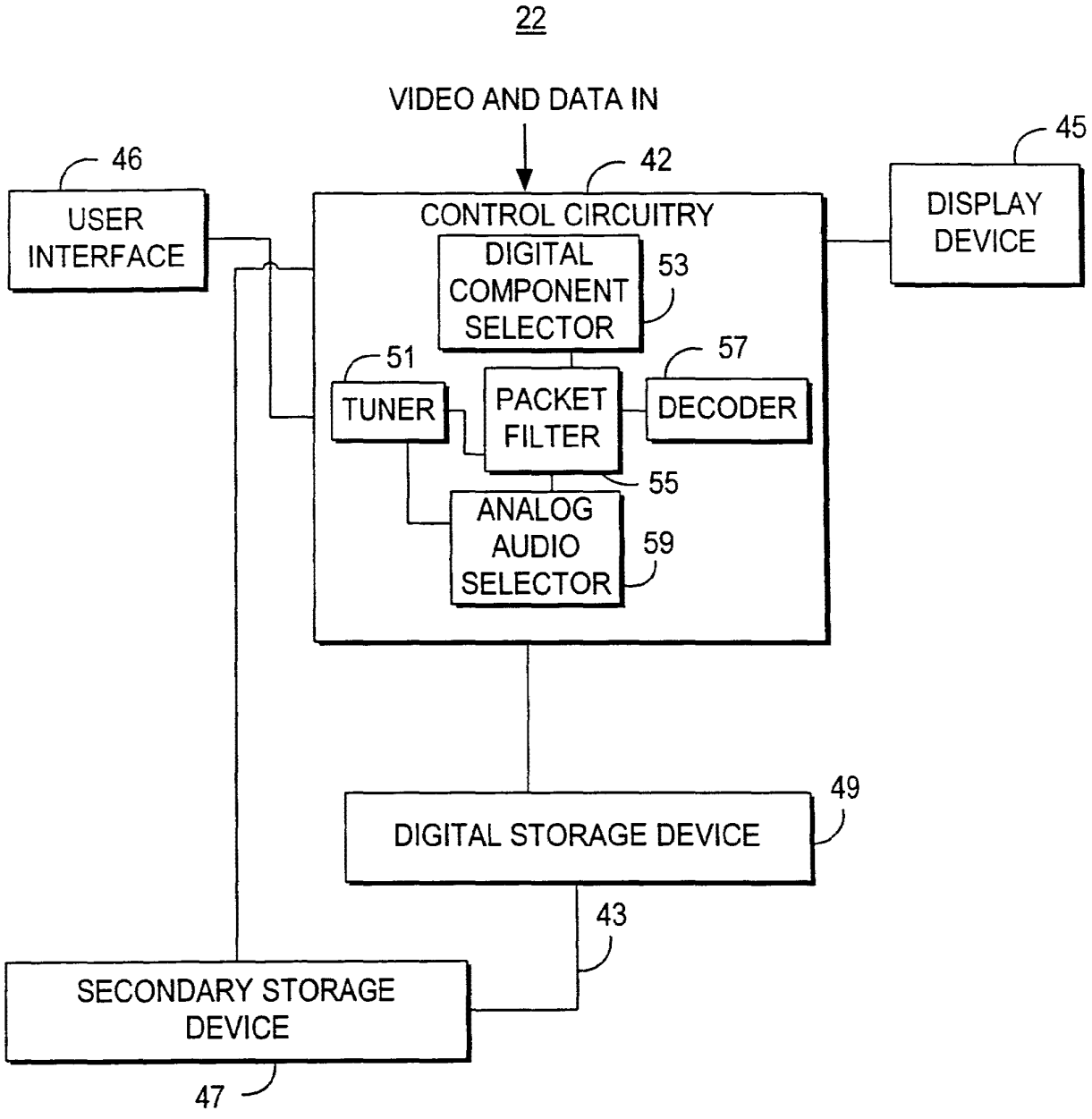

22
VIDEO AND DATA IN
46
USER INTERFACE
42
CONTROL CIRCUITRY
DIGITAL COMPONENT SELECTOR
53
45
DISPLAY DEVICE
51
TUNER
PACKET FILTER
57
DECODER
55
ANALOG AUDIO SELECTOR
59
49
DIGITAL STORAGE DEVICE
43
SECONDARY STORAGE DEVICE
47

FIG. 4

100

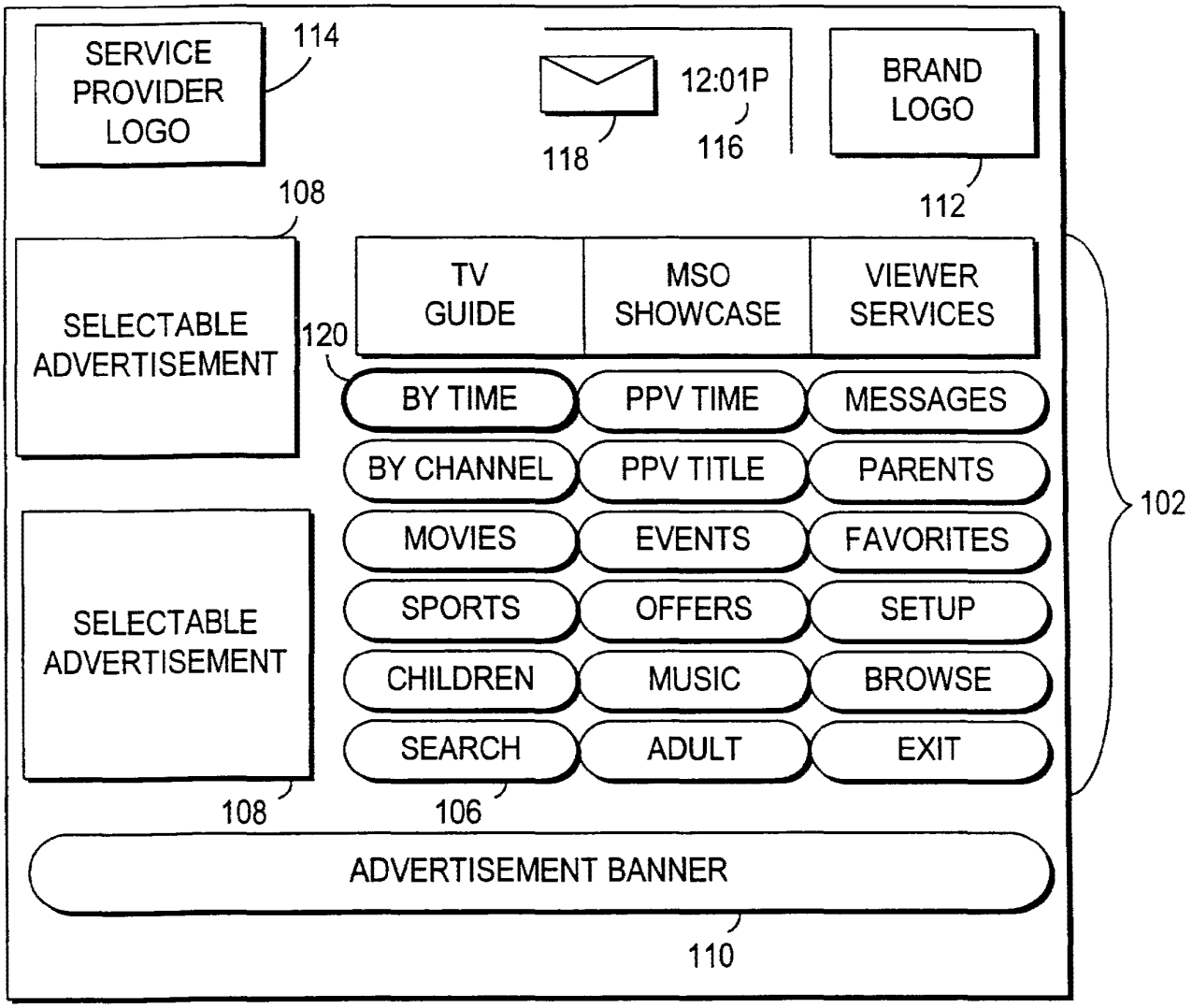

SERVICE PROVIDER LOGO
114
12:01P
118
116
BRAND LOGO
112
108
SELECTABLE ADVERTISEMENT
120
TV GUIDE
MSO SHOWCASE
VIEWER SERVICES
BY TIME
PPV TIME
MESSAGES
BY CHANNEL
PPV TITLE
PARENTS
MOVIES
EVENTS
FAVORITES
SPORTS
OFFERS
SETUP
CHILDREN
MUSIC
BROWSE
SEARCH
ADULT
EXIT
102
SELECTABLE ADVERTISEMENT
108
106
ADVERTISEMENT BANNER
110

FIG. 5

130

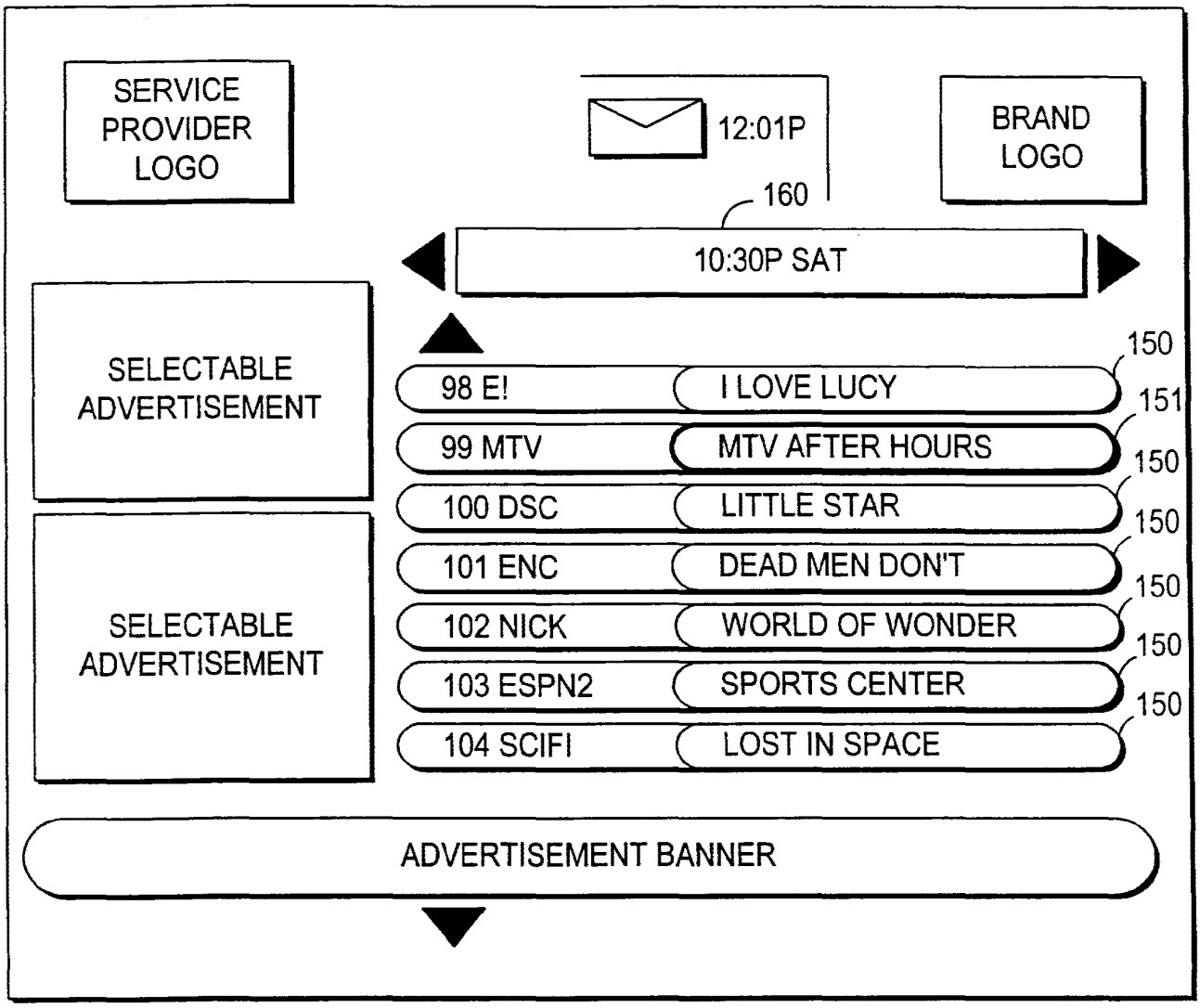

SERVICE PROVIDER LOGO
12:01P
BRAND LOGO
160
10:30P SAT
SELECTABLE ADVERTISEMENT
SELECTABLE ADVERTISEMENT
150
98 E!
I LOVE LUCY
151
99 MTV
MTV AFTER HOURS
150
100 DSC
LITTLE STAR
150
101 ENC
DEAD MEN DON'T
150
102 NICK
WORLD OF WONDER
150
103 ESPN2
SPORTS CENTER
150
104 SCIFI
LOST IN SPACE
ADVERTISEMENT BANNER

FIG. 6a

135

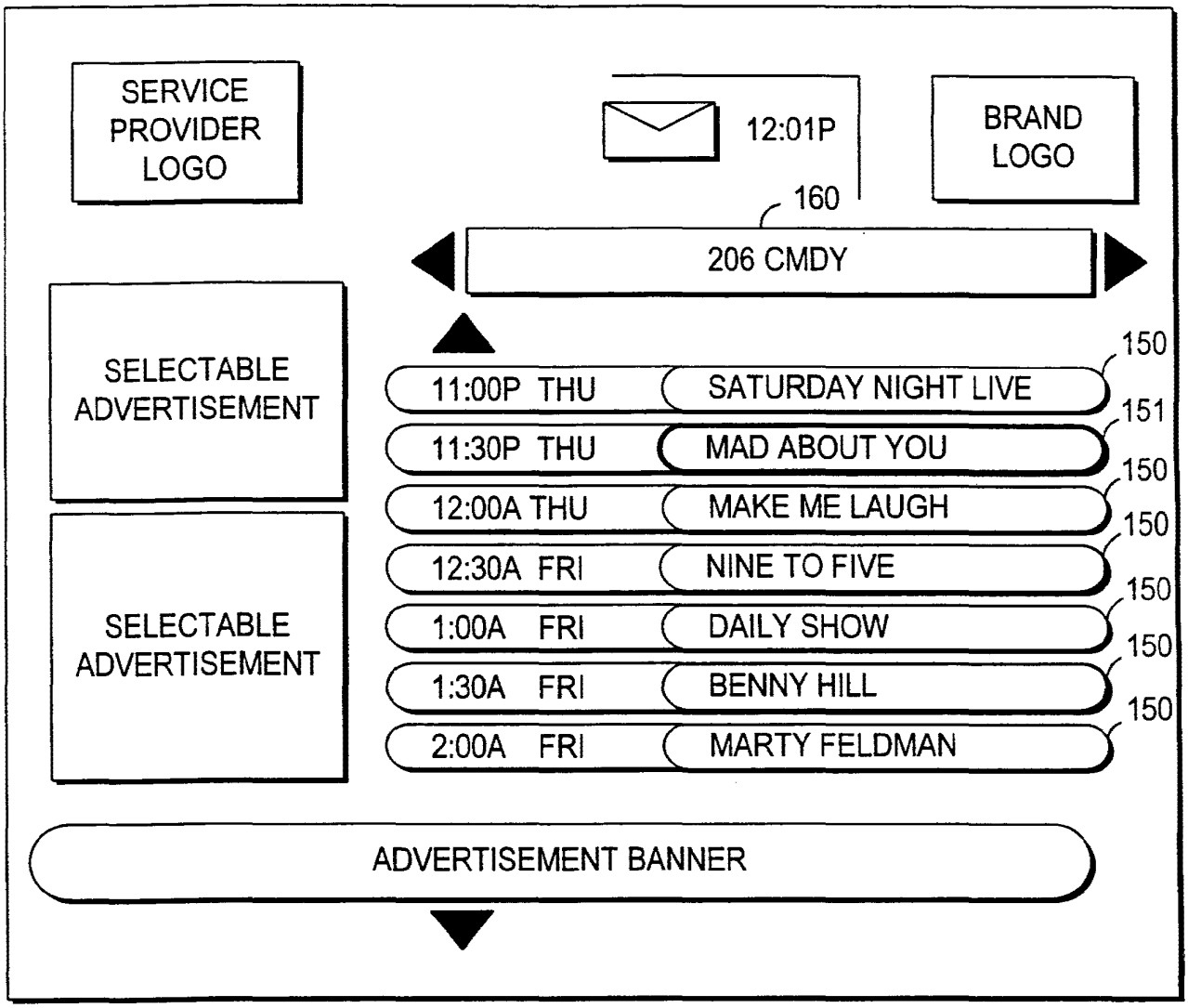

SERVICE PROVIDER LOGO
12:01P
BRAND LOGO
160
206 CMDY
SELECTABLE ADVERTISEMENT
SELECTABLE ADVERTISEMENT
11:00P THU
SATURDAY NIGHT LIVE
150
11:30P THU
MAD ABOUT YOU
151
12:00A THU
MAKE ME LAUGH
150
12:30A FRI
NINE TO FIVE
150
1:00A FRI
DAILY SHOW
150
1:30A FRI
BENNY HILL
150
2:00A FRI
MARTY FELDMAN
150
ADVERTISEMENT BANNER

FIG. 6b

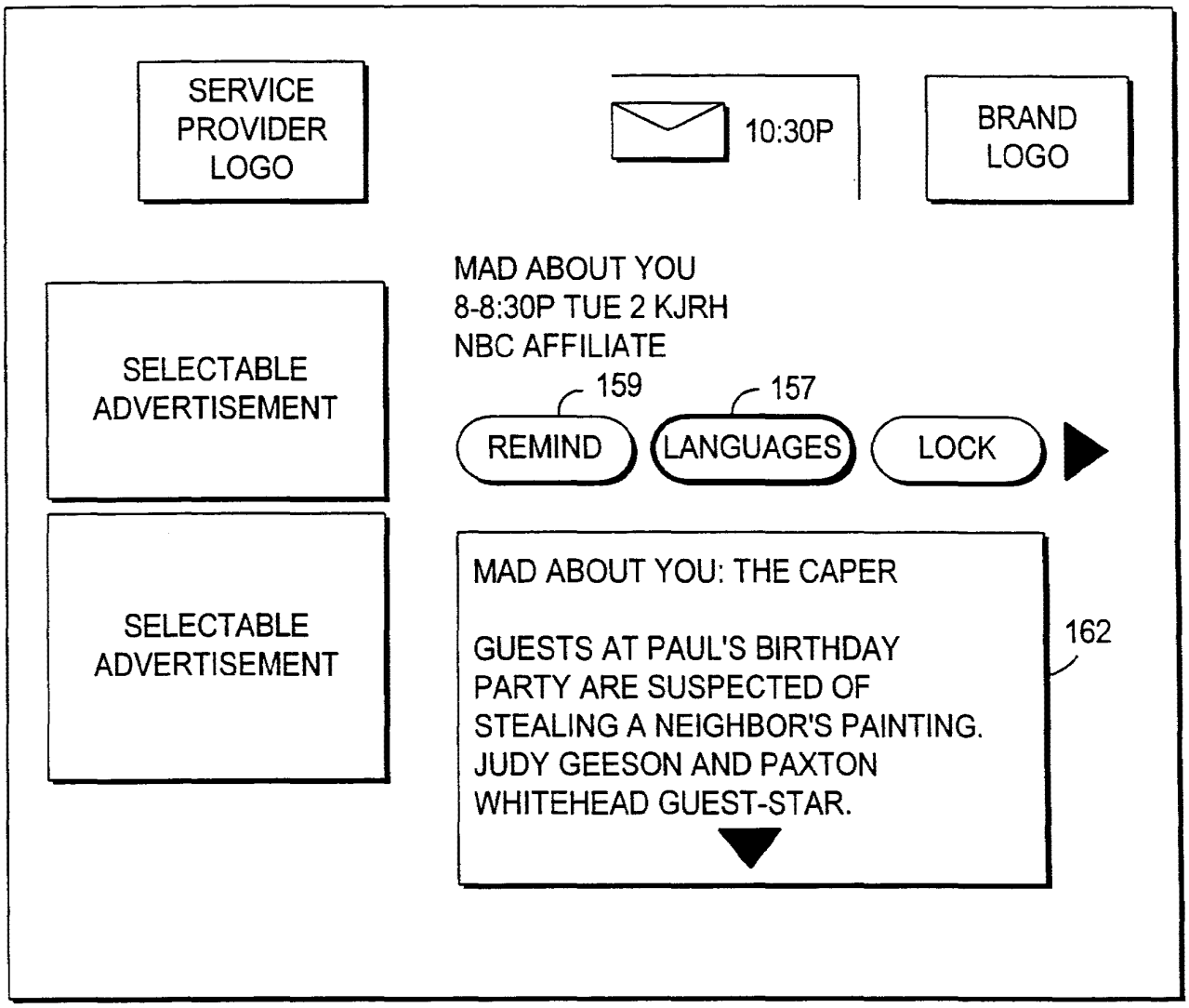

161
SERVICE PROVIDER LOGO
10:30P
BRAND LOGO
MAD ABOUT YOU
8-8:30P TUE 2 KJRH
NBC AFFILIATE
SELECTABLE ADVERTISEMENT
159
157
REMIND
LANGUAGES
LOCK
SELECTABLE ADVERTISEMENT
MAD ABOUT YOU: THE CAPER
GUESTS AT PAUL'S BIRTHDAY PARTY ARE SUSPECTED OF STEALING A NEIGHBOR'S PAINTING. JUDY GEESON AND PAXTON WHITEHEAD GUEST-STAR.
162

FIG. 7a

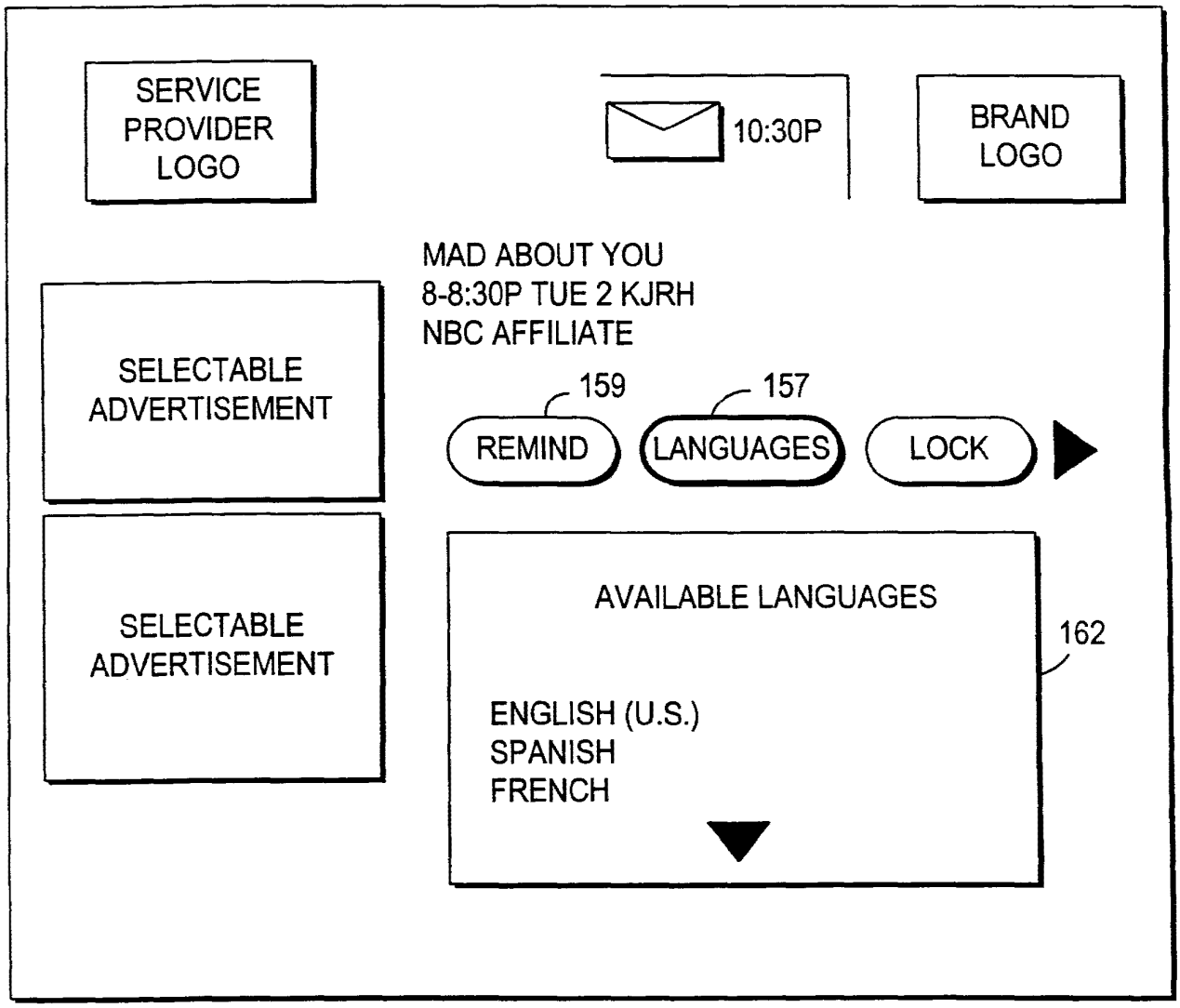

161
SERVICE PROVIDER LOGO
10:30P
BRAND LOGO
MAD ABOUT YOU
8-8:30P TUE 2 KJRH
NBC AFFILIATE
SELECTABLE ADVERTISEMENT
159
157
REMIND
LANGUAGES
LOCK
SELECTABLE ADVERTISEMENT
AVAILABLE LANGUAGES
162
ENGLISH (U.S.)
SPANISH
FRENCH

FIG. 7b

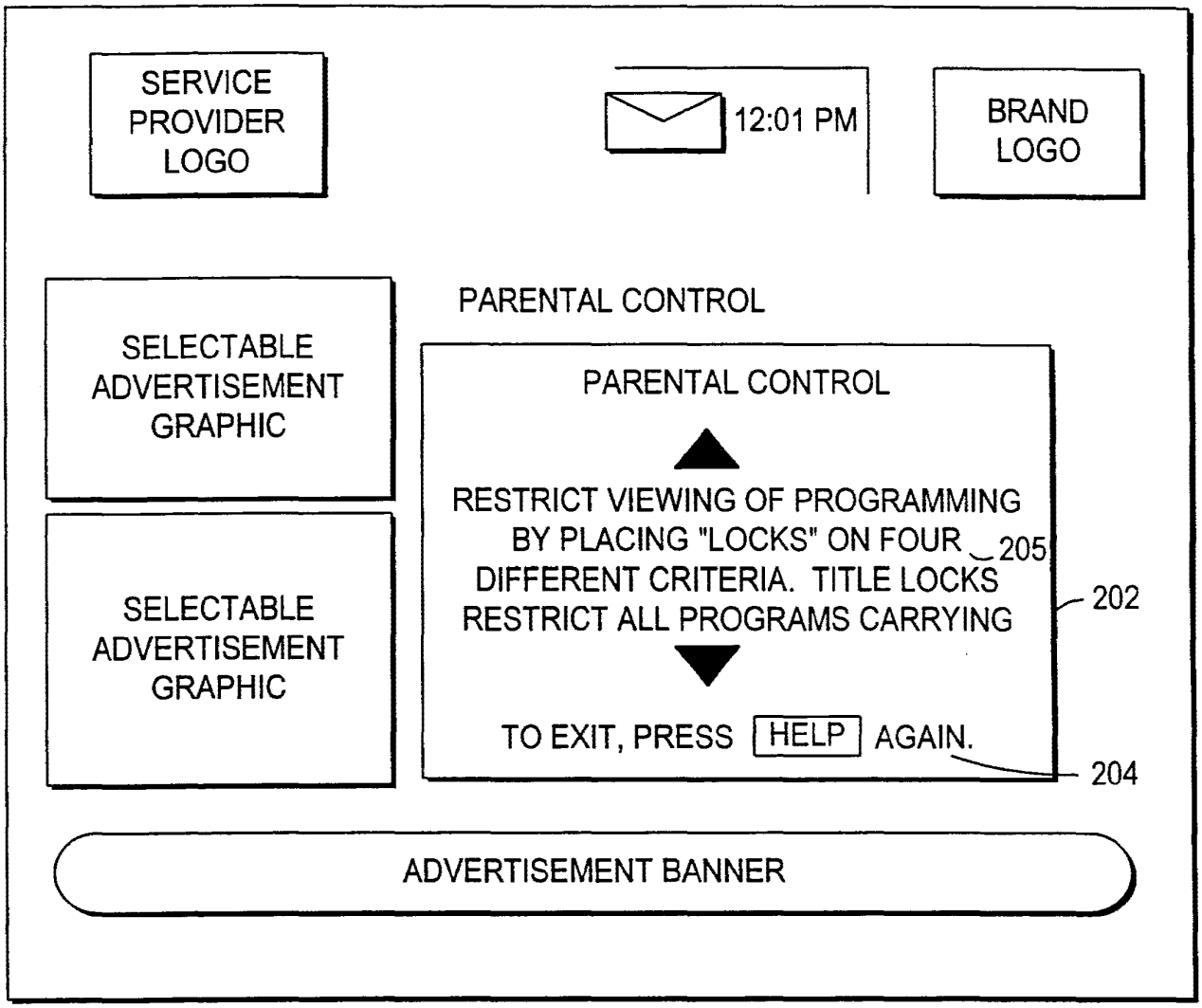

200
SERVICE PROVIDER LOGO
12:01 PM
BRAND LOGO
SELECTABLE ADVERTISEMENT GRAPHIC
SELECTABLE ADVERTISEMENT GRAPHIC
PARENTAL CONTROL
PARENTAL CONTROL
RESTRICT VIEWING OF PROGRAMMING BY PLACING "LOCKS" ON FOUR DIFFERENT CRITERIA. TITLE LOCKS RESTRICT ALL PROGRAMS CARRYING
205
202
TO EXIT, PRESS HELP AGAIN.
204
ADVERTISEMENT BANNER

FIG. 8

300

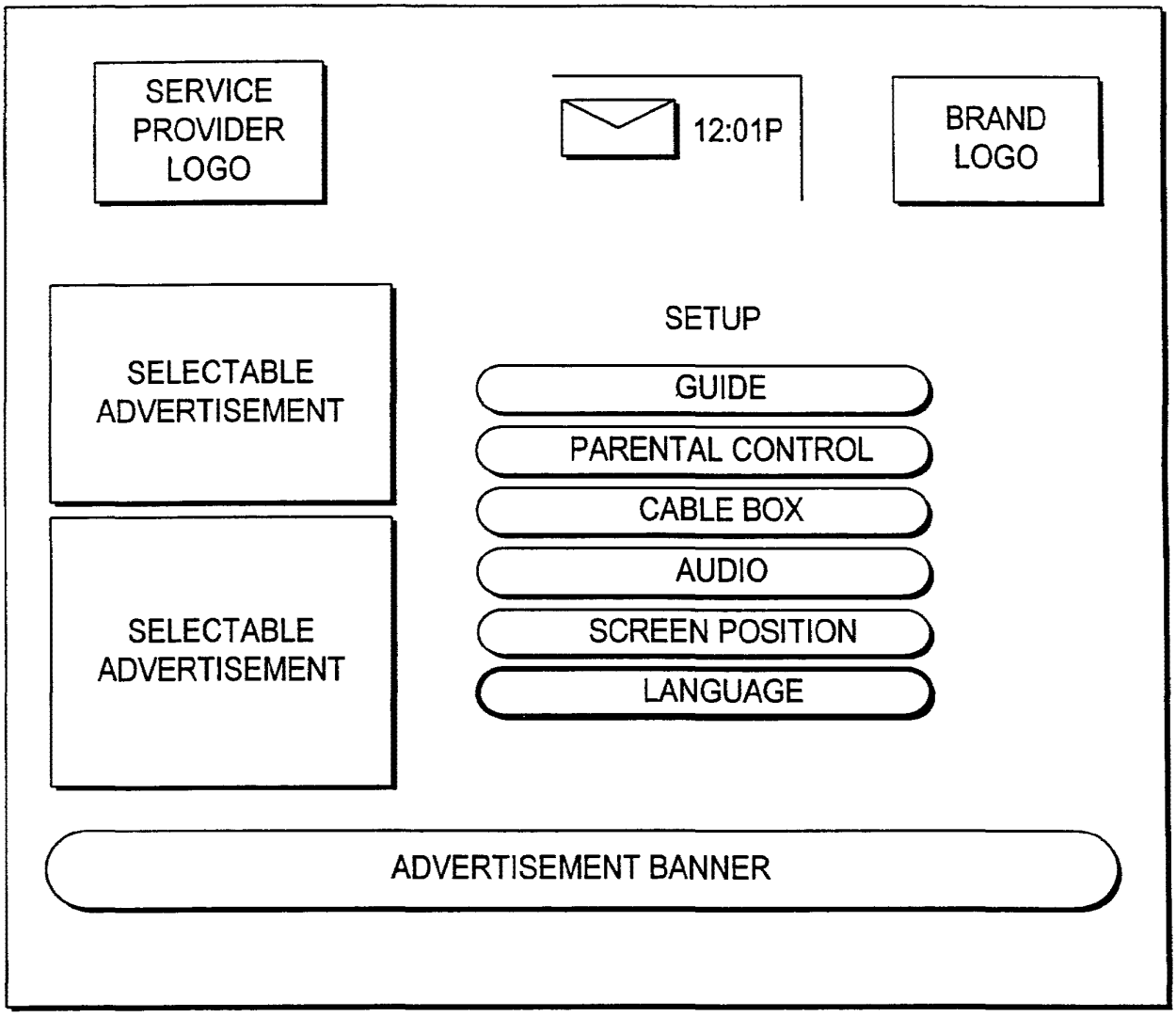

SERVICE PROVIDER LOGO
12:01P
BRAND LOGO
SELECTABLE ADVERTISEMENT
SELECTABLE ADVERTISEMENT
SETUP
GUIDE
PARENTAL CONTROL
CABLE BOX
AUDIO
SCREEN POSITION
LANGUAGE
ADVERTISEMENT BANNER

FIG. 9

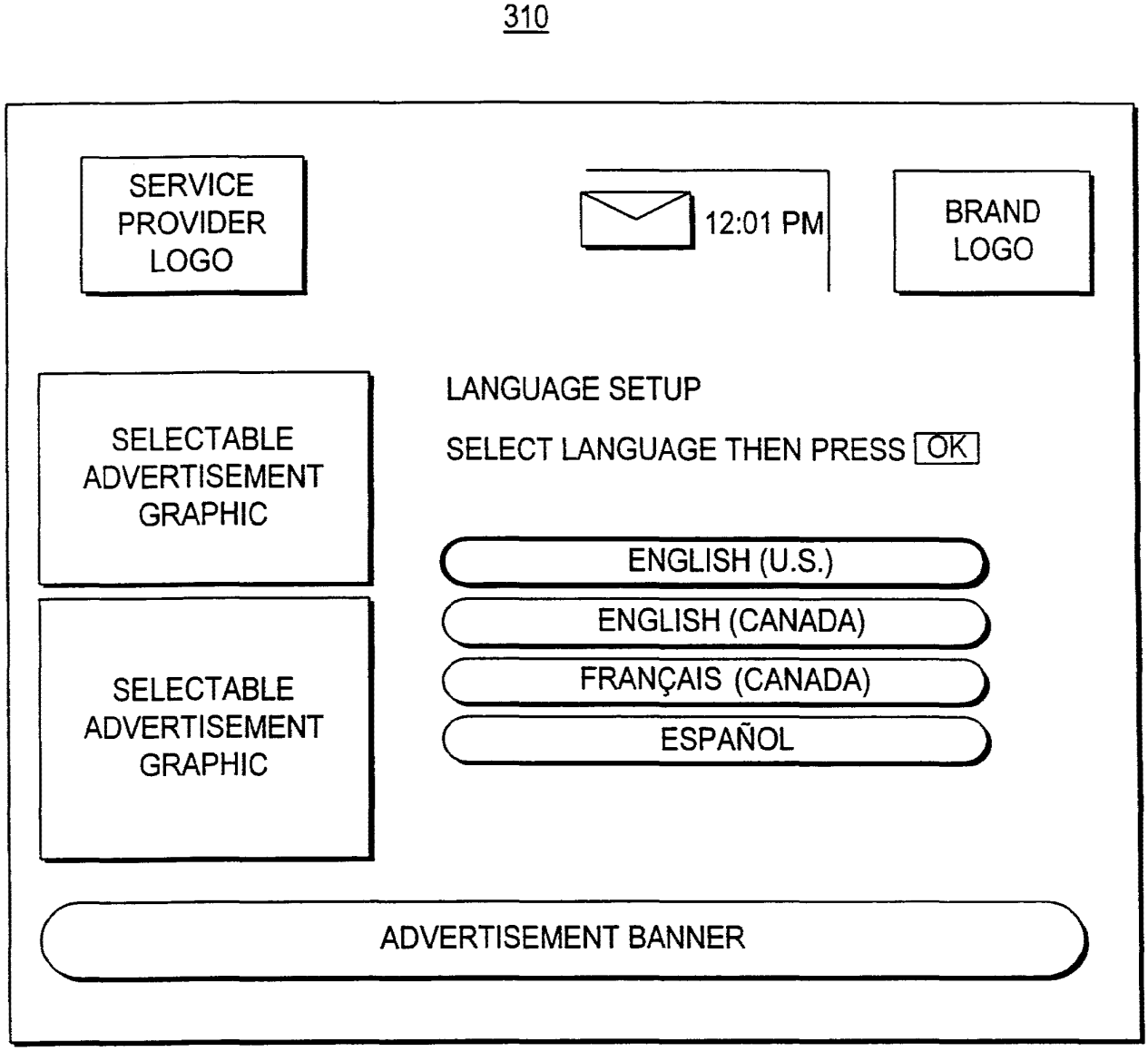

310
SERVICE PROVIDER LOGO
12:01 PM
BRAND LOGO
SELECTABLE ADVERTISEMENT GRAPHIC
LANGUAGE SETUP
SELECT LANGUAGE THEN PRESS OK
ENGLISH (U.S.)
ENGLISH (CANADA)
FRANÇAIS (CANADA)
ESPAÑOL
SELECTABLE ADVERTISEMENT GRAPHIC
ADVERTISEMENT BANNER

FIG. 10

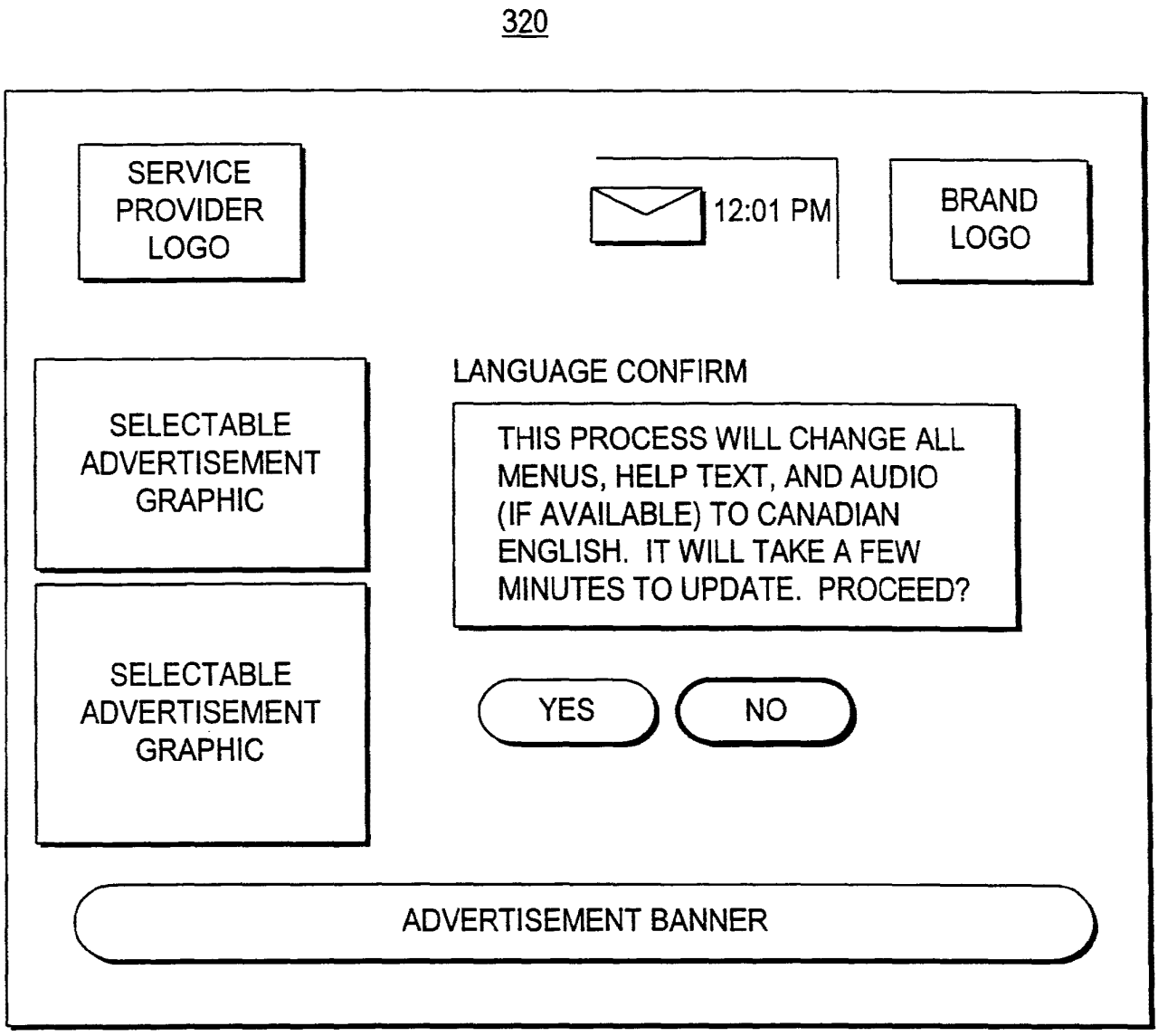

320
SERVICE PROVIDER LOGO
12:01 PM
BRAND LOGO
SELECTABLE ADVERTISEMENT GRAPHIC
LANGUAGE CONFIRM
THIS PROCESS WILL CHANGE ALL MENUS, HELP TEXT, AND AUDIO (IF AVAILABLE) TO CANADIAN ENGLISH. IT WILL TAKE A FEW MINUTES TO UPDATE. PROCEED?
SELECTABLE ADVERTISEMENT GRAPHIC
YES
NO
ADVERTISEMENT BANNER

FIG. 11

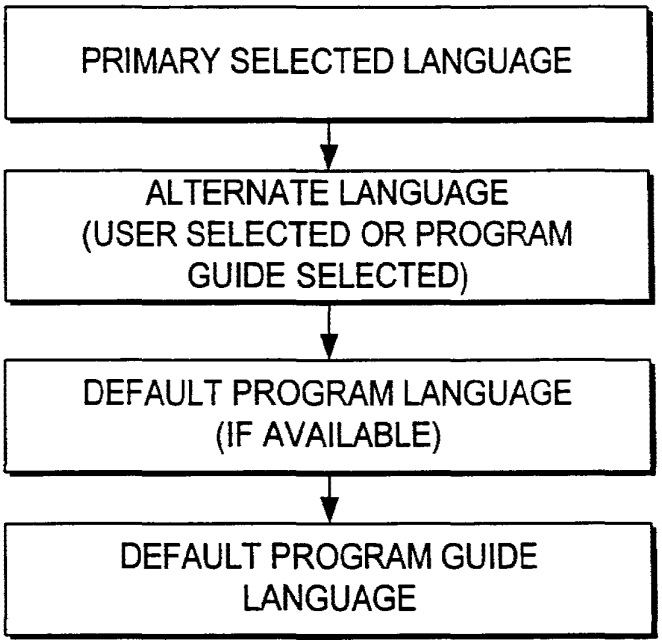

PRIMARY SELECTED LANGUAGE
ALTERNATE LANGUAGE (USER SELECTED OR PROGRAM GUIDE SELECTED)
DEFAULT PROGRAM LANGUAGE (IF AVAILABLE)
DEFAULT PROGRAM GUIDE LANGUAGE

FIG. 12

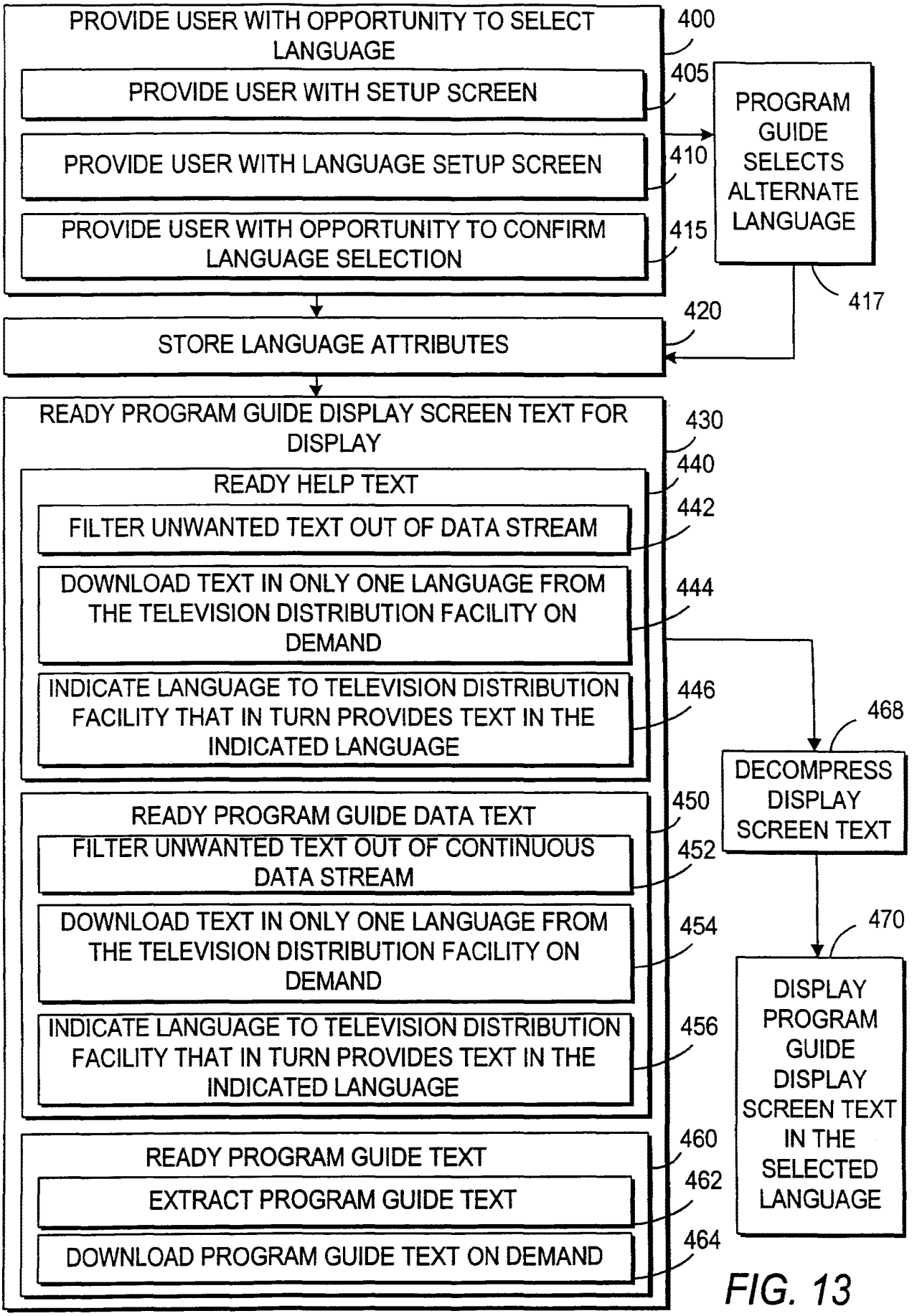

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
400
PROVIDE USER WITH SETUP SCREEN
405
PROVIDE USER WITH LANGUAGE SETUP SCREEN
410
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
415
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
STORE LANGUAGE ATTRIBUTES
420
READY PROGRAM GUIDE DISPLAY SCREEN TEXT FOR DISPLAY
430
READY HELP TEXT
440
FILTER UNWANTED TEXT OUT OF DATA STREAM
442
DOWNLOAD TEXT IN ONLY ONE LANGUAGE FROM THE TELEVISION DISTRIBUTION FACILITY ON DEMAND
444
INDICATE LANGUAGE TO TELEVISION DISTRIBUTION FACILITY THAT IN TURN PROVIDES TEXT IN THE INDICATED LANGUAGE
446
READY PROGRAM GUIDE DATA TEXT
450
FILTER UNWANTED TEXT OUT OF CONTINUOUS DATA STREAM
452
DOWNLOAD TEXT IN ONLY ONE LANGUAGE FROM THE TELEVISION DISTRIBUTION FACILITY ON DEMAND
454
INDICATE LANGUAGE TO TELEVISION DISTRIBUTION FACILITY THAT IN TURN PROVIDES TEXT IN THE INDICATED LANGUAGE
456
READY PROGRAM GUIDE TEXT
460
EXTRACT PROGRAM GUIDE TEXT
462
DOWNLOAD PROGRAM GUIDE TEXT ON DEMAND
464
DECOMPRESS DISPLAY SCREEN TEXT
468
DISPLAY PROGRAM GUIDE DISPLAY SCREEN TEXT IN THE SELECTED LANGUAGE
470

FIG. 13

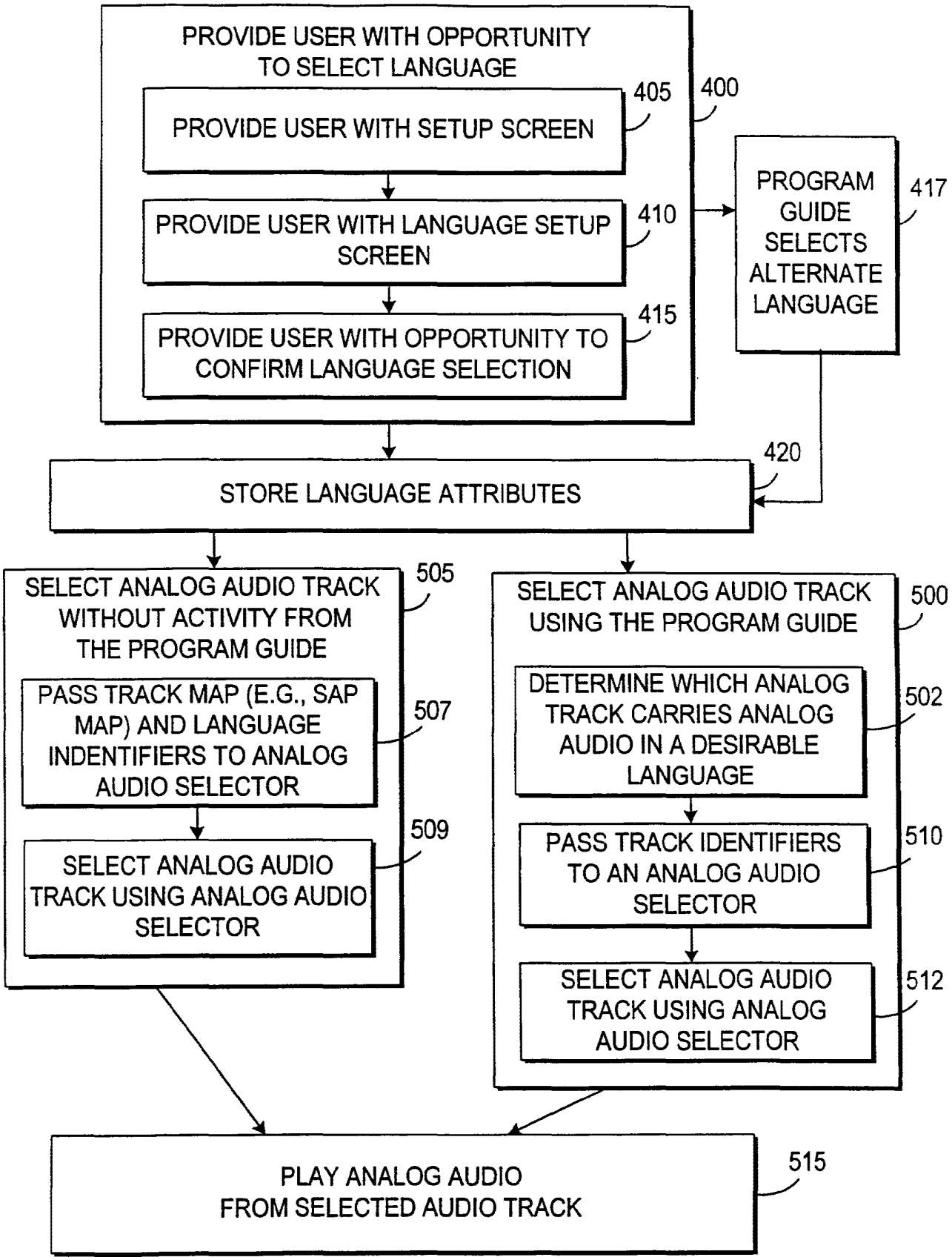

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
400
PROVIDE USER WITH SETUP SCREEN
405
PROVIDE USER WITH LANGUAGE SETUP SCREEN
410
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
415
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
STORE LANGUAGE ATTRIBUTES
420
SELECT ANALOG AUDIO TRACK WITHOUT ACTIVITY FROM THE PROGRAM GUIDE
505
PASS TRACK MAP (E.G., SAP MAP) AND LANGUAGE INDENTIFIERS TO ANALOG AUDIO SELECTOR
507
SELECT ANALOG AUDIO TRACK USING ANALOG AUDIO SELECTOR
509
SELECT ANALOG AUDIO TRACK USING THE PROGRAM GUIDE
500
DETERMINE WHICH ANALOG TRACK CARRIES ANALOG AUDIO IN A DESIRABLE LANGUAGE
502
PASS TRACK IDENTIFIERS TO AN ANALOG AUDIO SELECTOR
510
SELECT ANALOG AUDIO TRACK USING ANALOG AUDIO SELECTOR
512
PLAY ANALOG AUDIO FROM SELECTED AUDIO TRACK
515

FIG. 14

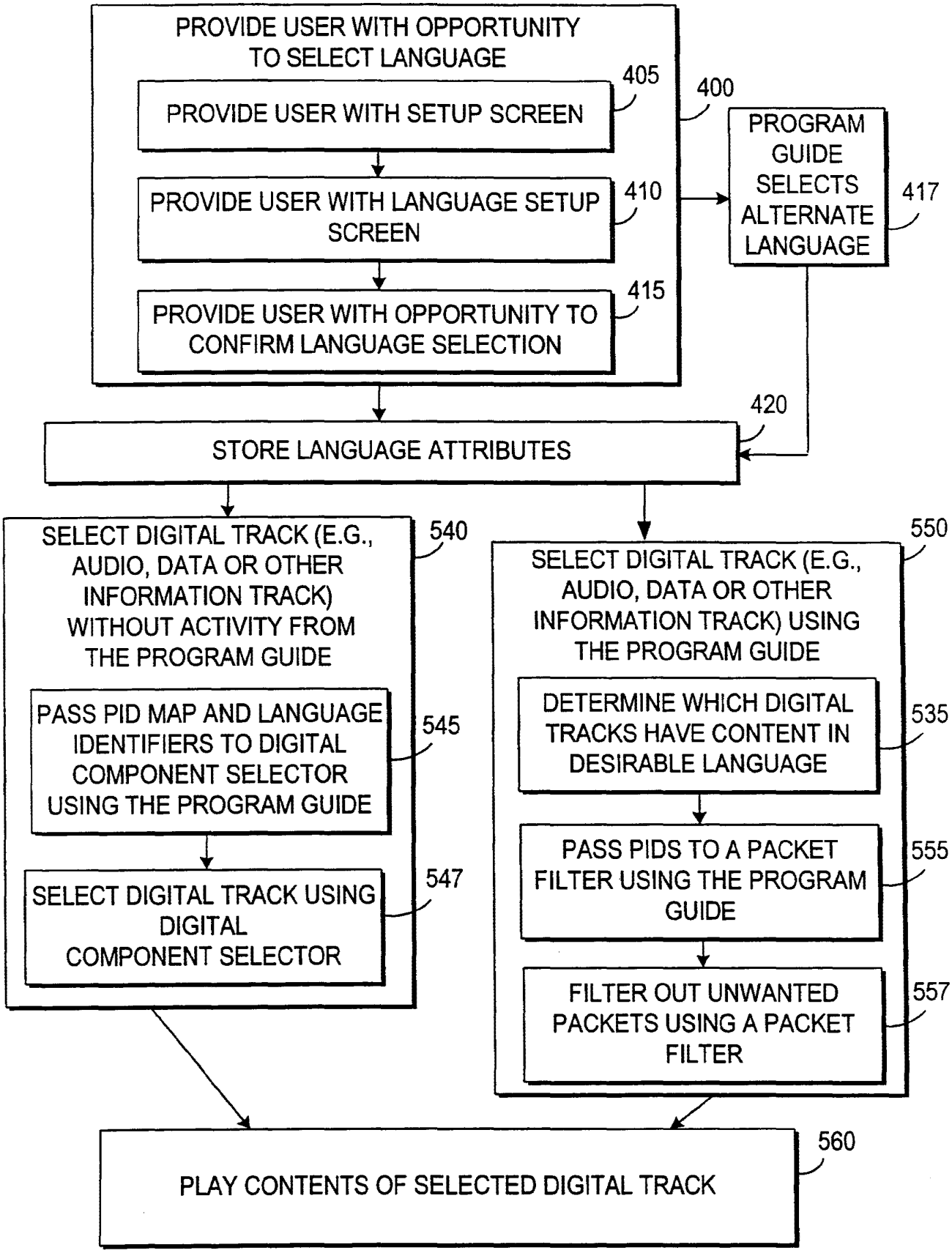

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
405
PROVIDE USER WITH SETUP SCREEN
410
PROVIDE USER WITH LANGUAGE SETUP SCREEN
415
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
400
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
420
STORE LANGUAGE ATTRIBUTES
SELECT DIGITAL TRACK (E.G., AUDIO, DATA OR OTHER INFORMATION TRACK) WITHOUT ACTIVITY FROM THE PROGRAM GUIDE
540
PASS PID MAP AND LANGUAGE IDENTIFIERS TO DIGITAL COMPONENT SELECTOR USING THE PROGRAM GUIDE
545
SELECT DIGITAL TRACK USING DIGITAL COMPONENT SELECTOR
547
SELECT DIGITAL TRACK (E.G., AUDIO, DATA OR OTHER INFORMATION TRACK) USING THE PROGRAM GUIDE
550
DETERMINE WHICH DIGITAL TRACKS HAVE CONTENT IN DESIRABLE LANGUAGE
535
PASS PIDS TO A PACKET FILTER USING THE PROGRAM GUIDE
555
FILTER OUT UNWANTED PACKETS USING A PACKET FILTER
557
PLAY CONTENTS OF SELECTED DIGITAL TRACK
560

FIG. 15

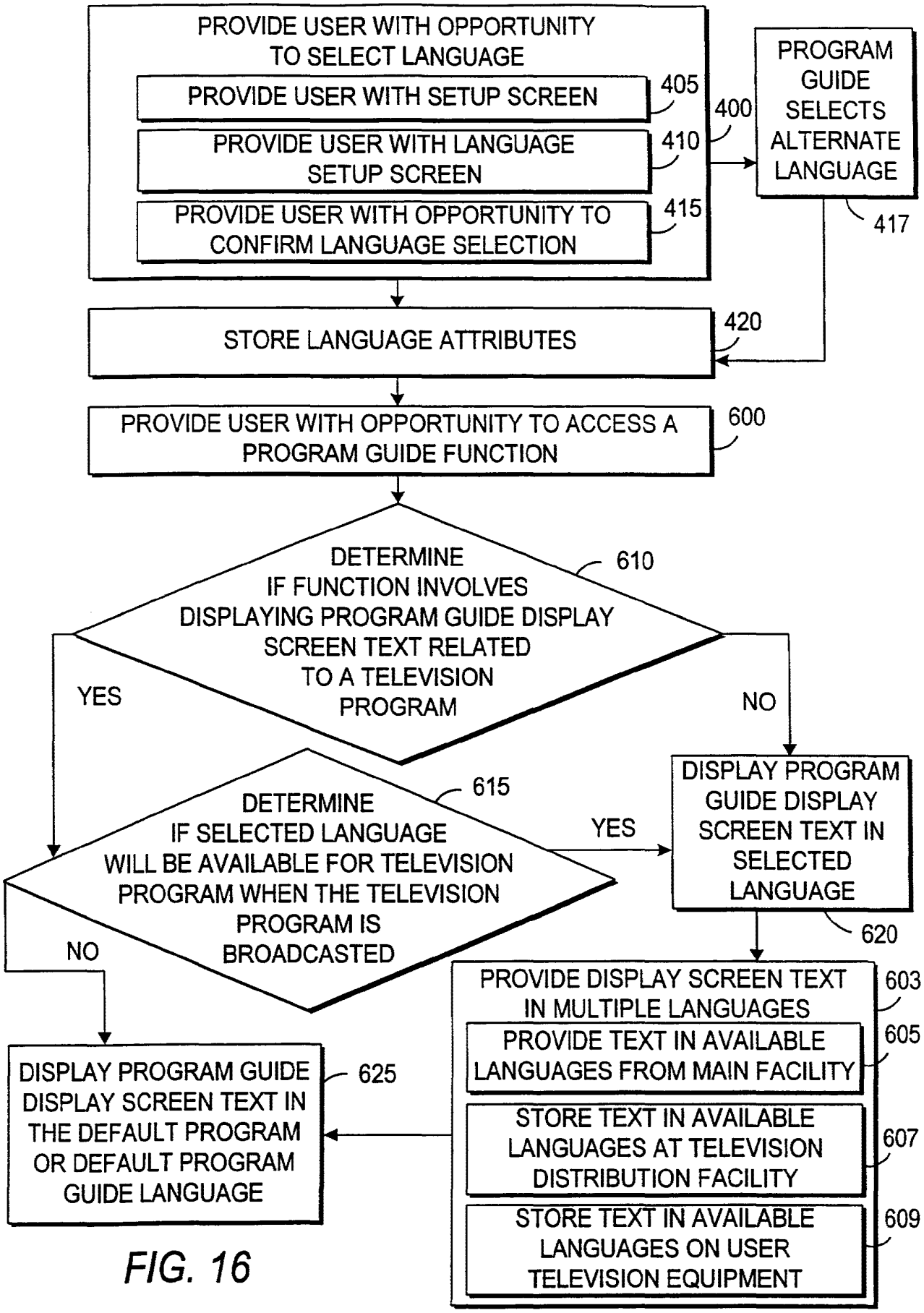

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
PROVIDE USER WITH SETUP SCREEN
405
PROVIDE USER WITH LANGUAGE SETUP SCREEN
410
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
415
400
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
STORE LANGUAGE ATTRIBUTES
420
PROVIDE USER WITH OPPORTUNITY TO ACCESS A PROGRAM GUIDE FUNCTION
600
DETERMINE IF FUNCTION INVOLVES DISPLAYING PROGRAM GUIDE DISPLAY SCREEN TEXT RELATED TO A TELEVISION PROGRAM
610
YES
NO
DETERMINE IF SELECTED LANGUAGE WILL BE AVAILABLE FOR TELEVISION PROGRAM WHEN THE TELEVISION PROGRAM IS BROADCASTED
615
YES
NO
DISPLAY PROGRAM GUIDE DISPLAY SCREEN TEXT IN SELECTED LANGUAGE
620
PROVIDE DISPLAY SCREEN TEXT IN MULTIPLE LANGUAGES
603
PROVIDE TEXT IN AVAILABLE LANGUAGES FROM MAIN FACILITY
605
STORE TEXT IN AVAILABLE LANGUAGES AT TELEVISION DISTRIBUTION FACILITY
607
STORE TEXT IN AVAILABLE LANGUAGES ON USER TELEVISION EQUIPMENT
609
DISPLAY PROGRAM GUIDE DISPLAY SCREEN TEXT IN THE DEFAULT PROGRAM OR DEFAULT PROGRAM GUIDE LANGUAGE
625

FIG. 16

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/US 00/16878

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	EP 0 744 866 A (NOKIA TECHNOLOGY GMBH) 27 November 1996 (1996-11-27) the whole document	1,33,65, 96-98 2-32, 34-64, 66-95
Y A	US 5 585 838 A (MATTHEWS III JOSEPH H ET AL) 17 December 1996 (1996-12-17) the whole document	1,33,65, 96-98 2-32, 34-64, 66-95
A	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 04, 31 May 1995 (1995-05-31) & JP 07 030814 A (NEC CORP), 31 January 1995 (1995-01-31) abstract	1-98

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in 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 document 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	Date of mailing of the international search report
31 August 2000	19/09/2000

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

1

Form PCT/ISA/210 (second sheet) (July 1992)

VIZIO Ex. 1002, Page 1062 of 3573
VIZIO v. MMT, IPR2024-00722

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/US 00/16878

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 700 322 A (BENBASSAT GERARD V ET AL) 13 October 1987 (1987-10-13) the whole document	1-98
A	EP 0 299 830 A (ACTV INC) 18 January 1989 (1989-01-18) abstract	1-98
A	WO 80 00209 A (TELEASE INC) 7 February 1980 (1980-02-07) abstract	1,25,65, 87
A	US 4 805 014 A (SAHARA HIROSHI ET AL) 14 February 1989 (1989-02-14) abstract	1-98
A	US 5 751 282 A (MATTHEWS III JOSEPH H ET AL) 12 May 1998 (1998-05-12) the whole document	1-98
A	WO 97 42763 A (SCHEIN STEVEN ;KLOSTERMAN BRIAN L (US); STARSIGHT TELECAST INC (US)) 13 November 1997 (1997-11-13) the whole document	1-98

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

VIZIO Ex. 1002, Page 1063 of 3573
VIZIO v. MMT, IPR2024-00722

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter ..onal Application No
PCT/US 00/16878

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0744866 A	27-11-1996	FI 952503 A	24-11-1996
US 5585838 A	17-12-1996	NONE	
JP 07030814 A	31-01-1995	JP 2565097 B	18-12-1996
US 4700322 A	13-10-1987	FR 2547146 A	07-12-1984
		EP 0128093 A	12-12-1984
		JP 1807234 C	10-12-1993
		JP 5010874 B	10-02-1993
		JP 60018080 A	30-01-1985
EP 0299830 A	18-01-1989	US 4847700 A	11-07-1989
		AU 610887 B	30-05-1991
		AU 1631488 A	19-01-1989
		CA 1283202 A	16-04-1991
		JP 1138871 A	31-05-1989
WO 8000209 A	07-02-1980	US 4225884 A	30-09-1980
		AT 2471 T	15-03-1983
		CA 1140668 A	01-02-1983
		CA 1163357 A	06-03-1984
		DE 2964706 D	17-03-1983
		EP 0016125 A	01-10-1980
		JP 6097787 B	30-11-1994
		JP 55500886 A	30-10-1980
		US 4528589 A	09-07-1985
US 4805014 A	14-02-1989	JP 60100889 A	04-06-1985
		JP 60102080 A	06-06-1985
		AU 576787 B	08-09-1988
		AU 3483584 A	16-05-1985
		CA 1223335 A	23-06-1987
		DE 3479280 D	07-09-1989
		EP 0144770 A	19-06-1985
US 5751282 A	12-05-1998	NONE	
WO 9742763 A	13-11-1997	AU 720002 B	18-05-2000
		AU 3058397 A	26-11-1997
		BR 9709048 A	04-01-2000
		CA 2253293 A	13-11-1997
		CN 1236524 A	24-11-1999
		EP 0896775 A	17-02-1999
		US 5940073 A	17-08-1999

VIZIO Ex. 1002, Page 1064 of 3573
VIZIO v. MMT, IPR2024-00722

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 October 2002 (10.10.2002)

PCT

(10) International Publication Number
WO 02/080552 A2

(51) International Patent Classification[7]: H04N 7/173

(21) International Application Number: PCT/IB02/00852

(22) International Filing Date: 15 March 2002 (15.03.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/823,658 29 March 2001 (29.03.2001) US

(71) Applicant: **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventor: **VAN EE, Jan**; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(74) Agent: **GROENENDAAL, Antonius, W., M.**; Internationaal Octrooibureau B.V., Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

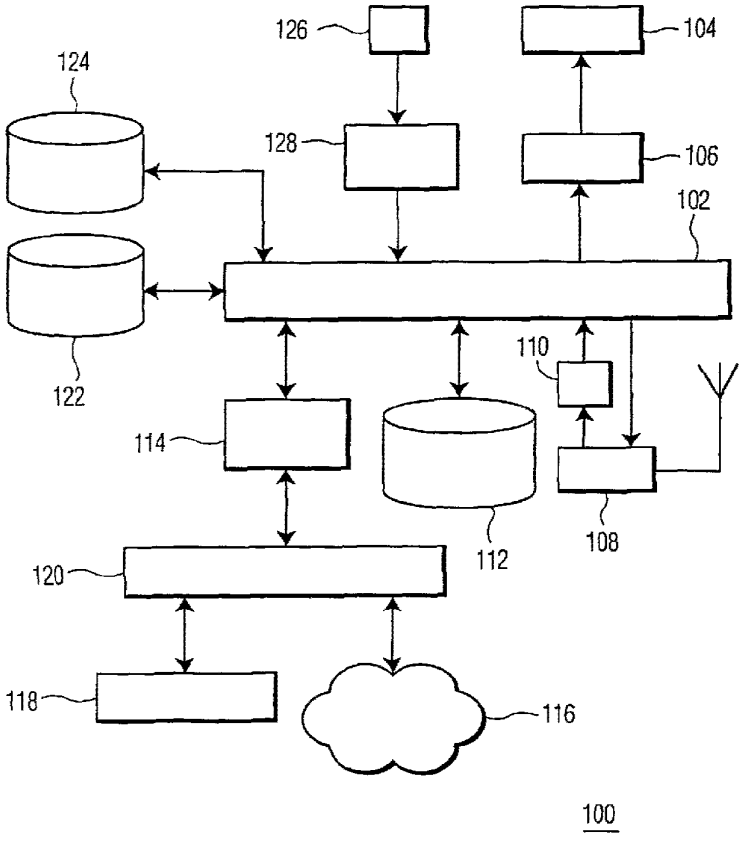
(81) Designated State *(national)*: JP.

(84) Designated States *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

Published:
— *without international search report and to be republished upon receipt of that report*

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

(54) Title: VIRTUAL PERSONALIZED TV CHANNEL



(57) Abstract: A data management system creates a personalized content information channel for an end-user by enabling to automatically play out a plurality of concatenated content information segments. These segments or programs have been selected on the basis of a criterion independent of a respective resource of respective ones of the segments.

WO 02/080552 A2

Virtual personalized TV channel

FIELD OF THE INVENTION

The invention relates to personalizing the presentation of content information, in particular, but not exclusively, TV broadcasts.

BACKGROUND ART

Philips Electronics markets a Personal Video Recorder (PVR) that is powered by the TiVo service. The PVR allows a user to pause, rewind, slow-motion, and even frame-forward and back live TV. Fast forward with "Smart Scan" lets the user choose what to watch or skip. The PVR is compatible with direct broadcast satellite, cable and antenna. The PVR digital video recorder is connected between a TV set and cable box (digital or analog), satellite receiver, and/or antenna. Via the user's existing phone line, the recorder downloads up-to-date programming information from the TiVo service. The service further lets the user manage and create his/her own TV schedule with automatic digital recordings of favorite shows that are saved to a hard disk drive (HDD) without the user having to explicitly set a timer.

The PVR has several user-selectable operational modes listed as options in an on-screen menu. Choosing the option "now playing" brings up a graphical user interface that lists the programs previously recorded on the HDD. The user can select any of the programs for playing out. Choosing the option "watch live TV" lets the user watch any currently broadcast TV program.

SUMMARY OF THE INVENTION

The PVR decribed above lets the user watch live TV programs or recorded programs according to the user selecting the operational mode and the available content information in that mode. For example, a live broadcast is selected from an electronic program guide (EPG) or by simply tuning to a specific channel via the remote's channel up/down keys. An EPG is an application in an interactive TV service that creates, based on data received from the service provider, an on-screen overview of all programs available. A recorded program is selected for play out by selecting the program from the list presented in

the "now playing mode". Accordingly, the user selects each time an individual program by interacting with the EPG or list of recorded items, or surfs the channels until coming across a program to his/her current liking. That is, each time the user has to select an item of content information for play-out. The invention now, facilitates the selecting and at the same time increases the user-friendliness and level of user control regarding program selection.

The invention provides a data management system for creating a personalized content information channel for an end-user by enabling to automatically play out a plurality of concatenated content information segments, or programs, selected on the basis of a criterion independent of a respective resource of respective ones of the programs. The concatenation enables a substantially continuous, or back-to-back, play-out as if the personalized channel were a conventional TV or radio channel. Respective resources comprise, for example, respective TV channels with live broadcasts.

Preferably, the system comprises a recording device for time-shifting the play-out of at least a specific one of the programs so as to have it fit into the concatenation of the programs per personalized channel. The recording device can also be used as a resource for supply of a content information segment to the personalized channel. Multiple personalized content information channels can be created, each respective one thereof being associated with, e.g., a respective topic such as "movies", "educational documentaries", "sports", "shows", etc., or "westerns", "musicals", "movies featuring Katherine Hepburn", "science fiction movies", etc.

Alternatively, or in addition, respective channels are created for respective members of the family so that everyone has his/her own personalized channel with content information according to his/her profile. As mentioned above, a resource may also comprise or provide recorded content information, e.g., as stored on a PVR or on a DVD in a DVD jukebox, on a CD or solid state memory, as a video-on-demand service, etc.

Alternatively, a personalized channel comprises different types of programs or segments, as selected from the available resources. For example, a user has specified that his/her personalized channel on Saturday's be created as follows: first the news from CNN, then the weather forecast on the local weather channel, then a movie at PBS, and afterwards a late-night comedy show after a coffee break.

The system may only have to switch among live TV channels on occasion in order to create the personalized channel. However, in order to provide flexibility and user adaptability, recording for later play-out, and resources other than TV programs are included in the personal channel. The channel may not be limited to video only as a conventional TV

channel, or audio only as a conventional radio channel, but may instead comprise content information of diverse formats for being played out via respective associated apparatus (display monitor, loudspeaker system, etc.).

Preferably, the system comprises a generator for generating an overview of the concatenated programs, preferably in a graphical user interface (GUI). Preferably, the overview allows some degree of user-interactivity, e.g., for letting the end-user control the compilation of the programs in the personalized channel, e.g., an order of playing -out the programs assigned to the concatenation or substituting another program for an earlier assigned one, etc.

An example of the invention relates to the creation of one or more virtual TV channels containing only programs which match predefined criteria, e.g., implicitly derived from a user's TV watching profile, explicitly defined by a user, etc. When multiple virtual TV channels are created, specific virtual channels can be assigned to family members, or a single person can create multiple virtual channels according to different kinds of content (based on topic, e.g., "my sports", "my news", "my movies", etc.).

Preferably, virtual channels can be locked, and it is possible to allow children to only watch the virtual channel(s) set up for them by their parents (virtual channels can also be made to 'black out' at times when the parents do not want their children to watch TV). Once set up, a user interacts with a virtual channel like he or she interacts with a conventional TV channel. When one program ends, the system automatically switches to the appropriate conventional channel or another resource for the next program in the virtual channel.

Preferably, certain programs are stored in a buffer, e.g., a hard-disk drive (HDD) -based video recorder for time-shifted play-out, so as to reduce the occurrence of empty time slots or program overlap in a virtual channel. At any moment in time at most one program can be active for every virtual channel. There are many ways in which this program can be selected for a given virtual channel. For example, the user can explicitly select programs from all available conventional TV channels, e.g., through an EPG, for each or each desired, time slot in a virtual channel.

Alternatively, or in combination with the user-selection, a virtual channel is automatically created based on a user's viewing profile by filling time slots with a matching or otherwise suitable program from all available conventional channels. For example, the user selects a program type for every time slot in a virtual channel, and based on a user's viewing profile a specific instance of that program type is automatically assigned to that time

slot. As another example, the user explicitly selects programs for some of the time slots, and all other time slots are filled based on the user's viewing profile.

The expression "personalized content information channel" or "virtual channel" has been chosen to refer to the invention to indicate the continuous or substantially continuous back-to-back supply of content information as if it were a conventional TV or radio channel, wherein programs are concatenated in time by the broadcaster. In the invention, the selection of programs for back-to-back supply is under control of the individual end-user. Note that the programs in a conventional TV channel all comprise video content, and that all programs in a conventional radio channel comprise only audio. The invention allows to create a personalized channel on the home equipment across the media (audio, video, etc.) and the available resources (TV, radio, Internet, DVD, CD, HDD recorder, Video-on-Demand, etc.). For example, a personalized channel makes available on a specific day a live TV broadcast, a recorded TV broadcast, a DVD movie from the home network's DVD jukebox or player, a concert played from a CD on the home network, an audio program streamed via the Internet, etc.

An aspect of the invention resides in providing a service via a data network, e.g., the Internet. The service enables to create a personalized content information channel for an end-user, and comprises enabling to automatically play out a plurality of concatenated content information segments selected on the basis of a criterion independent of a respective resource of respective ones of the segments. Respective resources comprise, for example, respective TV channels, and the service supplies, for example, a personalized EPG and controls the switching between the proper channels or the proper channels and a recording device. The service controls the recording of at least a specific one of the segments for time-shifting the play-out so as to have it fit into a concatenation of the segments. The service may enable to create multiple personalized content information channels.

The service may supply an overview of the concatenated segments scheduled for the personalized channel. The overview is, e.g., a personalized EPG or ECG (electronic content guide; see, e.g., U.S. serial no. 09/568,932 (attorney docket US 000106) filed 5/11/00 for Eugene Shteyn and Rudy Roth for ELECTRONIC CONTENT GUIDE RENDERS CONTENT RESOURCES TRANSPARENT, referred to below. The overview preferably allows user-interactivity, e.g., for modifying the concatenation under user-control. In this way, the management of playing out and recording of the content information for this individual user is delegated to a server system. The server system may comprise a dedicated server to optimize the matching between content information and user profile. The server

preferably has access to a profile of the user, to the user's home network for play-out and record control purposes, and to an inventory of content information (or parts thereof made accessible by explicit agreement from the user) for selecting pre-recorded local content. Note that a user data base according to content information preferences is a valuable tool for commercial enterprises to offer products and services in targeted ads to the appropriate demographic groups.

Another aspect of the invention resides in a software application for being installed on a home network. The application controls the creating of a personalized content information channel for an end-user by enabling to automatically play out a plurality of concatenated content information segments that have been selected on the basis of a criterion independent of a respective resource of respective ones of the segments. EPG's and inventories of content information available locally, i.e., at the user's home entertainment equipment, enable the software application to select content segments under control of a user-profile and/or history of user-interaction with the equipment.

Reference is made to the following patent documents:

- U.S. serial no. 09/568,932 (attorney docket US 000106) filed 5/11/00 for Eugene Shteyn and Rudy Roth for ELECTRONIC CONTENT GUIDE RENDERS CONTENT RESOURCES TRANSPARENT. This document relates to a data management system on a home network. The system collects data that is descriptive of content information available at various resources, including for example, an electronic program guide (EPG), on the network. The data is combined in a single menu to enable the user to select from the content, regardless of their resource.

- U.S. serial no. 09/519,546 (attorney docket US 000014) filed 3/6/00 for Erik Ekkel et al., for PERSONALIZING CE EQUIPMENT CONFIGURATION AT SERVER VIA WEB-ENABLED DEVICE. This document relates to facilitating the configuring of CE equipment by the consumer by means of delegating the configuring to an application server on the Internet. The consumer enters his/her preferences in a specific interactive Web page through a suitable user-interface of an Internet-enabled device, such as a PC or set-top box or digital cellphone. The application server generates the control data based on the preferences entered and downloads the control data to the CE equipment itself or to the Internet-enabled device.

- U.S. serial no.09/807618 (Attorney docket US 018028) filed 3/8/01 for Eugene Shteyn for ACTIVITY SCHEDULE CONTROLS PERSONALIZED ELECTRONIC CONTENT GUIDE. This document discloses a system and method wherein

electronic content information and the time slots for play-out are being determined based on the activities scheduled in the user's electronic calendar and the user's profile or declared interests. In this manner, the recording and downloading of content is automated based on the user's life style. More specifically, an EPG and/or ECG is under control of the user's personal schedule, e.g., as represented on the user's electronic organizer with the user's scheduled personal activities.

A data processing system is provided for managing electronic content information under control of data representative of at least one activity scheduled in a user's calendar. The system preferably has a control output for control of a data recording device for recording the electronic content. The system also preferably has an input for receiving input data representative of an EPG, and an input for receipt of the data representative of the activity. The latter is then used for data communication between the system and an electronic calendar on, e.g., the user's PDA.

The managing may comprise selecting specific content information based on a profile of the user. The profile comprises, for example, a preference regarding an attribute (e.g., genre, semantic content, performer, etc.) of the content information based on which the user ordinarily decides whether or not to watch or listen to it. The profile may also comprise relative priorities of the activities scheduled in the calendar with respect to each other and/or with respect to certain content information, or relative priorities of content information entities or files. The profile gives further criteria, in addition to the calendar, based on which the system processes, e.g., records or not, content information.

The system preferably creates a GUI for presenting an overview of the specific content information available in the time slots other than those associated with the scheduled activities in the calendar. The system preferably dynamically adjusts the processing upon a user interaction with the calendar. For example, if the user enters a new activity into the calendar or cancels a scheduled one, the availability changes of the time slots that can be used for processing or playing out content information. Based on, e.g., the user's profile, the system may allocate new time slots to suitable content or time-shift the content to a new time slot fitting into the profile of the user.

- U.S. ser. no. 09/160,490 (attorney docket PHA 23,500) filed 9/25/98 for Adrian Turner et al., for CUSTOMIZED UPGRADING OF INTERNET-ENABLED DEVICES BASED ON USER-PROFILE. This document relates to a method of enabling customizing a technical functionality of network- (e.g., Internet-) enabled equipment of an end-user. According to the method a profile of the end-user and information about a technical

feature for use with the equipment are stored at a server system. Based on the user-profile it is determined whether or not the user should be notified about the availability of this feature. If it has been decided that there is a match between the user profile as stored and the information about this feature, the end-user gets notified via the network of the option to obtain the feature for being added to his/her equipment. In case the feature relates to new software, it can be downloaded via the network for preferably automatic installation in the equipment. In case the feature comprises a hardware component, it can be shipped to the end-user upon acceptance of the offer. A helpdesk is preferably provided through the network to help the end-user install the feature. This concept is based on the insight that network-enabled equipment will become a flexible repository into which the end-user can place new and exciting features over time dependent on the user's needs or desires, context of use, advancement of technology, etc.

Not all end-users are always interested in all possible features for creating enhanced functionality of the equipment. Accordingly, a user-profile is established, either when the user registers his equipment with the notification service, or dynamically as a consequence of the user's interaction with the server system, or through a combination thereof. The profile is used to select technical features that are likely of interest to the user. In this manner, the user is kept abreast of the latest trends of interest to him/her. This service implicitly supports virtual recycling as equipment needs to be designed for the purpose of being upgraded.

The modular approach of adding or deleting technical software or hardware features as needed thus assists in slowing down the trend that products becoming obsolete fairly quickly, but without barring the manufacturer or aftermarket sales organizations from continuing doing business. This service is specifically relevant to vertical markets. A vertical market is a particular branch of commercial activity for which similar products or similar services are relevant. Examples of vertical markets are education, offices, hotels, consumers, hospitals, etc. Each of these segments have unique requirements for hardware devices and their functionality. Hardware manufacturers can make their devices more relevant to a specific vertical market segment by combining a relevant set of applications and services.

- U.S. ser no. 09/653,784 (attorney docket US 000220) filed 9/1/00 for Frank Caris et al., for STB CONNECTS REMOTE TO WEB SITE FOR CUSTOMIZED CODE DOWNLOADS. This document relates to marketing a set top box (STB) together with a programmable remote. The remote has a dedicated button to connect the STB to a specific server on the Internet. The consumer can notify the server of his/her other CE equipment,

which he/she desires to be controllable through the same remote as the one that came with the STB. The server downloads to the STB data representative of the relevant control codes. The STB is provided with means to program the remote with these codes. In return the server has obtained detailed and accurate information about this consumer's equipment. A reliable customer base can thus be built for streamlining Help Desk operations.

BRIEF DESCRIPTION OF THE DRAWING

The invention is described in further detail, by way of example and with reference to the accompanying drawing, wherein Fig.1 and 2 are block diagrams of systems in the invention.

Throughout the drawing, same reference numerals indicate similar or corresponding features.

DETAILED EMBODIMENT

Fig.1 is a block diagram of a system 100 in the invention. System 100 comprises a data processing unit 102 with an onboard memory. System 100 further comprises a play-out apparatus 104, here a display monitor, coupled to unit 102 via an encoder 106; a TV tuner 108 whose content information output is coupled to unit 102 via a D/A converter 110, and whose control input is connected to unit 102 for controllably switching channels; a storage 112, e.g., a HDD, for storing digital content information; a network interface 114 for connecting unit 102 to an external network like the Internet 116 and to a home network 118 via a gateway or a hub 120; a storage 122 for storing a currently valid EPG; and a storage 124 for storing a user profile, e.g., in terms of the user's preferences with regard to genre's or types of content information or in terms of a history of user interaction with content offered via the EPG or available from other resources on home network 118, such as a DVD jukebox (not shown). The user interacts with system 100, e.g., via a remote control device 126 and an IR receiver 128 coupled to unit 102 for processing the IR commands.

In this example, the user profile represents the types of content information (e.g., audio, video) and time slots wherein the user wants to have the content information made available to him/her. The profile may also comprise indications of relative priorities this particular user assigns to certain programs. The priorities may be dependent on the time of the day or the day of the week, for example. Under control of the profile, and the available content information, system 100 creates a personalized channel for this user with content information segments, e.g., programs, played out back to back, or, in other words, without the

user having to switch channels, or switch content providing resources. The back-to-back play-out can be interrupted automatically for a certain time period, e.g., if the user has specified this in advance in the profile or by a manual override through remote 126. Unit 102 selects content segments that match the user's profile based on the information available from EPG 122, from an inventory of recorded content 112 and based on information on the resources on home network 118.

EPG's are supplied by the service provider as data, and thus can be interpreted as to their semantic content and thus can serve as a basis for finding a match between the user's preferences and the available programs.

The recorded content information 112 comprises programs recorded on a previous occasion, e.g., under control of EPG 122. A recording control software application (not shown) running on unit 102 tags the content being recorded with the associated EPG data so as to enable semantic querying for the purposes of finding a match. Home network 118 comprises, for example, a DVD jukebox or a CD jukebox. Each DVD or CD has a unique identifier that enables to identify its content information, either through a service (not shown) on the Internet or by the data itself. In addition, the user may manually create a description of an inventory of his/her collection of content information on home network 118, e.g., via a PC, and make that available to unit 102. Accordingly, information about the content information available is present as data to enable a query, that has been given as input a description of the user's profile.

Once system 100 has identified matching content for the time slots specified (if any), system 100 arranges broadcast programs, received via tuner 108 and played out in real time, recorded or time-shifted broadcast programs in storage 112, Internet TV (via a PC on home network 118) and a video-on-demand program (via a set top box on home network 118) in time and in a preferred order by control of the access to the programs' resources (tuner 108; storage 112; home network 118; Internet 116) and control of recording programs in storage 112.

In above example of the invention, user profile storage 124 is part of the user's local equipment. Fig.2 illustrates another example of a system 200 in the invention. In system 200, user profile 124 is stored at a remote server 202 that communicates with unit 102 via the Internet 116. Server 202 also has access to the EPG 204 to which service this user has subscribed. EPG 122 is the locally cached version of (a part of) EPG 204. Based on this, server 202 can find a match and send the recommended match as a control script to unit 102. This script controls tuner 108, the recording of programs in storage 112 and the playing out

of recorded programs from storage 112. Preferably, server 202 has also access to an inventory of content information on home network 118, and to content providing services to which this user has access, e.g., via an STB or via the Internet. Based on this information, server 202 can optimize the matching of the content information with the user's profile and download the control script to unit 102 for control of tuner 108, control of storage 112, control of gateway 120 and control of home network 118. An advantage is that the processing power for running the queries and for generating the control scripts resides at a dedicated server instead of at the user's equipment. Moreover, the user can access his/her profile through the Internet from any connected PC or STB.

Server 202 thus obtains information about the profiles of this user and others who want to delegate the control at least partly to service provider 202. This customer base is highly valuable to third parties such as content providers, e.g., to optimize their services based on demographics, and on-line retailers, e.g., to provide targeted advertisements. Note that the supply of control scripts to enable creation of personalized content information channels is a business model that can be subsidized at least partly by advertisements that can be downloaded, e.g., from server 202 onto home network 118 or unit 102 and interspersed with, or overlaid on, the content information made available under control of the script.

Still other examples of an embodiment of the invention delegate the storage of content 112 to a remote server as well. The play-out time is known in advance and the download time of the remotely stored content is to be taken into account when preparing for play-out

CLAIMS:

1. A data management system (100) for creating a personalized content information channel for an end-user by enabling to automatically play out a plurality of concatenated content information segments selected on the basis of a criterion independent of a respective resource of respective ones of the segments, at least one of the respective resources providing content other than a liver or locally recorded TV program.

2. The system (100) of claim 1, wherein the respective resource comprises a respective TV channel.

3. The system (100) of claim 1, comprising a recording device for time-shifting the play-out of at least a specific one of the segments so as to fit into a concatenation of the segments.

4. The system (100) of claim 1, arranged for creating multiple personalized content information channels.

5. The system (100) of claim 1, wherein at least one resource comprises recorded content information (112).

6. The system (100) of claim 1, comprising a generator for providing an overview of the concatenated segments scheduled for the personalized channel.

7. The system (100) of claim 3, having a user interface (126) for enabling the end-user to control a compiling of the segments in the concatenation.

8. A method of enabling to create a personalized content information channel for an end-user, the method comprising enabling to automatically play out a plurality of concatenated content information segments selected on the basis of a criterion independent of

a respective resource of respective ones of the segments, at least one of the respective resources providing content other than a live or locally recorded TV program.

9. The method of claim 8, comprising recording at least a specific one of the segments for time-shifting the play-out so as to fit into a concatenation of the segments.

10. The method of claim 8, comprising receiving a profile for the end-user selecting the plurality based on the profile.

11. The method of claim 10, further comprising selecting one or more advertisements and adding the selected advertisements to the plurality.

12. A software application for being installed on a home network for control of creating a personalized content information channel for an end-user by enabling to automatically play out a plurality of concatenated content information segments selected on the basis of a criterion independent of a respective resource of respective ones of the segments, at least one of the respective resources providing content other than a liver or locally recorded TV program.

13. A customer data base created from respective user profiles obtained for creating respective personalized content information channels for respective end-users by enabling to automatically play out a plurality of concatenated content information segments selected on the basis of a criterion independent of a particular resource of particular ones of the segments, at least one of the respective resources providing content other than a liver or locally recorded TV program.

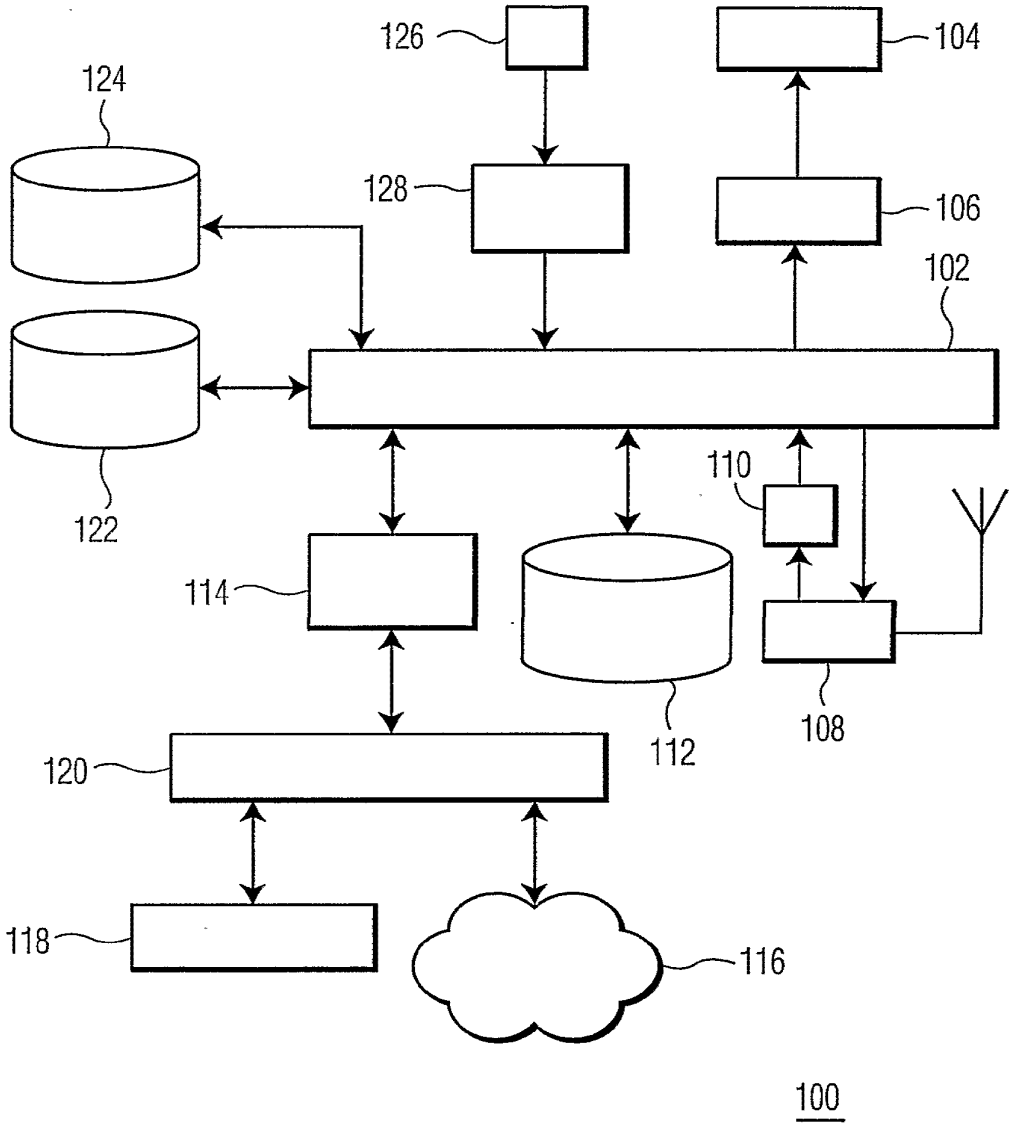


FIG. 1

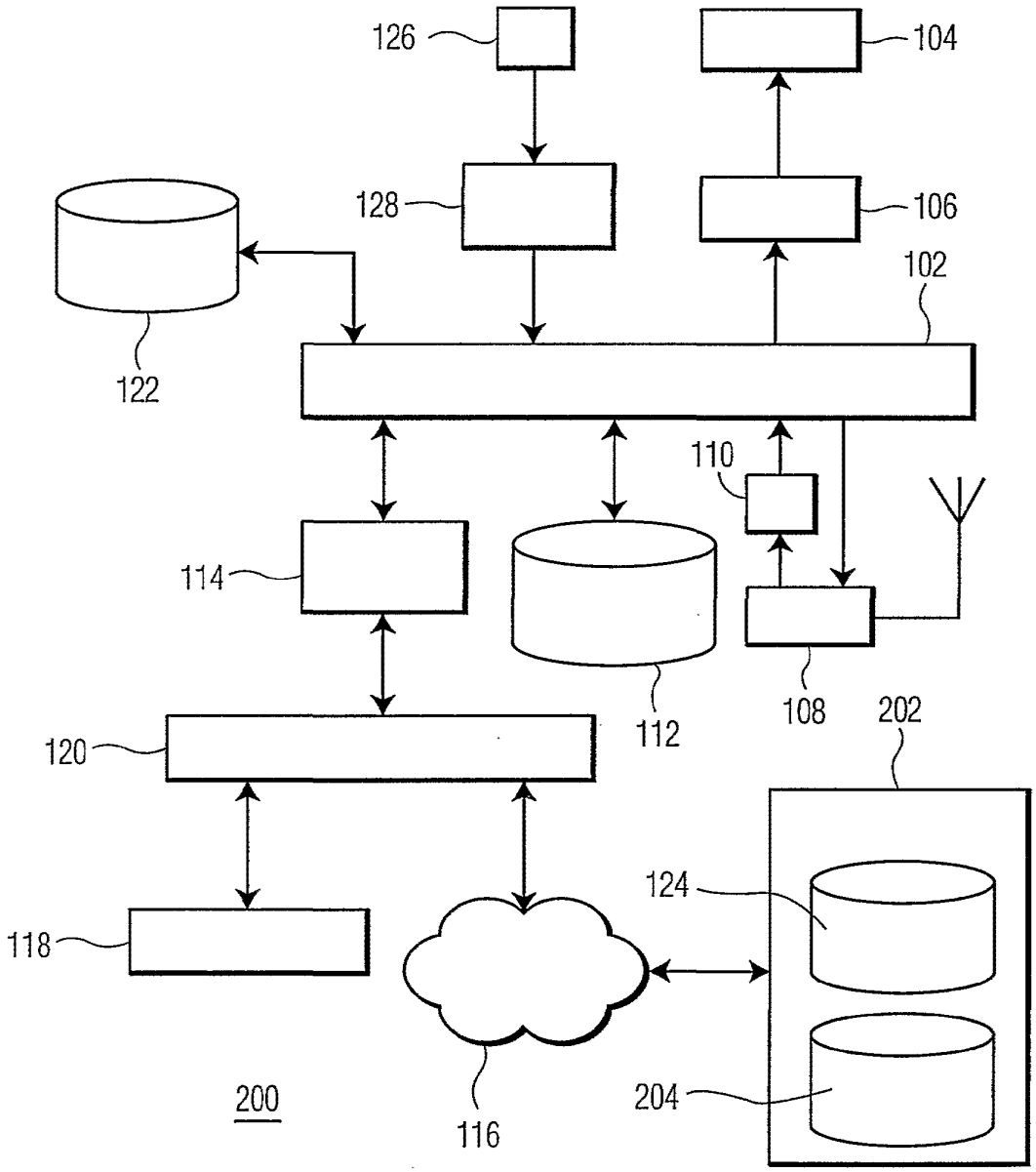

126
104
128
106
102
122
110
114
112
108
202
120
124
118
200
116
204

FIG. 2

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
30 May 2003 (30.05.2003)

PCT

(10) International Publication Number
WO 03/044755 A1

(51) International Patent Classification[7]: G08C 19/04, 19/10, 19/22, G05B 23/02, H04Q 9/00, G06F 3/00

(21) International Application Number: PCT/US01/47518

(22) International Filing Date:
8 November 2001 (08.11.2001)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **BEHAVIORAL INFORMATICS, INC.** [US/US]; 109 West Mount Airy Avenue, Philadelphia, PA 19119 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **KUTZIK, David, M.** [US/US]; 109 West Mount Airy Avenue, Philadelphia, PA 19119 (US). **GLASCOCK, Anthony, P.** [US/US]; 64 Llangollen Lane, Newtown Square, PA 19333 (US).

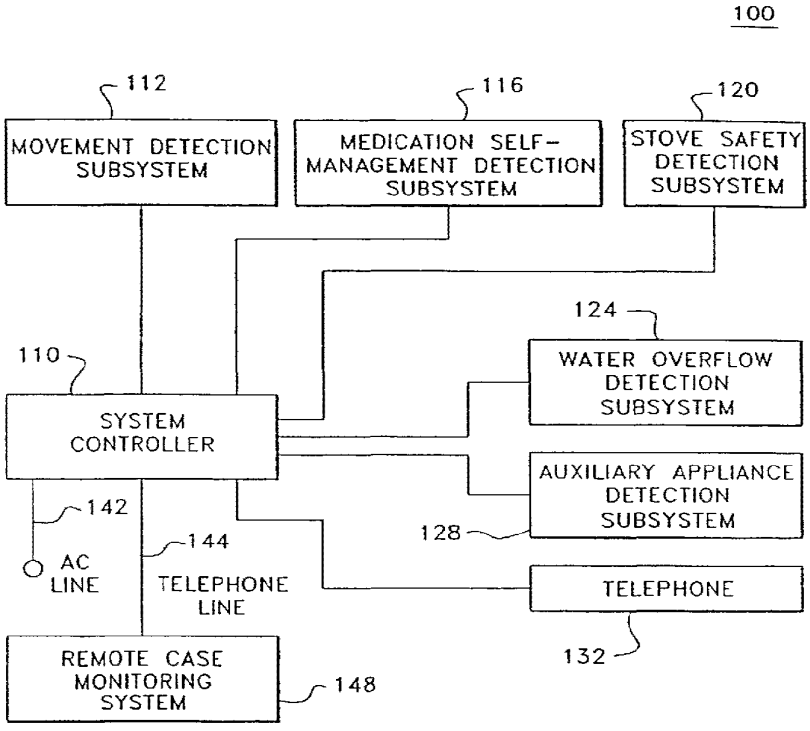
(74) Agent: **LINGUITI, Frank, M.**; Caesar, Rivise, Bernstein, Cohen & Pokotilow, LTD., Seven Penn Center, 1635 Market Street, 12th Floor, Philadelphia, PA 19103 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: MONITORING A DAILY LIVING ACTIVITY AND ANALYZING DATA RELATED THERETO



(57) Abstract: A system is provided for monitoring a user in a user living area. The system includes a system controller (110) and an activity detection subsystem (112, 116, 120, 124 and 128). The activity detection subsystem (112, 116, 120, 124 and 128) monitors a daily living activity of the user and provides information representative of the daily living activity to the system controller (110). The system controller (110) includes a control circuit, which generates a control signal in response to the daily living activity information obtained by the activity detection subsystem (112, 116, 120, 124 and 128). Control information from the system controller (110) is applied by way of a control information communication channel both to the activity detection subsystem (112, 116, 120, 124 and 128) and to a remote monitoring site (148). The activity detection subsystem (112, 116, 120, 124 and 128) may be a system for determining the movement of the user around the home, medication compliance by the user, problem with usage of stoves or other potentially dangerous appliances, and selected auxiliary appliances.

WO 03/044755 A1

Published:
— *with international search report*

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

MONITORING A DAILY LIVING ACTIVITY AND ANALYZING DATA RELATED THERETO

Field of the Invention

The present invention relates to a system for providing in-home monitoring and intervention to assist individuals, particularly functionally impaired persons, in maintaining independent living.

Background of the Invention

Several known user monitoring systems have an immediate response feature. In one prior art system if a user falls down and is unable to get up the user may push a button on a small radio frequency transmitter. This radio frequency transmitter may be worn by the user. For example, it may be worn on a necklace or on a key chain for convenience and to assure that it is available when it is needed. Pushing the button activates a device at the residence of the user which places a telephone call to a user remote monitoring site. Personnel at the remote monitoring site may listen and talk through a paging telephone in order to communicate with the user. Additionally, personnel at the user monitoring site may dispatch an ambulance or other assistance for the user.

There is a large number of devices designed to enhance medication compliance and to monitor the extent of non-compliance. Devices available in the prior art include timers, medicament containers and combinations of timers and containers. Also available in the prior art are multiple compartment timed containers which only open at timed intervals and beep until the compartment is opened and closed. Devices available to researchers include specialized containers and bottle caps which record the date and time of opening of the container. This information is provided in a machine transferable form which may be applied to a computer for analysis of scheduling and dosing compliance.

In addition, a variety of specialized dispensers using stripped, bubble wrapped medicaments is available. These dispensers are available from pharmacists and are adapted to provide the correct pills at scheduled times and use a less expensive method for loading doses than other prior art self-loading timed dispensers. One prior art system in particular uses a host computer system to control a dispensing schedule in addition to a local timer-memory system. Another system uses color coded indicia to aid in identification of medication by users.

Various home health monitoring systems are also known in the prior art. These systems fall into a broad category of devices which offer in-home electronic monitoring of health conditions ranging from fetal heart beat to blood pressure and blood sugar. Some of these health monitoring systems transmit a log to a central unit if a monitored parameter is outside a predetermined range. Other systems monitor predetermined health related parameters in the environment of the user.

The present invention comprises a user monitoring system for monitoring and intervening in selected activities of daily living for users requiring differing levels of monitoring or supervision. The user monitoring system monitors and provides interventions relating to four principal event domains. These event domains are (1) movement around the home, (2) medication compliance by the user, (3) problems with usage of stoves or other potentially dangerous appliances, and (4) selected auxiliary appliance control. Each of these event domains corresponds to a detection subsystem of the user monitoring system. Each detection subsystem is linked to the user monitoring system by means of radio frequency signals transmitted from subsystem sensors and received by a system controller device within the user monitoring system. In addition to using information obtained by monitoring the selected activities of daily living to make decisions locally, the user monitoring system produces, stores and transfers data concerning all monitored event domains and intervention activity to a remote case management system for further analysis and intervention. The remote case management monitoring system may use a knowledge base and an inference generator in order to make decisions regarding various types and degrees of intervention. The user monitoring system may provide reminders for the user to take their medications. Local and remote reprogramming of event parameters determining interventions and data recording are provided. The user monitoring system may execute controlled shutdown of the stove and other appliances as well as call the remote monitoring site in the event of possible emergencies. Data for monthly case monitoring reports which may include event logs of problem occurrences may be provided to permit cross-sectional and long-term trend analysis of difficulties. These may serve as a basis for case management decisions determining additional contacts and interventions.

Summary of the Invention

A system is provided for monitoring a user in a user living area. The system includes a system controller and an activity detection subsystem. The activity detection subsystem monitors a daily living activity of the user and provides information representative of the daily living activity to the system controller. The system controller includes a control circuit which generates a control signal in response to the daily living activity information obtained by the activity detection subsystem. Control information from the system controller is applied by way of a control information communication channel both to the activity detection subsystem and to a remote monitoring site.

Brief Description of the Drawings

The foregoing summary, as well as the following detailed description of preferred embodiments of the invention, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there is shown in the drawings embodiments which are presently preferred. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown. In the drawings:

Fig. 1 is a block diagram representation of the user monitoring system of the present invention;

Fig. 2 is a more detailed block diagram representation of the system controller device of Fig. 1;

Fig. 3 is a block diagram representation of the movement activity detection subsystem of the user monitoring system of Fig. 1;

Figs. 4A, B are side and top plan views of the medication self-management detection subsystem of the user monitoring system of Fig. 1;

Fig. 5 is a more detailed block diagram representation of the medication self-management detection subsystem of Figs. 4A, B;

Fig. 6 is a block diagram representation of the gas stove safety detection subsystem of the user monitoring system of Fig. 1;

Fig. 7 is a block diagram representation of the electric stove safety detection subsystem of the user monitoring system of Fig. 1;

Fig. 8 is a more detailed schematic representation of the current drain monitor of the electric stove safety detection subsystem of Fig. 7;

Fig. 9 is a schematic representation of the water overflow detection subsystem of the user monitoring system of Fig. 1;

Fig. 10 is a block diagram representation of the auxiliary appliance detection subsystem of the user monitoring system of Fig. 1;

Figs. 11A-11M are flow charts representing operations performed with respect to the various subsystems of the system of Fig. 1.

Fig. 12 is a block diagram representation of the user monitoring system of Fig. 1 wherein the internet is used as the communication channel.

Detailed Description of Preferred Embodiments

Referring to the drawings, wherein the same reference numerals are used to designate the same elements throughout, there is shown in Fig. 1 a block diagram representation of a user monitoring system 100 in accordance with a preferred embodiment of the present invention. The monitoring system may be used to monitor and assist elderly persons, functionally impaired persons or the like on a temporary short-term basis or on a long-term basis. The user monitoring system 100 includes a microprocessor based system controller device 110 linked to various sensors which are provided within a number of activity detection subsystems 112-128. Activity detection subsystems 112-123 are adapted to monitor various activities of daily living of the user of the monitoring system 100. Also included are the in-home telephone 132 which is located within the user living area being monitored and an outside telephone line 144.

Any number of daily living activity detection subsystems may be provided within the user monitoring system 100 of the present invention. The detection subsystems provided in one embodiment may include a movement detection subsystem 112, a medication self- management detection subsystem 116, and a stove safety detection subsystem 120. However, it will be understood that using differing types of monitors, any other activities of daily living may be sensed and detected within user monitoring system 100. Additionally, the user monitoring system 100 may be coupled to a computer based case monitoring system 148 by way of a telephone line 144. Formal and informal care givers may be provided with information to determine whether short and long term intervention is

required using the data transmitted to the case monitoring system 148. It will be understood that in addition to telephone line 144 or interactive television, any method of transmitting messages to system 148 may be used. For example, messages may be transmitted by an add-on fiber optic cable box or a portable transmitter.

The user monitoring system 100 integrates sensor data from different activity domains to make a number of determinations at predetermined times on a twenty-four hour basis. One activity domain determination within the user monitoring system 100 includes movement of the person being monitored. In this movement domain determinations are made by the movement detection subsystem 112 whether the user is up and around. The detection information which results from this determination by movement detection subsystem 112 is transmitted to the system controller device 110.

Another activity domain determination within the user monitoring system 100 is a determination of medication self-management. In this activity domain determinations are made whether the user is following a predetermined medication regimen. This determination is made by the medication self-management detection subsystem 116 of the user monitoring system 100. The detection information which results of this determination by medication self-management system 116 is also transmitted to the system controller device 110.

Stove usage is another activity domain which is monitored by the user monitoring system 100. In this activity domain determinations are made as to whether a stove has been left on inappropriately. Detection information in accordance with this determination is transmitted to the system controller device 110. This determination may be made by differing embodiments of the stove safety detection subsystem 120 depending on whether the stove being monitored by detection subsystem 120 is a gas stove or an electric stove.

In the preferred embodiment of the user monitoring system 100 it is also possible to monitor and control other designated appliances using one or more auxiliary systems subsystems 128. These auxiliary systems may include, for example, other potentially harmful appliances such as irons or electric space heaters. System controller device 110 also receives detection information representative of the determination of the detection subsystems 116, 128.

Referring to Fig. 2, there is shown a more detailed block diagram representation of the system controller device 110 of the user monitoring system 100. The system controller device 110 includes a computer 208 and a radio frequency multichannel receiver 212. The computer 208 may be any type of computer capable of running C++ or any similar functionally equivalent object code. The various channels of the radio frequency receiver 212 are provided within system controller device 110 for receiving radio frequency signals transmitted from the various detection subsystems 112-128 by way of detection system antennas provided within the various detection subsystems 112-128. It will be understood that a sufficient number of information channels required to accommodate the number of detectors should be provided within system 100. These communication channels may be provided, for example, by a number of radio frequency channels within radio frequency receiver 212.

The various channels of the radio frequency receiver 212 thus serve as detection information channels for receiving detection information within the monitoring system 100. However, it will be understood that any information channel or information conduit or means for applying information may be used to apply information from detection subsystems 112-128 to system controller 110. The system controller device 110 is also provided with an AC power line transmitter 202 for applying control signals to the various detection subsystems 112-128 and to the remote monitoring site 148. Additionally, a system controller modem 204, and a telephone interfacing circuit 202 are present within the system controller 110.

In the preferred embodiment of the user monitoring system 100 the system controller device 110 may also be provided with a voice data storage device 210. The voice data storage device 210 may be used within the user monitoring system 100 to store various audio reminder and inquiry messages which may be provided to the user being monitored at predetermined times.

The power supply of the system controller device 110 of the user monitoring system 100 may include a well regulated battery with a battery backup to prevent loss of valuable user data stored in the user monitoring system 100. The radio frequency multichannel receiver 212 of the system controller device 110 is a conventional multichannel radio frequency device having appropriate anti-interference technology for preventing

interference between the various subsystem channels and interference from external sources. The anti-interference technology may be, for example, broad spectrum modulation.

In the preferred embodiment of the system controller device 110 the radio frequency receiver 212 may be a pulsed radio frequency device. The power line transmitter 202 of the system controller device 110 is a conventional system for turning controlled appliances on and off. In the preferred embodiment of the user monitoring system 100, this control may be accomplished by sending pulsed radio frequency signals through the AC lines of the living areas of the user as understood by those skilled in the art. The use of different pulsed signals, decodable by different detection subsystems, is effective to provide any required number of control information channels for applying control signals to detection subsystems 112-128 by system controller 110. However, it will be understood that the transmission of control information from the system controller device 110 to the various detection subsystems 112-128 may be performed by any suitable information channels.

The controller modem 204 of the system controller device 110 may be a conventional modem capable of providing known incoming and outgoing modem protocols. The outgoing protocols of the controller modem 204 may be used for data transfer from the system controller device 110 to the case monitoring site 148 or to other locations by way of telephone line 144. The incoming protocols of the system controller modem 204 may be used for reprogramming various monitoring and intervention parameters of the user monitoring system 100. Reprogramming may be performed either by the remote case monitoring site 148 through the controller modem 204 or directly to the system controller device 110. Additionally, the incoming protocols may be used for any type of communication with the user monitoring system 100.

The local telephone interface circuit 206 of the system controller device 110 provides several functions within the user monitoring system 100. It transmits incoming calls received by the user monitoring system 100 by way of the telephone line 144 to the in-home telephone 132. The telephone interface device 206 also connects ringing voltage as well as synthesized voice messages from the voice data storage device 210 to the in-house telephone 132 on command to provide messages to the user by way of the in-home telephone 132. It also makes several determinations regarding the state of the in-house telephone 132. For example, determinations when the in-home telephone 132 is off-hook, when the in-home

telephone 132 is not off-hook, and whether the number one has been pressed on the in-home telephone 132 may be made by the local telephone interface circuit 206.

The user monitoring system 100 operates in a home mode and in an away mode. The away mode of the user monitoring system 100 may be selected by pressing a dedicated away switch (not shown) located in a convenient location in the home of the user. Additionally, the away mode of user monitoring system 100 may be remotely set from the case management monitoring host site 148. The home mode of the user monitoring system 100 may be passively set, for example, by the opening of a door when the user returns home.

In the preferred embodiment of the system controller device 110, a reprogrammable microprocessor receives detection information, makes determinations as set forth herein, and provides control information accordingly. However, it will be understood by those skilled in the art that any type of control circuitry capable of performing the operations set forth herein may be used within the user monitoring system 100.

Referring to Fig. 3, there is shown a block diagram representation of a preferred embodiment of the movement activity detection subsystem 112 of the user monitoring system 100. Within the user monitoring system 100, movement sensed by the movement activity detection subsystem 112 is assumed to indicate that the user being monitored is up and around.

It will be understood by those skilled in the art that the configuration of the movement detection subsystem 112 may vary according to the differing living areas being monitored by user monitoring system 100. However, in general the movement detection subsystem 112 includes at least one and preferably several motion sensors such as motion sensor 304 positioned at spaced locations within the home of the user or a conventional reed switch door opening such as sensor detector 308. The motion sensor 304 and the reed switch 308 are provided for determining whether there is movement or activity within the living area being monitored by the user monitoring system 100.

In the most basic embodiment of the detection subsystem 112, only a single motion sensor 304 may be provided. In this case the single motion sensor 304 is preferably placed between the bed of the user and the bathroom. In a case where only a single reed switch is provided within the movement detection subsystem 112, it is preferably placed on the door of the bathroom. Such basic configurations of the movement detection subsystem

116 are effective to determine whether the user being monitored has gotten out of bed or has gone to the bathroom after a predetermined time.

When an activity is sensed by the motion sensor 304 or the door opening sensor 308, a motion transmitter 306 of the motion detection subsystem 112 transmits a radio frequency signal by way of the motion antenna 302. This motion signal representing an activity of daily living by the user is received by the system controller device 110 of the user monitoring system 100. It is therefore activity of daily living information which indicates that the detected user movement has occurred within the home being monitored by the user monitoring system 100.

Similarly, a conventional reed switch (not shown) or other type of switch within the door opening sensor 308 is provided with a radio frequency door opening transmitter 312. The door opening transmitter 312 transmits a door opening signal indicating the opening of a door or cabinet to which the sensor 308 is applied. The door opening signal is transmitted by detection subsystem 112 is a radio frequency signal representative of this activity. It is transmitted to the system controller device 110 by way of the motion detection antenna 310.

If the dwelling being monitored is large or complex a more elaborate configuration of movement and activity sensors 304, 308 may be required within the movement detection subsystem 112 of the user monitoring system 100. However, in the preferred embodiment of the user monitoring system 100 at least movement from the bed and movement into and out of the bathroom should be monitored by the movement detection subsystem 112. Inappropriate periods of user inactivity as indicated by sensors 304, 308 or other sensor disposed in these locations may indicate a medical emergency. It will be understood that a plurality of motion sensors or switches such as reed switches may be placed in locations within the living area being monitored and that there are no theoretical limitations in the number of such devices which may be used with the movement detection system 112.

When the movement detection subsystem 112 operates in the home mode the user monitoring system 100 is in a twenty-four hour cycle. This twenty-four hour cycle includes information with respect to the usual waking time of the user being monitored. Using the motion sensors 304, 308 of the motion detection subsystem 112 the user

monitoring system 100 determines if the user remains in bed a specified length of time beyond the usual waking time or has not gone from the bed to the bathroom for a predetermined time period. If the user monitoring system 100 determines an abnormal lack of user activity such as this it may enter a wake up monitor phase.

In the wake up monitor phase of the user monitoring system 100 the system controller device 110 may place a telephone call to the user by way of the telephone 132 in order to determine whether the user is having a problem. If the telephone call placed by the system controller device 110 is answered, the user is prompted by the system controller device 110 to depress a predetermined key on the in-home telephone 132. For example, the user may be prompted to press the telephone key indicating the number one. If the user complies with the prompt from the system controller device 110 the wake up monitor phase of the user monitoring system 100 is complete. If there is no answer to the call placed by the system controller device 110 and the user monitoring system 100 is not in away mode, or if the user answers the telephone but does not depress the requested key, the user monitoring system 100 contacts the case monitoring site 148 with an immediate status report indicating a potential problem with the user.

Assuming all is well, the activity movement detection subsystem 112 of the user monitoring system 100 merely monitors all system status changes within system 100. This includes monitoring and storing information from the motion detectors 304, 308 representing movement and the opening and closing of doors, the usage of medication, the usage of the stove and appliances, and any other auxiliary devices which may be monitored by the user monitoring system 100.

Each status change detected by the user monitoring system 100 is assumed to indicate activity of the user being monitored. In the event of the detection of a period of inactivity in excess of a predetermined amount of time during the usual waking hours of the user, the user monitoring system 100 returns to the wake up monitor phase and places a telephone call to the user as previously described. The period of inactivity required for the user monitoring system 100 to return to the wake up monitor phase is adjustable depending upon the habits of a particular user but may, for example, be two and one-half hours.

When the user monitoring system 100 is in the away mode it does not record or report any activities. It merely waits for active or passive resetting of the home mode as

previously described. Active resetting of the home mode of the user monitoring system 100 occurs when the user activates a dedicated home/away switch which may be mounted at any convenient location. Passive resetting of the mode of the user monitoring system 100 may occur when the user returns and changes the status of any detection subsystem 112-128.

Referring to Figs. 4A, B, and 5, there are shown a side view, a top plan view, and a schematic representation of a preferred embodiment of the medication self-management detection subsystem 116 of the user monitoring system 100 of the present invention. The medication self-management detection subsystem 116 comprises a medication holder 404 which is a specialized portable holder or caddy for holding at least one medication container 402 in a corresponding container opening 404.

In the preferred embodiment of the medication detection subsystem 116 a plurality of the medication containers 402 may be installed within their corresponding container openings 406 in the portable medication holder 404 when the user being monitored is not removing medication from them. The medication containers 402 and the container openings 406 within the medication holder 404 may be color coded. In this method the colors of a selected medication container 402 and its container opening 406 match each other. Likewise, each container opening 406 of the medication holder 404 may be provided with a matching colored light 408. The colored lights 408 assist the user in returning a removed medication container 402 to its correct container opening 406.

When a medication container 402 is disposed within a container opening 406 of the medication holder 404 the medication container 402 closes a conventional normally open switch 416. When the medication container 402 is removed from the opening 406 of the medication holder 404 it releases the normally open switch 416 causing it to open. When a switch 416 within the medication holder 404 is opened or closed in this manner by a medication container 402 a radio frequency medication transmitter 424 is activated. In this manner the medication self-management detection system 116 communicates this activity of daily living information with the system controller device 110.

The radio frequency signal provided by the medication transmitter 424 when it is activated by a switch 416 is pulse code modulated by pulse coder 420. The modulating of the pulse coder 420 is performed in a series of differing manners according to which switch 416 within the medication container 404 is opened. The selected pulse coded signal

from the medication transmitter 424 is received, decoded, and stored by the system controller device 110 of the user monitoring system 100.

While the medication container 402 is removed from the medication holder 404 its matching colored light 408 is activated. This causes the color code of the medication container 402 removed from the medication holder 404 to be displayed as previously described. When the medication container 402 is replaced in its opening 406 of the medication holder 404 and the transmitter 424 is activated to transmit a corresponding pulse code modulated signal, the colored light 408 turns off and the transmission from the medication transmitter 424 to the system controller device 110 terminates. The termination of the transmission by the medication transmitter 424 indicates to the system controller device 110 that the medication container 402 has been returned to its opening 406 in the medication holder 404.

It will be understood by those skilled in the art that any number of medication openings 406 may be provided within a container holder 404 of the medication self-management detection subsystem 116. However, it is believed from current research that the daily medication management needs of a majority of users of the user monitoring system 100 may be met by eight medication openings 406 and eight corresponding medication containers 402 although only three are shown in order to simplify the drawings. It will also be understood that the openings 406 of the container holder 404 and the medication containers 402 may be provided with keying features so that only the correct medication container 402 may be placed into an opening 406 of the medication holder 404.

While the above describes many of the features of a preferred embodiment of the medication self-management detection system 116, it should be noted that various arrangements of medication holders and dispensers may be used. For example, the medications within a medication holder 404 may be organized according to the time of day they are taken. In this type of organization medications which are taken at the same time may be loaded together into a single compartment within the medication holder 404. A plurality of these compartments may be provided within the medication self-management detection system 116. The opening and closing of these compartments may be monitored by the medication self-management detection system 116 in substantially the same manner as

previously described with respect to monitoring the removal of the medication containers 402 from the openings of the medication holder 404.

As previously described the pulsed transmissions from the medication transmitter 424 to the system controller device 110 may carry a plurality of differing codes corresponding to the plurality of differing medication containers 402. Each pulse code corresponds to an individual medication container 402 and indicates when its corresponding medication container 402 is currently removed from the medication holder 404.

The system controller device 110 of the user monitoring system 100 is programmed to record the times of removal and replacement of each medication container 402 within medicine holder 404 according to these transmissions. It is also programmed to determine scheduled on-time removals of each of the medication containers 404 from the medicine holder 404. Compliance data representative of these determinations according to transmissions from the medication self-management detection system 116 may be transferred to the case monitoring site 148 for intervention decisions.

The system controller device 110 of the user monitoring system 100 may be programmed to determine when user compliance does not conform to a scheduled regimen. After a selected time period, for example, one-half hour, without user compliance, voice data from the voice data storage device 224 may be applied by the controller device 110 to the in-home telephone 132 to remind the user to take medications. The system controller device 110 may also provide general and specific reminders and inquiries to the user concerning medications after the user returns from being away. These reminders and inquiries may be made with respect to all medications or with respect to specific medications. The system controller device 110 may also provide specific time scheduled reminders to take medication.

Referring to Figs. 6, 7, there are shown two embodiments of the stove safety detection subsystem 120, the stove safety detection subsystem 600 and an electric stove safety detection subsystem 700. The stove safety detection systems 600, 700 of Figs. 6, 7 are preferred alternate embodiments which are adapted for monitoring and controlling gas stoves and electric stoves, respectively.

The stove safety detection subsystems 600, 700 of the user monitoring system 100 each include an appropriate stove-in-use sensor for determining when a monitored stove

is turned on. Each stove safety detection subsystem 600, 700 also includes an appropriate shut-off receiver unit for receiving a radio frequency transmission from the system controller device 110 by way of the AC lines to turn the monitored stove off and protect the user. The stove-in-use sensors of the stove safety detection subsystems 600, 700 continuously provide information to the system controller device 110 of the user monitoring system 100 regarding whether the monitored stove is currently on.

The stove-in-use sensor 604 of the gas stove safety detection subsystem 600 is a gas flow monitor 604. The gas flow monitor 604 is disposed in the gas line 602 which supplies gas to the gas stove 610 in order to monitor the gas supplied by the gas line 602 to the gas stove 610. Gas flow information from the gas flow monitor 604 is pulse coded by a pulse coder 612. The coded signal from the pulse coder 612 is transmitted to the system controller device 110 by a gas stove transmitter 620 by way of the gas stove antenna 616.

The system controller device 110 may determine that the gas stove 610 must be shut off in accordance with the coded information from the gas flow monitor 604. If this determination is made by the system controller device, it applies a control signal to the gas stove safety detection subsystem 600 by way of the AC line 630. The control signal to the gas stove detection system 600 from the system controller device 110 is generated and transmitted by way of the AC power line transmitter 216 as previously described. This control signal is received by the controller receiver 628 of the gas stove safety detection subsystem 600. The controller receiver 628 instructs a gas shut off valve 608 by way of a step down circuit 608 to terminate gas flow through gas line 602 to the gas stove 610 in response to the control signal. This turns off the gas stove 610.

When the user monitoring system 100 monitors an electric stove 710, an electrical current draw monitoring device 704 is provided for use along with the electric stove safety detection system 700. The electrical current monitoring device 704 is applied to the AC power line 706 which supplies power to the electrical stove 710. By monitoring the AC power line 706 detector subsystem 700 is able to indicate the on/off status of the burners of the electric stove 710. On/off status information is coded by the pulse coder 712 and transmitted by an electric stove transmitter 720 by way of antenna 716 to the system controller device 110.

The system controller device 110 may determine that the electric stove 710 must be shut off in accordance with the coded information from the current draw monitor 704 as previously described with respect to the gas stove safety detection system 600. If electric stove 710 is to be shut off, the system controller device 110 applies a control signal to the electric stove safety detection subsystem 700 by way of the AC line 730. This signal is received by a controller receiver 728 of the electric stove safety detection subsystem 700. The controller receiver 728 instructs the electrical trip relay 708 to interrupt electricity through the electrical power supply line 702 to electrical stove 710. This turns electric stove 710 off.

When the stove safety detection subsystems 600, 700 provide information indicating that a stove is on, shut down predetermined control algorithms are followed in order to determine whether the stove 610, 710 should be turned off. These predetermined control algorithms are executed within the system controller device 110 of the user monitoring system 100. In the preferred embodiment of the user monitoring system 100 the algorithms operate upon coded information transmitted from the stove safety detection management subsystems 600, 700 and the movement detection subsystem 112 in the following manner although the other algorithms may be used if desired:

> If (no movement detected for 30 minutes) or (away-mode status) and stove-on status), then (call with stove reminder).
>
> If (no answer to call), then initiate shut down and record event. If (call is answered and 1 is pressed), override shut down.
>
> If (stove on status) and (smoke detector tripped), then initiate shut down and record event.
>
> If (stove is on for [X] minutes), then alert remote site host with automated telephone message: "Your stove is on, do you want it on ? If yes, press 1; otherwise, it will be turned off." Answering the telephone and pressing 1 override the shut-down sequence.

Additionally, management subsystems 600, 700 may include smoke detector sensor devices 632, 732 coupled to radio frequency transmitters 620, 720. The smoke detection sensor devices 632, 732 may be standard optical smoke detector modified to include a subsystem switching circuit (not shown) which is effective to provide a smoke detect control signal when smoke is detected by the senor devices 632, 732. The radio frequency transmitters 620, 720 of the smoke detection subsystem is coupled to the system switching circuit of the smoke detection sensor devices 632, 732 in a manner well understood by those skilled in the art.

When the sensor devices 632, 732 detect smoke within the home of the user they sound a fire alarm in a conventional manner. Additionally, the detection of smoke by the sensor devices 632, 732 activates subsystem switching circuit which activates the respective smoke detector transmitter 620, 720. In response the smoke detection transmitters 620, 720 provide a pulsed radio frequency control signal by way of the antenna 616. This control signal conveys information to the system controller device 110 of the user monitoring system 100. The information transmitted by the subsystems 600, 700 in this manner indicates to the system controller device 110 that smoke was detected by a sensor device 632, 732. It may also indicate which particular sensor device is triggered if more than one sensor device 632, 732 is used within a subsystem 600, 700.

Referring to Fig. 8, there is shown a more detailed schematic representation of the current draw monitor 704 of the electric stove detection subsystem 700. The current drain monitor 704 may include a passive clamp coil 730 disposed around the electrical supply line 706 which applies electrical energy to the electric stove 710. Electromagnetic fields arising from the current applied to the stove 710 by way of the electrical supply line 706 thus induce current in the passive clamp coil 730. The current induced in the passive clamp coil 730 may be rectified by a bridge rectifier 734, amplified by an amplifier 738, and applied to a diode switch 742. The diode switch 742 may then control the gate of silicon control regulator 746 to apply energy to the pulse coder 712.

It will be understood that any method may be used for sensing the electromagnetic fields arising from the current applied to the stove by way of the electrical supply line which induces current in the passive clamp coil 730, provided the current induced in the passive clamp coil is used to toggle an electronic switch of suitable design to

control a pulsed radio frequency signal indicating to the system controller the on/off state of the stove 710. Additionally, it will be understood by those skilled in the art that pulse code 710 may be controlled by any other means for determining the state of stove 710.

Referring to Fig. 9, there is shown a preferred embodiment of the water overflow detection subsystem 124 of the user monitoring system 100. The water overflow detection subsystem 124 may be installed on plumbing fixtures such as sinks and bathtubs within the home of the user being monitored by the user monitoring system 100. Within the water overflow detection subsystem 124 a water level sensing device 1004 and a remote controlled shut-off device 1030 are provided in communication with the system controller device 110 of the user monitoring system 100.

In the principles of its operation, the water overflow detection subsystem 124 is similar to the gas stove safety subsystem 600 previously described. The water level sensing device 1004 or water level monitor 1004 sends information to the system controller device 110 by means of a pulsed radio frequency water level transmitter 1002. The system controller device 110 is programmed to initiate shut off of water within overflow detection subsystem 124 by means of a radio frequency remote control signal. The radio frequency remote control signal is transmitted through the home of the user by way of the AC lines.

The control signal from the system controller device 110 is received by the controller receiver 1044, stepped down by step down circuit 1040. The stepped down signal is used to control resetable electrically controlled water valves 1034, 1038. The electrically controlled valve 1034 may control water flow from an inlet pipe 1026 to a tub supply pipe 1028. The electronically controlled valve 1038 may control water flow from an inlet pipe 1026 to a sink inlet pipe 1032.

The water level sensing device 1004 includes two water level detectors 1006, 1012, and a siren module 1018 having a conventional timer. A siren transducer such as a piezoelectric crystal is also provided. A three-state pulsed radio frequency transmitter 1002 may be provided within the water overflow detection subsystem 124.

When water is sensed at a warning level by the level detector 1006 the system controller device 110 of the user monitoring system 100 is informed that water is approaching the warning level mark. When this is detected the user monitoring system 100 calls the user on the in-home telephone 132 in order to provide a reminder. When the level

detector 1012 determines that the water level has approached the high water mark, the siren 1024 sounds. Additionally, the received radio frequency pulse data informs the system controller device 110 of the user monitoring system 100 to turn the water off. This event is logged within the system controller device 110. The water overflow detection subsystem 124 may be programmed to permit resetting of the valves 1034, 1038 in response to commands from within user monitoring system 100 or from the case monitoring site 148.

Referring to Fig. 10, there is shown a block diagram representation of the auxiliary appliance detection subsystem 128 of the user monitoring system 100. The auxiliary appliance detection subsystem 128 provides additional channels to the user monitoring system 100 for monitoring and controlling further appliances 1116 or devices 1116.

The on/off state of the further device 1116 is monitored and transmitted to the system controller device 110 of the user monitoring system 100 by means of a current draw detector 1108. The current draw detector 1108 monitors current applied to the device 1116 by way of the AC power supply line 1114. The current draw detector 1108 is coupled to a radio frequency auxiliary transmitter 1112 which transmits a two state signal representing on and off. This information may be used by the system controller device 110 both for status change data and for generating a daily activity data log. The current draw sensor 1108 of the auxiliary detection subsystem 128 should be sufficiently sensitive to distinguish between trickle draw and operational power when auxiliary device 1116 is a solid state device such as a television or a clock radio.

In addition to the monitoring of the use of a auxiliary device 1116, automatic remote control of the device 1116 may be accomplished. The system controller device 110 of the user monitoring system 100 may be programmed to control a controlled outlet or receptacle adapter which applies energy to the AC line 1114. This control may be exercised at predetermined times of the day or upon certain environmental occurrences. For example, when the user monitoring system 100 is in the away mode this feature may be used to automatically turn the auxiliary appliance 1116 off. More than one auxiliary subsystem 128 may be provided within the user monitoring system 100.

Furthermore, monitoring system 100 may be provided with an auxiliary detection system which is not monitored by a current draw monitor 1108 or controller

receiver 1104. For example, the multichannel receiver 212 of system controller 110 may be used to monitor smoke detection subsystem 900 shown in Fig. 9.

It will be understood that many differing combinations of auxiliary detection subsystems may be provided within the user monitoring system 100 of the present invention. It will also be understood that these combinations may be used in combination with automated dialing systems at other locations. Automated dialing systems which may call the dwellings of various users, for example, one or more times a day have been developed. This provides the user with an opportunity to return a predetermined signal if there are no problems and return a different predetermined signal or no signal if there are problems.

These services may give users up to six automated contacts per day. For example, an automated dialing system for providing medication compliance reminders, suitable for use with the user monitoring system 100, has been field tested. In this automated reminder system users were called daily and reminded to follow their medication regimen.

Referring to Figs. 11A-11M, there are shown flow chart representations of the operations of the various subsystems of the user monitor system 100. Fig. 11A is a flow chart representation of a method for determining which of the various subsystems has initiated an event for processing by the controller 110. Fig.11B is a flow chart representation of a method for determining whether the user has arisen by a designated wake up time. This method may be performed in response, for example, to a signal from the motion sensor 304. Fig. 11C is a representation of a method for determining whether the user is complying with the medication schedule as indicated by the subsystem 116.

Fig. 11D is a representation of methods for determining whether a stove has been left on according to the subsystem 600 and whether the smoke detector 732 has been activated. Fig. 11E is a flow chart representation of a method for turning off the stove 610, 710. Fig. 11F is a flow chart representation of a method for controlling water flow according to the subsystem 124. A pseudocode representation of a method for controlling water flow is set forth in Table I.

Is there a flow

If yes

Is there a change of state

If yes

send event to main controller

If no

recycle to flow monitor

If no

Is there a change of state

If yes

send event to main controller

If no

recycle to flow monitor

Is there water overflow

If yes

Send event to main controller

If no

Is there water warning

If yes

send event to main controller

If no

recycle to water overflow

Table I

Fig 11G is a flow chart representation of a method for alerting a user that an appliance has been left on, for example, in accordance with the bridge rectifier 734. Fig 11H shows a method for calling a designated party when an alert has been determined. Fig 11I shows a method for recording the detection of movement, for example, in response to a signal from the motion sensor 304.

Fig. 11J is a flow chart representation of a method for reading switches within the user monitoring system 100. A pseudocode representation of a method for reading switches is set forth in Table II.

Is the switch open

If yes

Is there a state change

If yes

send event to controller
turn off light

If no

recycle to open test

If no

Is there a state change

If yes

send event to main controller
turn on light

If no

recycle to open test

Table II

Fig. 11K is a flow chart representation of an algorithm for determining either current flow or gas flow. Fig. 11L is a flow chart representation of an algorithm for detecting water overflow. Fig. 11M is a flow chart representation of an algorithm for controlling an auxilliary appliance. A pseudocode representation of this method is set forth in Table III.

Is the automatic timer set

If yes

Is there current draw

If yes

Is turn off timer exceeded

If yes

turn off appliance
send event to controller

If no

recycle to AT set

If no

Is turn on time exceeded

If yes

turn on appliance
send event to controller

If no

recycle to AT set

If no

Is there current draw

If yes

Is there a state change

If yes

send event to main controller

If no

recycle to AT set

If no

Is there a state change

If yes

send event to main controller

If no

recycle to AT set

Table III

As previously described, using the microprocessor based system controller device 110 and a system of sensors the user monitoring system 100 can determine, for example, whether users are up and about in their homes and whether they are having difficulty managing their medications. It can also be determined whether the user has accidentally left a stove on or has failed to get out of bed a predetermined number of hours after a usual waking time. If the user monitoring system 100 detects any of these or other problems it can then call the user on the in-home telephone 132 to provide a reminder about the medications, stove, or other detected problems.

Using this data from the user monitoring system 100, the remote case monitoring system 148 may provide on-line case monitoring of each user by receiving standard information and information designated as priority information and analyzing the

received information. In order to do this, the remote case monitoring system 148 converts incoming data on each user into various summary reports which track the activities of the client. This makes it possible to distribute specialized gerontological every day living summary reports to users, family members, case managers, physicians and others. It also makes it possible to collect and act upon the designated priority information which may indicate immediate problems for the user. For example when a user appears not to have gotten out of bed a problem may be indicated.

Additionally, the collection of this kind of data by the remote case monitoring system 148 may provide an aggregate data base for identifying which users require personal interventions and which do not. In order to perform these functions the remote case monitoring system 148 serves as a central hub for the collection, analysis and exchange of information which has direct case management import. It should be understood that in different embodiments of the inventive concept different degrees of autonomy of the local system controller 110 in relation to the remote system 148 are possible. In one embodiment a local system controller 110 may be programmed to perform many functions performed by the remote case monitoring system 148 in another embodiment.

For example the dialing and sending of voice messages to a list of relatives and providers may be performed either by the local system controller 110 or the remote case monitoring system 148. However, it will be understood that the primary function of the local system controller 110 is to provide lower level case management of local observations and decisions and the primary function of the remote case monitoring system 148 is to provide higher level case management to enable long term interpretation of the data obtained from the user monitor system 100 and intervention in view of the long-term interpretation.

Thus in the preferred embodiment of the present invention, the user monitoring system 100 or the remote case management system 148 may use its electronic records to enable the production of scheduled periodic user activity reports based upon information gathered by the various subsystems of the user monitoring system 100. These periodic reports may include collections, compilations and arrangements of information on any or all of the monitored activities within the user's living area. These electronic records may be used in combination with any other information to produce any type of periodic activity reports desired on the user being monitored. These user activity reports may be used

by a professional case manager or a designated family member to determine if the user is experiencing problems with specific activities of daily living. Thus these problems may be dealt with before they become a threat to the continued well being of the user and the ability of the user to live independently.

Furthermore, in addition to providing remote case monitoring and in-home reminders, the user monitoring system 100 may be programmed to take corrective actions when certain problems are detected. For example, if the user being monitored has not gotten out of bed by a predetermined time the user monitoring system 100 may call the user on the telephone 132. If there is no answer to the telephone call the user monitoring system 100 may be programmed to automatically transmit this information to the remote case monitoring site 148.

A social worker, health professional or designated family member at the remote case monitoring site 148 may respond to the transmitted information according to a predetermined protocol. In addition to transmitting the information to the remote case monitoring site 148 the user monitoring system 100 may provide control signals within the home of the user. For example, if the user monitoring system 100 of the present invention determines that a stove has been left on, the user monitoring system 100 itself can turn off the stove.

The remote case monitoring system 148, in association with the user monitoring system 100, may serve the functions of a case management site. In an example of the case management site function of the remote case monitoring system 148 the case management site may monitor approximately fifty distributed clients, each using a distributed user electronic monitoring system 100. The fifty clients thus have the system controller 110 and various subsystem sensors installed in their dwellings in ways appropriate for the specific configuration of their living areas. For example, the various subsystem sensors must be adapted for different floor plans and furniture arrangements.

The remote case monitoring system 148 may receive information from the distributed user monitoring systems 100 on an immediate basis or at predetermined time intervals. For example, the remote case monitoring system 148 may receive information hourly, daily or weekly basis. If one of the clients does not get out of bed within a predetermined time duration and does not answer the telephone, the local system controller

110 of the user monitoring system 100 at that client's house may call the case management site. At the case management site, this event may be brought to the immediate attention of the human case monitor, for example, by means of a computer screen. The remote case manager may examine individual case and data records for the client being monitored to learn the predetermined response for the monitored person when the reported event occurs.

Likely interventions required of personnel at the case management site may include calling a local case manager, a hospital social worker or a local next of kin. Other actions the remote case monitor may execute include calling the user, remotely downloading the last twenty-four or forty-eight hours worth of event summary information from the local user monitoring system 100 and remotely initiating a diagnostic sequence on the local user monitoring system 100.

The protocol of procedures for intervention by the remote case monitor 148 may differ from one remote case monitoring system 148 to another and from one user to another. It is anticipated in the preferred embodiment of the invention that various intervention decisions such as who to call when predetermined events occur and what messages to deliver may be carried out by a machine intelligence expert system (not shown) at the remote case monitoring system 148 or by a person or a combination of both. The local user monitoring system 100 may also be programmed to carry out such decisions as who to call when appropriate. For example, the user monitoring system 100 may have a contact list of people to contact in various emergencies.

In addition to receiving and interpreting data indicating the need for intervention in event of emergencies, the remote case monitoring system 148 routinely receives downloaded data from individual user monitoring systems 100 at predetermined intervals. This data is interpreted on the individual and aggregate level by means of trend analysis software which detects larger than statistically normal deviations from event pattern measurements. The remote case monitoring system 148 may use this analysis to produce periodic summary reports of events relating to everyday living tasks in the home environment of the user. More specifically these reports may be used to detect certain event classes, to weight them in terms of their relative importance and to compare them with baselines of task performance. The events weighed with respect to their importance may include getting out of bed, managing medication, the proper control of a stove, the proper

control of water flow, and the proper control of selected electrical appliances. Based upon the reports of these events, gerontological living summary reports may be prepared in machine form and paper form at the remote case management system 148 for distribution to predesignated parties involved in the case management of the user of the user monitoring system 100. These parties may include the users themselves, relatives of the user, case manager social workers, physicians and other appropriate formal and informal providers.

Two additional functions of the remote case monitoring system 148 may be provided. These functions are: (1) the remote programming and reprogramming of the user monitoring system 100, and (2) the generation of aggregate and individual level data on relatively large numbers of users. This data may serve both as an empirically grounded knowledge base driving the decision protocols for both humans and machines as well as research data for further development of the user monitoring system 100.

In order for these functions to be performed data must be transmitted between the user monitoring system 100 and the remote case monitoring system 148. Information transmitted to the system controller 110 of the local user monitoring system 100 from the remote case monitoring system 148 may include three different types of commands: queries, diagnostics and settings. The query commands request the downloading of specific information from the memory of the user monitoring system 100 to the remote case monitoring system 148. The requested information forms the basis of the gerontological everyday living events report along with specific information necessary for case monitoring by the remote system 148. For example the status of different subsystems of the user monitoring system 100 might be made available to the remote system 148 when the motion subsystem 112 indicates that the user has not gotten up in the morning.

The diagnostic commands to the local user monitoring system 100 test the different subsystems of the system 100 by suppressing the ability of the system 100 to either call out interventions or change settings on any of the remotely controlled devices while at the same time initiating a sequence of event codes which indicate the presence of various kinds of problems as if they were indicated by the different subsystems.

The setting commands from the remote case management system 148 to the user monitoring system 100 reset the parameters on the timers within the user monitoring system 100 as well as other variable values for the decisions made in the decision trees

described hereinbelow. These parameters may include, but are not limited to, the time of waking up, the times for taking different medications and the length of time which should elapse prior to turning off the stove.

Transfer information transmitted in the opposite direction, from the system controller 110 of the user monitor system 100 to the remote case monitoring system 148, includes two types: (1) priority specific data transfer and (2) standard data transfer. Priority specific data transfer is initiated by the local system controller 110 by means of dialing the remote case monitoring system 148 by way of the telephone line 144 or by means of another data link (not shown) and indicating the presence of a problem which the remote case monitoring system 148 must detect, record and act upon.

Situations in which the local system controller 110 dials out to inform the remote case monitoring system 148 that the user did not get out of bed or that the stove was left on, are potential emergencies and are therefore examples of priority specific data transfer. Standard data transfer includes the downloading of event log information for each subsystem. This information is used to produce trend analysis reports which show the frequency of occurrence of different events over a predetermined time period such as six months. Thus the trend analysis report might show that over the course of six months the user became increasingly noncompliant with medications and/or increasingly likely to leave the stove on inappropriately. Using a known trend analysis technique, software driven reports can detect increasing frequencies of problems of every day activities.

The trend analysis report may be a monthly paper or machine report which provides several indicators of performance on different areas of everyday living monitored by the user monitoring system 100. These areas may include waking and sleeping, medication management, stove management, water flow management and the operation of additional appliances. The raw data for this report is based on the event log data transferred from the local system controller 110 remote system using standard data transfer and priority specific modes. The raw data is used to provide a continuous baseline of the successful and not successful completion of the five task areas.

For example, in one month a user may use the stove fifty-five times and leave it on in violation of the programmed protocol two times. The monthly report line for the stove category might then show fifty-five uses and two usage errors. Furthermore, usage

errors may be classified according to level of importance by means of a weighting system. An error of, for example, skipping one medication may be weighted as considerably less significant compared with an error of leaving the stove on and leaving the apartment for several hours. Thus not only are errors recorded and plotted against continuous baselines over time in the trend analysis report of the system of the present invention, but the report is intended to contain a ranking system to reflect the potential negative impacts of different errors.

In addition to errors, the trend analysis report can plot deviations in behavior indicating changes in plot trend. For example, the trend analysis report can plot waking and sleeping hours and the number of times a user goes to the bathroom. While none of this in itself indicates a situation requiring intervention, sudden changes in sleep habits, bathroom use, even appliance use may indicate sudden changes in health or cognitive well being requiring a relative or a case management social worker or case management social worker or a physician to visit or interview the user.

While any number of combinations of interpreted data can be used in any number of specialized reports, it is anticipated that most case management sites and most relatives would want to know the frequency and severity of specific errors, the extent and accuracy of medication compliance and whether a waking or sleeping pattern of a user is changing radically. The trend analysis report provides case managers and relatives with this information and enables them to better help the user by locating subtle changes in behavior patterns, monitoring various kinds of potentially dangerous errors and keeping a record of baseline functioning in relation to monitored activities.

While the operation of the monitoring system 100 has been described principally with respect to the monitoring of a gerontological patient, it will be understood that system 100 may be used to monitor any type of patient, for example, infants and burn victims. Additionally, it will be understood that, using the correct sensors, monitoring system 100 may monitor any parameters relevant to these patients, for example, ambient temperature, body temperature and blood pressure. In general, anything which may be sensed by a sensor and converted into an electrical signal may be monitored by the monitoring system 100. Additionally, the data could be made available to a doctor prior to routine doctor's appointments in addition to being used to compile reports at the remote

monitoring site 148. The system could be monitored by a friend or relative rather than by professionals at a remote monitoring site.

Local microprocessor based system controller 110 and its associated system of sensors can determine any activity of daily living desired. For example, system controller 110 can determine whether users are up and moving around in their homes. Additionally, it can determine, for example, whether the user is having difficulty managing medications, whether the user has failed to get out of bed a predetermined number of hours after a usual waking time, and whether the user has left the stove on. Furthermore, system controller 110 can determine other detected problems.

As previously described, various degrees of autonomy of local system controller 110 from remote monitoring system 148 can be obtained in various embodiments of the invention. Thus, system controller 110 can be programmed to perform many functions performed by remote monitoring system 148 in other embodiments of the invention. However, it is understood that the primary function of local system controller 110 is to provide lower level case management of local observations and decisions and the primary function of remote monitoring system 148 is to provide higher level case management and enable long term interpretation of the data.

Using the information sent from local system controller, remote case monitoring system 148 can provide on-line case monitoring of any number of users by receiving standard priority information or other information and analyzing the received information. When performing these operations remote case monitoring system 148 converts incoming data on each user into various summary reports which track the activities of the individual users.

Monitoring and analyzing the received information in this manner makes it possible for remote case monitoring system 148 to distribute specialized everyday living monitoring summaries (ELMS) reports to other parties. For example, the reports obtained in this manner can be distributed to family members, doctors, case managers, and others.

The monitoring and analyzing by system controller 110 and remote case monitoring system 148 also makes it possible to collect action priority information. For example it is possible to determine when users do not get out of bed. In addition it may

provide an aggregate data base for identifying users requiring personal intervention. Additionally, it may be possible to provide a central hub for the collection and exchange of information with direct case management resources.

Local system controller 110 can be programmed to perform a variety of functions related to data base report generation and intervention decisions. In one embodiment of the invention system controller 110 can be programmed to learn activity patterns of the user. The learning by system controller 110 occurs through analyzing sensor data and performing a variety of operations that change various parameters of the user. For example, timing and frequency parameters of expected activity events can be changed based upon a trend analysis of the past timing, frequency, duration and concomitance of events. The trend analysis can be based upon an interval of a week, a month, or other time period for which data is internally stored.

The learning of user activity patterns by system controller 110 or remote case monitoring system 148 can be accomplished using various techniques. In most of these techniques the learning process involves the changing of variable values, parameter settings and decision algorithms. The quantities changed in this manner are changed with respect to interpreting data derived by sensors for machine initiated interventions and the production of various reports.

The determinations of the system of the present invention are based upon the assumption that the best predictor of future behavior is past behavior and upon the empirical knowledge of the relatively invariant frequency, timing, and duration of essential activities of daily living as part of daily and weekly cycles. Using these bases, it is possible to use a variety of methods to determine whether the activities on a certain day fall within or outside of the range of statistically expected occurrences of the activities. In the preferred embodiment, the user monitoring system uses well known algorithms for analyzing continuous baseline data.

Variable values obtained by system controller 110 or remote case monitoring system 148 can be in the form of time and date stamped event data or transformations thereof. For example, the variables can be a count or a weighted frequency of occurrence of a predetermined measurement, such as the number of times within a predetermined time period a medication is taken or a toilet is flushed.

Using programming and statistical techniques well known and understood by those skilled in the art, system controller 110 can be enabled to learn the typical timing and frequency of a user taking each prescribed medication as well as the number of times that a user typically uses the toilet. Using such techniques it is also possible to learn the typical timing and frequency of the user opening and closing the refrigerator door, the silverware cabinet, the microwave oven, and the stove, as well as the typical time of getting out of bed in the morning.

Typical variable values used in the method of the present invention for the purpose of, for example, report generation and learning, can be understood in the common statistical sense of measures of a central tendency paired with an appropriate measure of dispersion. The measurement of the central tendency of sensor events can include measurements such as mean, median, and mode. The measure of dispersion can be measurements such as standard deviation and interquartile range.

There are various techniques for statistically determining a typical value of a measured event and then using this value to predict the value of future events. A common technique sets the typical value equal to its measure of central tendency bounded by a confidence level (sigma) equal to +/- the appropriate number of dispersion units to account for an alpha level of (typically) .05. For each measurement within an activity or event domain, these standard statistical procedures apply, especially as used in relation to continuous baseline or moving averages. For example, motion out of bed, the opening of a refrigerator, or taking a medication, controller system 110 may store this information and compare it with past similar events using well known statistical methods of determining whether it falls within or outside of the typical range.

For example, a waking time may be compared with thirty previous waking times by determining whether it deviates by more than two standard deviations from the arithmetic mean of the previous thirty waking times. This is one type of comparison of an individual data point with a baseline computed as a moving average of past events.

Controller 110 can be programmed to make decisions based upon comparisons of new event data with past event data such as this. For example, machine initiated interventions and special data transfers or reports can be generated if a user appears to sleep more than two standard deviations past the average waking time. In this case the

trigger event is the lack of a signal from the sensor configuration used to establish that the user got out of bed. Thus, controller 110 need not remain programmed to expect the user to be awake at a predetermined time. Rather it can adjust and readjust the expected wake up time based upon the past sleep and waking patterns of the user.

In a similar fashion, system controller 110 can be programmed to permit the computing of average or typical expected values for any sensor based data or data derived from sensor based information. Programming controller 110 in this manner requires programming it to permit storing and updating of moving averages and sigma values for time, duration, and frequency of the activity and comparing the stored updated values to incoming data points.

System controller 110 can be enabled to change parameter settings in which variables are specified. For example, the number of medications within a medication regime can be increased from two to three on a daily basis. Using an additional position/compartment/switch provided on the medication monitor, the present invention can determine information for initializing a new variable associated with the new medication and begin recording time and date stamped information on its usage.

After several days, while the user takes the new medication, the average time and frequency baselines associated with the new medication become stable. Simultaneously, the sigma level (per. eg. two standard deviations) tends to become smaller in terms of the number of measured units as the number of observations increases. This permits system controller 110 to detect errors such as taking too few or two many of the third medication in a given day.

Other changes in parameters that can be learned by system controller 110 are those associated with changes in meal preparation by the user. An individual user may have a pattern of preparing meals twice daily. For example, the user may normally prepare meals only in the morning and in the evening. The user may only rarely prepare lunch. The timing, frequency and duration of the sensor correlates of meal preparation change.

In principal, it is possible for the system controller to learn any pattern of repeated behaviors conveyed to it by a sensor capable of signaling the occurrence, non occurrence, time and duration of any activity event.

Activities of Daily Living: "ADL's"

ADL's (Activities of Daily Living/Instrumental Activities of Daily Living) comprise those goal oriented activities which must be performed by or for a person in order to live independently in their dwelling. These include bathing, transferring, dressing, eating, grooming, meal preparation, light housekeeping, laundry, medication management, and other necessary tasks relating to personal care and household maintenance. We turn now to additional means for sensing and monitoring various activities germane to the current invention.

Toilet use can be monitored various sensor configurations. In the preferred embodiment, a motion detector and a flush switch detector are used in concert with a pressure sensor/position sensor combination on the toilet seat. The motion detector is placed in the bathroom and indicates the presence of individual(s) without regard to specific activity.

Bed-wetting can provide a problem requiring monitoring in a variety of situations. Bed-wetting can be monitored by means of moisture sensors placed under the on the surface of an under sheet pad on which the monitored individual lies.

Meal preparation may be monitored by means of a combination of sensors indicating the opening and closing of drawers, cabinets and appliances typically used by the client to prepare meals. In one embodiment, the refrigerator door, the silverware drawer and the microwave were monitored with reed switches to determine the presence, timing and duration of use corresponding to meal preparation. In an alternative embodiment, electric current flow detectors could be used to record the use of various appliances (e.g., coffee maker, toaster oven, etc.) used in meal preparation. Additional heat sensor configurations could be used to scan the stove. Pressure sensors, with or without weight differentiating means, could be used in the chairs at the eating table, etc.

For the current invention, variety of means have been developed to employ a small radio frequency transmitter and movement sensing trigger which can be attached directly to household objects thereby conveying to the system controller when these objects are manipulated. The preferred embodiment uses such an object movement detector (OMD) consisting of an inertia-momentum sensitive switch (mercury bulb or vibration detector) coupled to a transmitter with a timer/bounceless switch and timer reset which is small, low

in current draw and which can be attached to the object. When the object is moved/manipulated, a pulsed RF signal is emitted which identifies the object and is received by the local controller and time and date stamped. Such a jiggle detector can be attached to brooms and hairbrushes, electric razors and assisted devices like walkers and reachers.

Eating can be monitored through the use of pressure pad sensors on tables and chairs and if need be the use of OMD's on silverware. Housekeeping can be monitored by placing OMD's on broom, dustpan, vacuum cleaner to react to manipulation. In principal, any ADL/IADL can be monitored by means of a configuration of sensors and this information transmitted to the local controller and integrated into the daily activity log for use by care providers or for machine initiated interventions such as reminders. Laundry activities can be detected using a current draw detector on a washer or dryer. The appliances' electric lines can be passively coupled to a current draw detector configured to transmit a signal to the local controller when they are in use resulting in time date stamp and duration data to be logged.

Grooming consists of a variety of behaviors, commonly inclusive of hair brushing (for women), shaving (for men). This affords the possibility to attach an object movement detector (OMD) onto the hairbrush, razor, and other grooming implements to signal the local controller when the grooming behavior is taking place.

Bathing can be monitored by several means. A variety of devices can be coupled to the plumbing to determine if water is flowing into the tub/shower. A water/moister detector can be placed in the tub or at the opening of the faucet/shower head to react to the presence of water flow without direct physical connection to the plumbing. A pressure sensitive switch in an insulated no slip mat at the bottom of the tub/shower could be fitted with an RF unit so when the individual steps or sits on the surface the information is conveyed to the local controller. Each or a combination of these methods could be used to determine bath/shower use and transmit sensor data to the local controller.

Dressing consists of a complex ensemble of tasks requiring both cognitive and manipulative functions. For this reason specialists in geriatric functional assessment regard dressing as a benchmark of overall functional health and the length of time it takes to get dressed as an indicator of level of functioning sensitive to changes in ability. Dressing

can be monitored by placing reed switches on the dresser drawers and placing sensors in the closets can indicate the presence, time and duration of dressing activity.

Non-ADL Activity monitoring

In addition to task oriented activities, there are repeatedly occurring behaviors which are both important to the individual's lifestyle and indicative of their normal behavioral routine. This behavior includes a range of sedentary recreational activities such as television watching, radio or audio entertainment usage, computer usage, book reading, needlepoint, etc.

Such activities can be monitored in various ways. Those involving the use of electronic or electrical appliances can be monitored by a variety of means capable of determining when the appliance is on or off. For example, a television can trigger a current draw detector or a photo diode mounted on the corner of the CRT display. The detector should be configured to send data whenever the television is turned on or turned off so that it would be possible to log the time on time off on a daily basis. Given the popularity of television and the relative regularity with which it is viewed by many people, it may be useful to use this data in various ways. For example, behaviors whose change can be monitored could include early and late television watching. Similar techniques could be employed in relation to CD, radio, VCR's, computers, etc. which could produce information indicative of normal daily activity.

For example, an individual may typically watch favorite programs in the afternoon between 2 and 5 pm Mondays through Fridays. This activity, while not directed toward achieving functional performance goals maybe nevertheless an important part of the typical or normal daily routine of the individual. Changes in television viewing routine patterns, for example not watching the afternoon shows or watching 14 hours of television continuously may indicate a change of activity rooted in a health, cognitive or other problems and therefore may provide very useful information for reporting purposes or interventions. The preferred embodiment of the monitoring system television use is monitored by means of a current draw detector. However, it is to be understood by those skilled in the art that many commonly used means of determining whether the unit is on or off can be used to send a signal to the monitoring system. Furthermore, similar techniques

could be employed in relation to CD, radio, VCR's, computers, etc. which could produce information indicative of normal daily activity.

Distinguishing Among Several Individuals in Dwelling Unit

The present invention also includes means for distinguishing the activities of individuals in multi individual dwelling units. It may sometimes be useful to separately log the activities of two or more individuals living in the same household. In the case of medication adherence, this simply entails using separate medication monitoring caddies for each individual, each caddy signaling the local controller unit codes unique to the individual person being monitored. In the case of other activities, such as transference, toilet use, bathing, meal preparation, laundry and housekeeping it is necessary to introduce a variety of methods for distinguishing among multiple individuals and creating a separate activity log for each individual. Described below are a variety of methods that do not require the user to carry a special device on their person and rely entirely upon the individuals interaction with objects in their environment. Also described below is a special device, for example any type of transponder worn by the individual, which emits a very short range signal detectable used to detect the proximity of specific individuals to objects in their environment used in carrying out the monitored activities of daily living. In the preferred embodiment of the invention, the transponder or a similar device is not required for the system to work, but adds additional information to increase the validity of the determination of which individual is performing which task and when.

For transferring in and out of bed, it is possible to configure pressure sensitive switch pads on either side of the bed, on the floor, on the mattress, or both. With knowledge of who routinely sleeps on the right and who sleeps on the left, it is possible to configure these pressure sensors to indicate whether individual a or individual b is out of the bed.

For transferring onto chairs, it is possible to use a pressure sensitive sensor that responds to relative weight with sufficient precision as to distinguish between two individuals, such as a husband or wife. It may be possible to know which chair is customarily occupied by which individual, especially in relation to a married couple.

For toilet use, the above described differential weight sensor could be installed in the toilet seat along with a tilt switch sensor to indicate when the seat is in the upright position (customary for male urination) or in the downward position. Additionally

weight sensor pads could be embedded in a 'bath mat' in front of the toilet to assess weight differential. A variety of techniques could be used to signal toilet flushing, such as a flotation switch connected to an signaling unit such that when the water level in the tank drops below a threshold level, a the normally open float switch closes.

For bathing, a waterproof version of the weight sensitive bath mat could be placed in the bathtub to determine the differential weight of the person.

With respect to differential weight, in most case it is useful in a two individual household and the weight threshold should be adjusted to approximately the mean of the weight of the two individuals. Given the possibility that either individual may loose weight over time (or gain which is rarer) and the two weights become close to equal, it may be necessary to repeatedly weigh the individuals. This can be done unobtrusively using any known methods or just by wiring the scale and reminding the individuals to weigh in using his/her scales or transponders or some other means for differentiating the weights.

Physiological Measuring of Health Conditions

The monitoring of health conditions among individuals in their dwelling units consists of monitoring both their activities and their physiological functioning. A wide variety of physiological functioning measuring and monitoring devices are available for home use as variables, including, but not limited to, body temperature, pulse rate, weight, blood sugar, blood pressure, and oxygenation. All of these devices, such as infrared temperature, blood sugar and pulse readers, are currently available with digital readouts and could be easily modified to transmit the information to the local controller so that these physiological data could be recorded along with the activity data and integrated into a single report combining both kinds of information for family and professional care givers as well as for triggering machine initiated interventions. Many devices for taking measurements usable in accordance with the present invention are taught in Alyfuko, U.S. Patent No. 5,410, 471, which is incorporated by reference herein.

Furthermore, the system of the present invention can assist users in the measurements. For example, in order to determine blood pressure a user can be instructed by the system to be seated, put on the cuff and perform other required steps. If the readings obtained are not within predetermined ranges, the user can be instructed to repeat to the

measurement. This can be done by interactive software on the user's PC or by way of the internet.

An example of readings indicating intervention could be if a person is showing an trend toward decreased activity during the day and is not sleeping in bed at night. This can reflect symptoms of congestive heart failure (CHF). In this case decreased activity may be measured as fewer total movements around the house, fewer total movements going in and out of the dwelling unit, less frequent or slower (longer average duration) stair climbing (where applicable), and/or longer sleeping hours. The local controller could be programmed to trigger an intervention in view of decreased activity and/or not sleeping in bed at night, which would entail a request/reminder for taking a blood pressure reading during the next day. It could also plot the blood pressure against a continuous baseline of previously taken blood pressures, and, if either diastolic or systolic pressures fall outside of upper and lower critical values (sigma levels), action could be taken informing the monitored individual, their physician and/or other appropriate persons of a possible change in health status. Instructions to seek checkups or contact care providers can be the interventions indicated by the reports of the present invention.

When the physician compares the blood pressure data, activity log data and medication compliance data within an integrated health and functioning report, they are provided information invaluable for making adjustments to therapy. For another example, frequent over night bathroom use may indicate the presence of an infection. By combining information about toileting and body temperature readings in a single report, the physician or other care giver could be informed of evidence of an infection and make sure that the monitored individual is quickly seen by the appropriate providers. Again, it is possible to program the local controller to take action based on behavioral changes, physiological changes or a combination of the two. For example, the local controller may be programmed to request that the monitored individual take temperature and blood pressure or other measurements after night of unusual bathroom or other activity. In principal, any combination of physiological measuring devices can be integrated into the system by equipping them with a compatible RF transmitter and enabling these devices in the software.

In the various embodiments, the monitored individual is asked to participate in periodic automated check ups during which time they are reminded and prompted by the local controller to sit down at a table, take their temperature, take their blood pressure, etc. The controller prompts them using a synthesized or recorded voice that can be heard through speakers connected to a personal computer wherein the microprocessor of the local controller resides or a speaker phone connected to the local controller in the form of a stand alone unit. The individual is thereby instructed on what to do during the check up. The data captured by the controller is analyzed against the continuous baseline average and the results reported to the remote monitoring site. Thus the present invention permits the integration of information with respect to physiological and behavioral measures into a single report for human end users and/or machine initiated interventions.

Portability

While the current invention consists of various means for monitoring individual user or users in a dwelling unit, there is no reason why portable appliances could not be incorporated into the system. For example, a portable medication monitoring device could be carried by the user out of the home. This device could be enabled to record and/or remind the individual to take their medications. Upon returning to the dwelling unit, the medication unit is able to communicate by RF signaling to the local controller and information about medication taken outside of the dwelling unit is integrated with the information about medication taken that was collected in the dwelling unit. Thus it would be possible to integrate information about medication taking behaviors of the user outside the dwelling unit with the information obtained within the dwelling unit to develop a more complete picture of the individuals daily behavior.

In addition to portable medication monitoring, it is possible to have portable physiological monitoring (e.g., heart, respiration, blood oxygenation, blood pressure, etc.) and/or activity movement monitoring (e.g. odometer, walking odometer-like device, etc.) Likewise, similarly to the above described portable medication monitoring, it is technically easy to create data transfer channels and links integrate the signal data gathered from the portable units within the home-based local controller and use this as the basis for the production of daily living reports for human and machine use. Such reports and information products might prove very useful to maintaining the health and functionality of users.

Security and Environmental Monitoring

In addition to goal oriented functional activities and other behaviors which make up the routine everyday activity of individuals, the monitoring system of the present invention is capable of collecting and analyzing information relating to security, safety and environmental concerns within the dwelling unit. As described above, various embodiments of the monitoring and report generating system may be used to log activities relating to dangerous appliances, such as the stove, and, necessary, to take automatically initiated action in the event of a problem, such as shutting off the stove if it is determined that it has been left on too long or in the event that smoke or heat detector has been triggered.

Also described above are means and procedures for monitoring bathtub overflow, and in a similar manner, overflow of sinks in a dwelling unit. Both of these functions focus on detecting events that, if unchecked, may have serious negative consequences to the safety of the monitored individuals and/or the condition of the dwelling unit. In addition to these functions, there is a wide range of additional events impacting the security and safety of individuals and their dwelling units, which may prove very useful. For example, monitoring the closing and locking of the door leading outside of the house or apartment, along with reports and reminders, would reduce the risk of security problems for many individuals. Forgetful or disoriented individuals may be particularly helped by such a function. The monitoring of door closing and locking could be accomplished by a standard magnetic reed switch which opens and closes a circuit causing signals to be sent to the local controller in conjunction with a switch configuration fitted to the locking mechanism in such a manner as to enable the detection of the state of the locking mechanism as being either locked or unlocked. This switch would then be connected to the appropriate signaling device to convey information to the local controller so that the monitoring system could integrate this information into various reports and intervention decisions.

Ambient temperature above and below healthful levels is a real threat to the health and well being of frail elderly populations in particular. Each year heat waves and cold snaps kill scores, if not hundreds, of older people in part because of their physiological inability to adequately judge extreme and dangerous variation in ambient temperature. Many temperature detecting units, with either electronic or mechanical thermostatic components, are familiar to those skilled in the art of environmental control. Such units are commercially

available and routinely used in the monitoring and control of heating and cooling of buildings. By connecting temperature sensors to the appropriate signaling system, room temperature data can be transferred to the local controller, logged, analyzed and serve as the basis of machine generated reports as well as interventions. In the preferred embodiment of monitoring system, temperature sensors are used to trigger alerts and, if need be, automatically initiated communication with care givers if the temperature rises above a high threshold or falls below a low threshold. This functionality can save lives.

In principle, the information from security and environmental detectors can be integrated with the behavioral data within the local controller and be used, in conjunction with the behavioral information, to enable a variety of interventions. For example, the system could be configured and programmed to sense that the front door is unlocked, to note that there has been no movement in the dwelling unit since the door was shut, and take action by automatically locking the door. A variety of algorithms are possible for making interventions based on a combination of security and behavioral data.

Similarly, temperature data could be used in combination with behavioral information to inform analysis and interventions. For example, an increase in the amount of time an individual stays in bed along with the information that the room temperature has fallen below 50 degrees may be useful information to family or professional care givers who need to take quick action to help the individual. As with door locking and physiological measurements, there is no reason why environmental variables such as temperature could not be integrated into the reports and interventions of the monitoring system. Other environmental variables may include, smoke and particulate dust detectors (such as an optical smoke detector would measure), noise and vibration, carbon monoxide, humidity, etc. Any environmental condition that can be automatically detected using sensors could be used in connection to the monitoring system here described.

Internet

The use of the internet as a means of communication between the local controller and the remote monitoring site not only makes use of an efficient and cost effective means of exchanging information but also affords the possibility of multiple users and various types of individual and institutional users to access report information posted by local controllers to a website. In one embodiment, a number of local controllers use a

modem and automated dial up software to post activity logs onto a website using email as the means of data transfer. The posted email is then subject to interpretive post processing, converted to a variety of summary reports for different users. For example, relatives of the monitored individual may access the website, type in a pin number or password, and for access a report about basic day to day activities. Or a physician group at a hospital could access the website using and institutional portal and be able to get a report on medication adherence in greater detail than that available to the monitored individual family members. The remote monitoring station with its website could also be programmed to store and process financial and billing information relating to the access fees and report request transactions for the various individual and institutional clients. For example, family members might pay a relatively low monthly fee for monitoring and a small transaction fee for each report accessed while a health provider system might pay a substantially higher per month fee and report fee. Billing can be done by the remote monitoring site computer along with the above discussed processing and transfer of activity information on the monitored clients.

Whereas the internet provides excellent means of exchange of information in non emergency situations, it may be useful to couple the system to a pager to call helpers and family in case of an alarm code. For example, if a monitored individual does not get out of bed before a critical time lapse, paging can be done in conjunction with or in place of phone calls. Using alphanumeric display technology common in pager systems, the nature of the possible emergency can be designated using ASCII codes in place of the synthesized voice used on a voice telephone.

The internet can be used as a means of information transfer between local and remote controllers for any purpose. For example, the local controller can dial up an internet service provider (ISP), log on, and send or receive packets of data for purposes of analysis, intervention, report writing, reprogramming, etc. The remote monitoring site, structured as a web page, can store, analyze and disseminate a wide variety of user reports in various ways. In one embodiment, the local controller is programmed to access the internet periodically (e.g. every 6, 12, 24 or other number of hours) and transfer data to a remote site in the form of web server. The remote monitoring site receives the information and makes it available to the client, family, professional care givers, case managers, health care providers and others

who can access this information by logging on and entering secure portals using standard identification and password protocols. This enables a wide variety of users to make queries of the reports, analysis and records based on the monitored client(s).

Furthermore, the plurality of user portals by which clients (i.e., monitored individuals), family members (informal care givers), health providers, social support agencies (formal care givers), can each access client information at will could be used to automatically create a transaction record usable for information tracking and billing purposes. Figure 12 below illustrates an embodiment of an internet web site with multiple user portals. In this way, clients and other subscribers can be tracked and billed for information accessed in a wide variety of ways. In one embodiment, clients gain free access and registered family members can make a number of included queries per month with a per query charge thereafter. Hospitals can also be charged a per query fee.

In addition to placing client information on a web server and allowing registered users to access the information, it is also useful to periodically transfer information and reports to subscribers via e-mail. Thus family members, physicians, case managers and others can receive periodic machine generated reports on the client (daily, weekly, monthly, etc) via email which may be received on one's computer or any other device capable of receiving email messages. In addition, emergency or quick response options for information transfer via the internet are afforded by linking the internet with a wide variety of wireless devices, including, but not limited to cell phones, pagers and personal data assistants. For example, if a monitored individual does not get out of bed before a critical time lapse, paging can be done in conjunction with or instead of phone calls. Using alpha numeric display technology common in pager systems, it would be possible to designate the nature of the possible emergency using displayed printed words in place of the synthesized voice used on a voice telephone.The linking of local controller 100 and the remote monitoring site via internet as a communication channel need not alter the essential features of the local controller and remote monitoring site. The local controller can be used for obtaining, storing, organizing and analyzing sensor based data in the dwelling units of the monitored individuals. As mentioned above, it is possible to configure/program the local controller to carry out many of the functions of the remote monitoring site. Thus a wide variety of embodiments with differing amounts of functionality distributed among local

controllers and remote monitoring systems are possible. In principal all functions of report generation, automated behavioral and physiological profiling, machine initiated reminders and interventions can be carried out for individuals within a single dwelling units by the local controller. It is therefore possible to greatly reduce the number and complexity of functions of the remote monitoring site as long as an end user receives information about the client from this site.

In one embodiment the remote site is reduced to a pager, phone or radio receiver, which signals care givers and others when the client is in need or reports information via synthesized voice or displayed text. In this case the functionality of the local controller is maximized and the remote monitoring site minimized. On the other hand it is possible to have a monitoring system configured whereby sensors are placed in a dwelling unit and the local controller consists of no more than a system for gathering their outputs into a usable communication channel which then is processed by the remote monitoring site. This would be a minimalized local controller dependent for data analysis functionality almost entirely by the remote monitoring system. In the preferred embodiment, higher level functions of case management pertaining to the collection and analysis of data on single or many individuals in single or many dwelling units are carried out by a remote monitoring system whereas local controllers function primarily to log, analyze, report and make automated inventions based on sensor data within a single dwelling unit and the local controller is in the dwelling unit and that the remote is not.

The ubiquity of the internet makes it a preferred means of communication link between the local controllers and the remote monitoring site. There are various means of transferring data to, through and from the internet known to those skilled in the art. In a preferred embodiment the communications link between local and remote monitoring sites can be established and maintained by email. The activity log is simply uploaded as a text file and mailed to the remote site, which receives it, places it in the correct mailbox, processes it and then may automatically send out reports via email to end users (e.g., family, physicians, social workers, etc.) , or posts reports on a secure website accessible by password to family and professionals.

Referring now to Fig. 12, the preferred embodiment of the internet based remote monitoring site is organized in the form of a web page 1001. Web page 1001 allows clients to access information about the monitored individuals by means of client portals. Two portals are shown. The individual portal 1007, allows the monitored individual and designated individuals (such as family members) to access the behavioral and other information which is accumulated and integrated by the local controller and transferred to the internet by any variety of commonly used means. The institutional portal 1008, allows for institutions (e.g., health care providers, case management service units, insurers, etc.) to access information about monitored client). In the preferred embodiment these portals make use of commonly employed means for assuring security of the information about individual clients such as the use of PIN numbers, encryption, firewalls, etc. to assure that only authorized parties are able to access secured information. In principal, any number of portals could be used to accommodate different groups of clients with differing access to information.

A report generator 1002, a data base of monitored information 1003, and an incoming data portal 1004 form the means for generating a wide variety of reports from data accumulated by the local controller. The incoming data portal 1004 receives packets of information from any number of local controllers. In this embodiment, e-mail serves as the means for data transfer wherein the incoming data portal is configured to receive from the monitored individuals. The data base of monitored information 1003 contains a client background record of each monitored individual which includes demographics, medical and functional needs, plus billing information (e.g. postal address, phone number, etc.).

With respect to the data coming in from the incoming data portal 1004, the data base of monitored information 1003 also sorts and stores data files for each individual local controller, automatically updates the data base with newly received information and maintains an a record of instructions which determine the form, content and receiver of reports to be generated by the information. These instructions include, but are not limited to, the type and number of monitored events to be included in a given report, the particular type of summary used within the report (counts, sums, averages, critical levels, verbal descriptions of events, graphical descriptions of events, etc.), the frequency of the reporting

period (hourly, daily, weekly monthly, etc.) as well as information pertinent to the receiver of said reports (name, relationship, e-mail address, phone/pager numbers, postal address, etc.).

In this way the data base of monitored information 1003 includes the local controller accumulated data plus additional information about the monitored individual, the reports to be generated, and the parties to receive these reports. At time intervals determined in individual record instructions contained in the data base of monitored information 1003, the data is processed through the report generator 1002 wherein a variety of reports are produced reducing the data collected by the local controller to numerical, graphical and written reports. These reports are then saved and transferred to the report sender 1006 which can sort, store and transfer the reports to a variety of end users by means including e-mail, automated or live human telephone calls, voice/alpha numeric paging and postal mail by means of printing the report on paper and physically sending it to the appropriate customer. Any single or combination of commonly used means for conveying numerical, graphical and written information can be used.

The preferred embodiment uses e-mail for non-priority reports and paging and telephone messaging for priority reports/alarms. Billing report generator 1010, billing data base 1005 together provide a means for tracking customer billable usage of reports and queries. For example, each query from a family member may be tracked, a per query cost total tallied, and an end of the month usage statement produced which can serve as the basis of a bill. Similar procedures could be in place for institutional customers: a hospital may contract for 1,000 queries a month, pay a set amount, and then pay an additional amount per query when the contracted number is exceeded. The operation of billing report generator 1010 and billing data base 1005 require linkage to the monitored client data base 1003 so that information about the form and content of the reports, as well as customer and client information could be used to develop the billing reports. In addition, linkage with the report sender 1006, especially in so far as it sends reports by post mail, would be useful as a necessary means for printing and distributing the bill at the end of the billing cycle. Using means commonly employed in automated and semi automated billing systems, it is possible

to configure the data bases in a number of ways with billing report generators to accurately and efficiently generate bills for services provided.

The above description of the internet based remote monitoring site also includes functions for reprogramming and maintenance of the local controllers 110. The previously described reprogramming function is capable of resetting parameters controlling data collections and interventions, as well as testing and status checking of local controller and its network of sensors. Such functions may prove useful if not essential in the development of various installations of the monitoring system.

It should be pointed out that any functionality described above as embodied in the monitored client data base 1003 could in a given embodiment be located in the report generator 1010 and that any functionality described as part of the report sender 1006 could in actuality be located in the report generator 1002 or monitored data base 1003. In principal, it makes no difference where the functionality is embodied relative to the conceptual block diagram, as long as the functionality exists.

It will be appreciated by those skilled in the art that changes could be made to the embodiment described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover all modifications within the spirit and scope of the present invention as defined by the appended claims.

Claims

1. A user monitoring system having an activity detection subsystem for monitoring a user having a behavioral activity and a physiological parameter in a user living area, said system including a remote monitoring site, comprising:

(a) a system controller;

(b) a first detector device capable of being activated in response to an occurrence of said behavioral activity to provide behavioral activity information to said system controller;

(c) a second detector device for determining a value of said physiological parameter in said user living area to provide physiological parameter information to said system controller;

(d) a control circuit for generating a first control signal in response to said behavioral activity information and a second control signal in response to said physiological parameter information;

(e) a control information communication channel for applying said first and second control signals to said remote monitoring site; and

(f) a remote generator for generating an integrated report representative of both said behavioral activity and said physiological parameter.

2. The user monitoring system of Claim 1, wherein said occurrence of said behavioral activity is determined independently of physiological measurements.

3. The user monitoring system of Claim 2, wherein said occurrence of said behavioral activity is determined at said user living area.

4. The user monitoring system of Claim 1, comprising circuitry for intervening in said user living area in accordance with said integrated report.

5. The user monitoring system of Claim 1, comprising a trend analysis report determined in accordance with said integrated report.

6. The user monitoring system of Claim 5, comprising circuitry for intervening in said user living area in accordance with said trend analysis.

7. The user monitoring system of Claim 1, wherein said monitoring system comprises a plurality of programming instructions and said programming instructions are reprogrammed from a location outside said user living area.

8. The user monitoring system of Claim 7, comprising circuitry for intervening in said user living area in accordance with reprogrammed instructions.

9. The user monitoring system of Claim 1, wherein said control information communication channel comprises the internet.

10. The user monitoring system of Claim 1, wherein said behavioral activity comprises meal preparation.

11. The user monitoring system of Claim 1, wherein said behavioral activity comprises an activity level of said user.

12. The user monitoring system of Claim 1, wherein said behavioral activity comprises an awakening activity of said user.

13. The user monitoring system of Claim 1, wherein said behavioral activity comprises sleeping activity of user.

14. The user monitoring system of Claim 1, wherein said behavioral activity comprises bathroom usage by said user.

15. The user monitoring system of Claim 1, wherein at least one of said first and second detectors comprises an appliance.

16. A system for monitoring a user in a user living area, said system including a remote monitoring site comprising;

(a) a system controller;

(b) an activity detection subsystem for monitoring a daily living activity of said user independently of physiological measurements, said activity detection subsystem having at least one detector device capable of being activated in response to an occurrence of said daily living activity and capable of determining at said user living area that said daily activity has occurred to provide information to said system controller representative of said daily living activity, said system controller having a control circuit for generating a control signal in

response to said information representative of said daily living activity;

(c) a control information communication channel interfaced to the internet for applying said control signal to said remote monitoring site by way of said internet;

(d) a report generator for generating a scheduled periodic report on said daily living activity, said scheduled periodic report having collections of said information representative of a selected daily living activity; and

(e) circuitry for intervening in said user living area in accordance with said scheduled periodic report.

17. The system for monitoring a user of Claim 16, wherein said occurrence of said daily living activity is determined independently of physiological measurements.

18. The system for monitoring a user of Claim 17, wherein said occurrence of said daily living activity is determined at said user living area.

19. The system for monitoring a user of Claim 16, comprising a further detector device for generating a further control signal in response to a physiological parameter of said user determined in said user living area for providing an integrated report representative of both said daily living activity and said physiological parameter.

20. The system for monitoring a user of Claim 19, comprising a trend analysis report determined in accordance with said integrated report.

21. The system for monitoring a user of Claim 19, comprising circuitry for intervening in said user living area in accordance with said integrated report.

22. The system for monitoring a user of Claim 16, comprising a plurality of programming instructions wherein said programming instructions are reprogrammed from a location outside said user living area.

23. The system for monitoring a user of Claim 22, comprising circuitry for intervening in said user living area in accordance with reprogrammed instructions.

24. The system for monitoring a user of Claim 16, wherein said control information communication channel comprises a plurality of internet portals.

25. The system for monitoring a user of Claim 16, wherein said daily living activity comprises meal preparation.

26. The system for monitoring a user of Claim 1, wherein said daily living activity comprises an activity level of said user.

27. The system for monitoring a user of Claim 1, wherein said daily living activity comprises an awakening activity of said user.

28. The system for monitoring a user of Claim 16, wherein said daily living activity comprises sleeping activity of user.

29. The system for monitoring a user of Claim 16, wherein said daily living activity comprises bathroom usage by said user.

30. The system for monitoring a user of Claim 19, wherein at least one of said detector devices comprises an appliance.

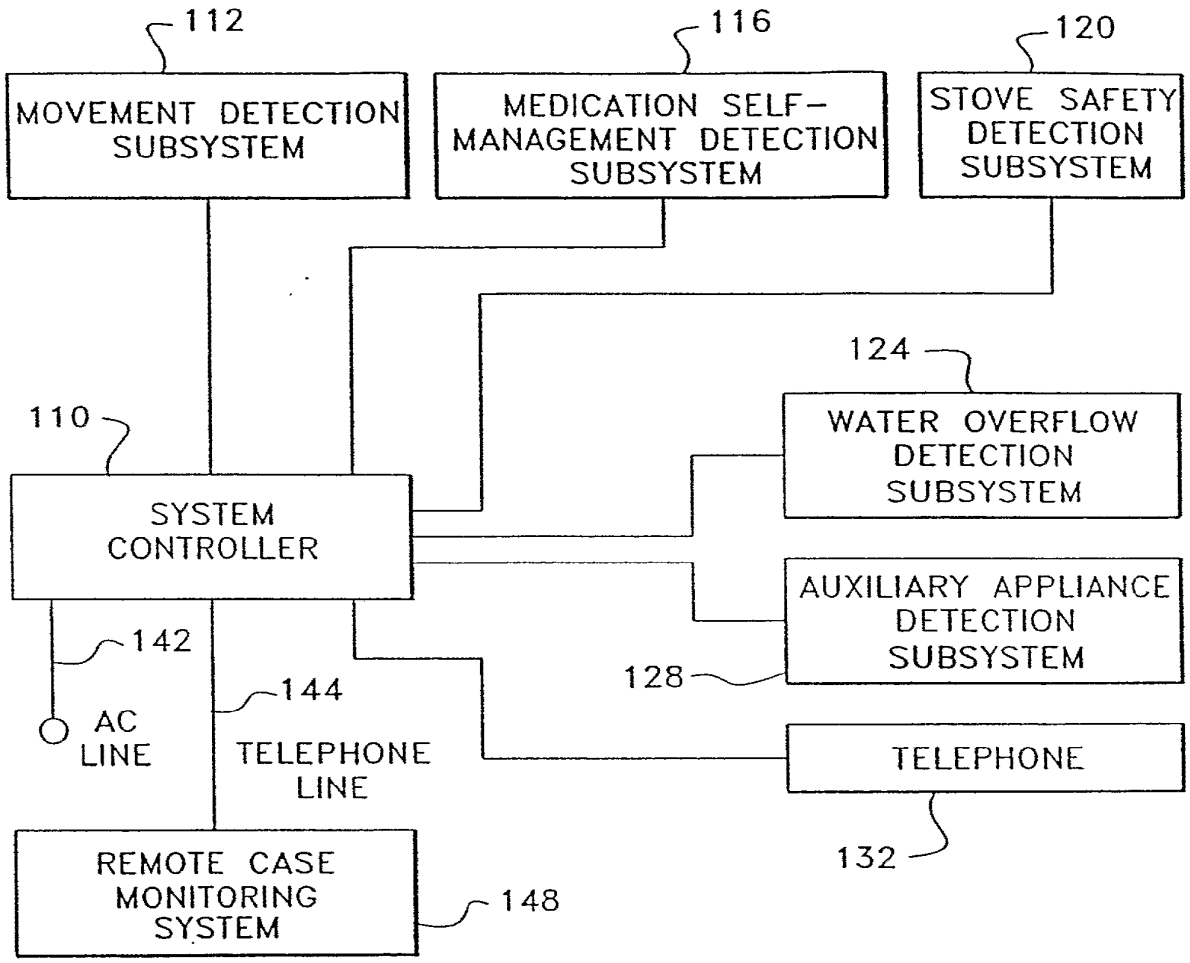

100
112
MOVEMENT DETECTION SUBSYSTEM
116
MEDICATION SELF-MANAGEMENT DETECTION SUBSYSTEM
120
STOVE SAFETY DETECTION SUBSYSTEM
124
WATER OVERFLOW DETECTION SUBSYSTEM
110
SYSTEM CONTROLLER
AUXILIARY APPLIANCE DETECTION SUBSYSTEM
128
142
AC LINE
144
TELEPHONE LINE
TELEPHONE
132
REMOTE CASE MONITORING SYSTEM
148

FIG. 1

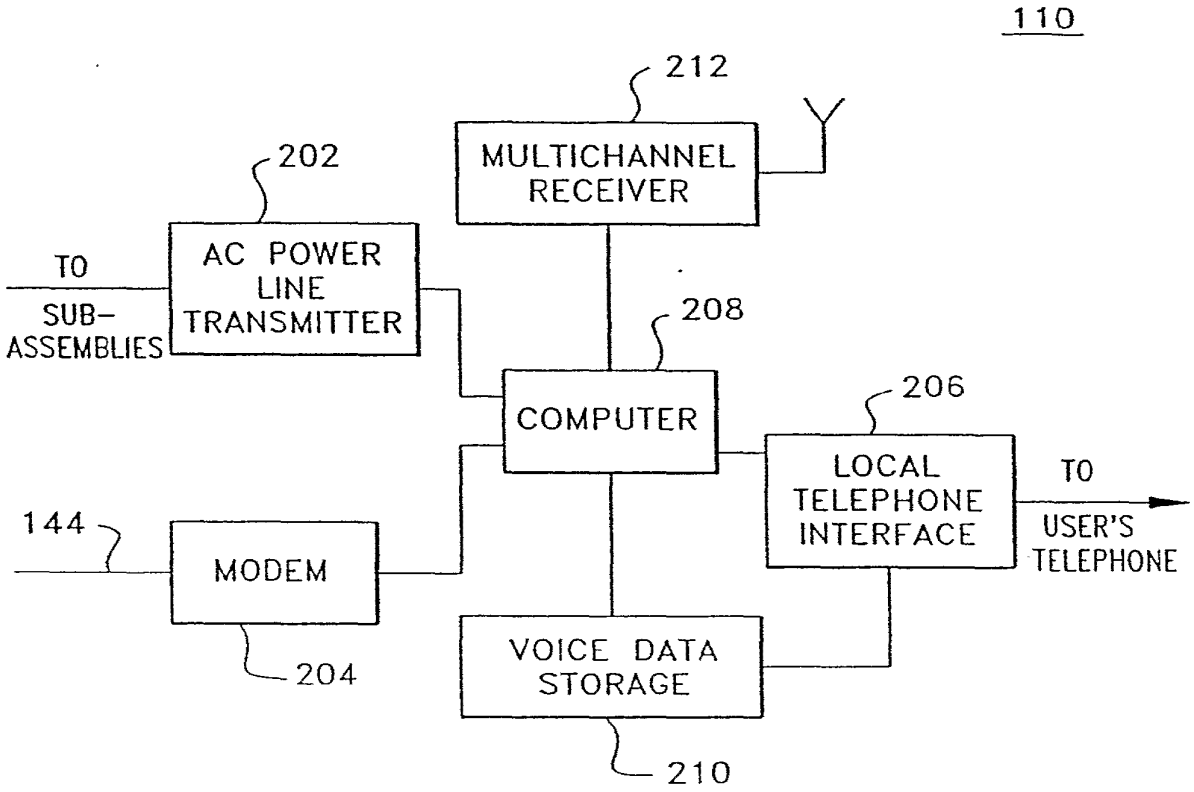

110
212
MULTICHANNEL RECEIVER
202
AC POWER LINE TRANSMITTER
TO SUB-ASSEMBLIES
208
COMPUTER
206
LOCAL TELEPHONE INTERFACE
TO USER'S TELEPHONE
144
MODEM
204
VOICE DATA STORAGE
210

FIG. 2

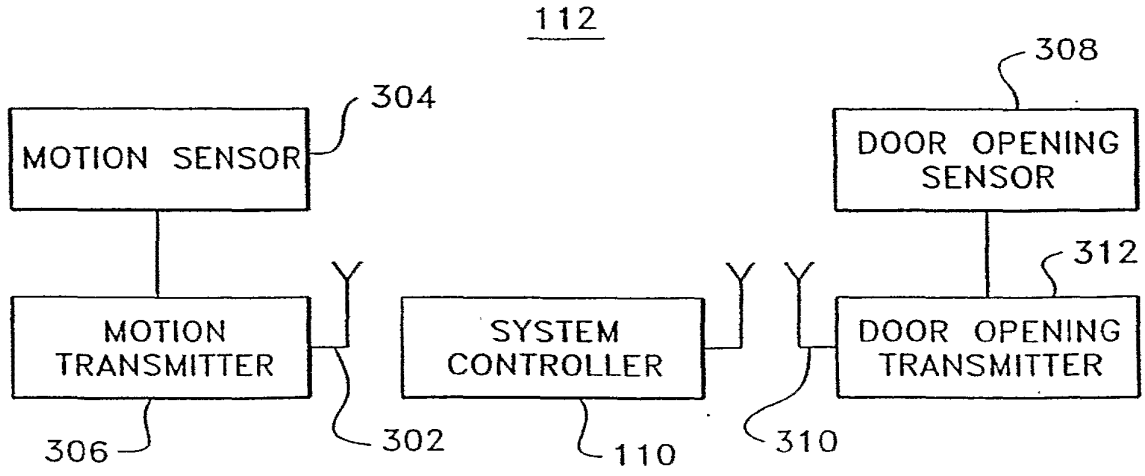

112
308
304
MOTION SENSOR
DOOR OPENING SENSOR
312
MOTION TRANSMITTER
SYSTEM CONTROLLER
DOOR OPENING TRANSMITTER
306
302
110
310

FIG. 3

116

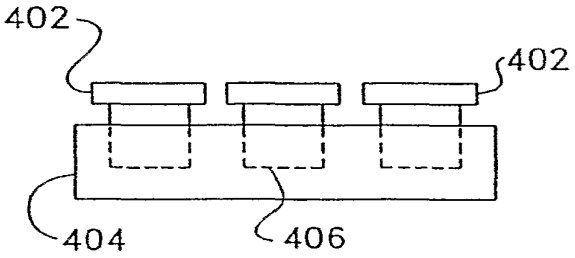


FIG. 4A

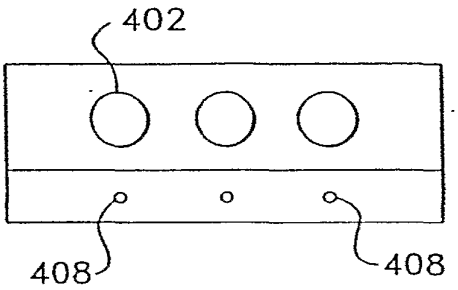


FIG. 4B

115

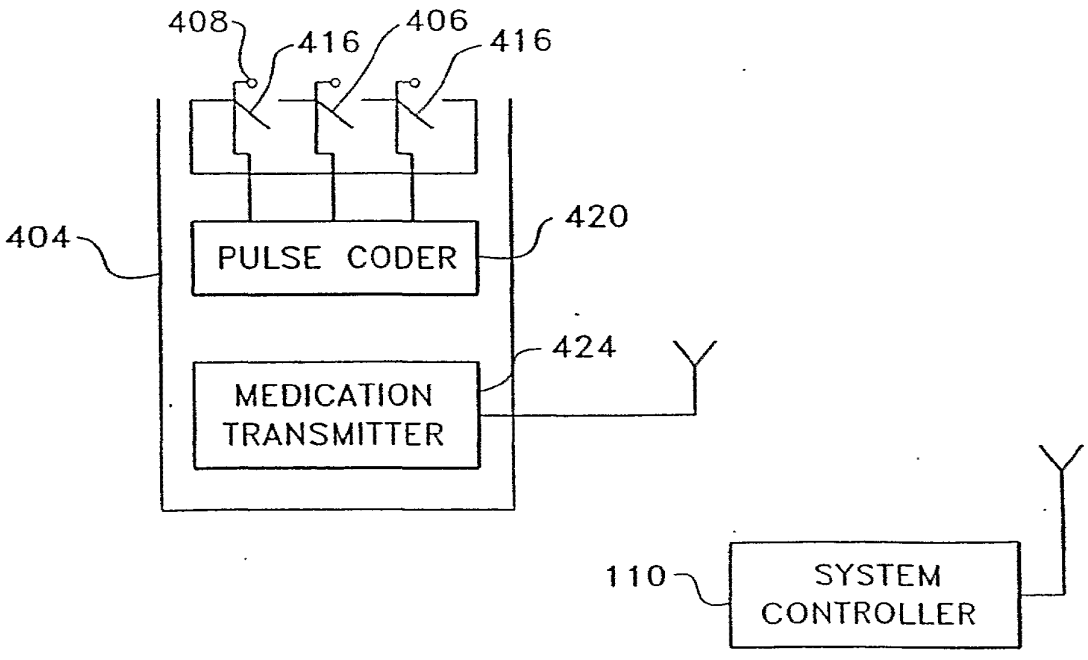


FIG. 5

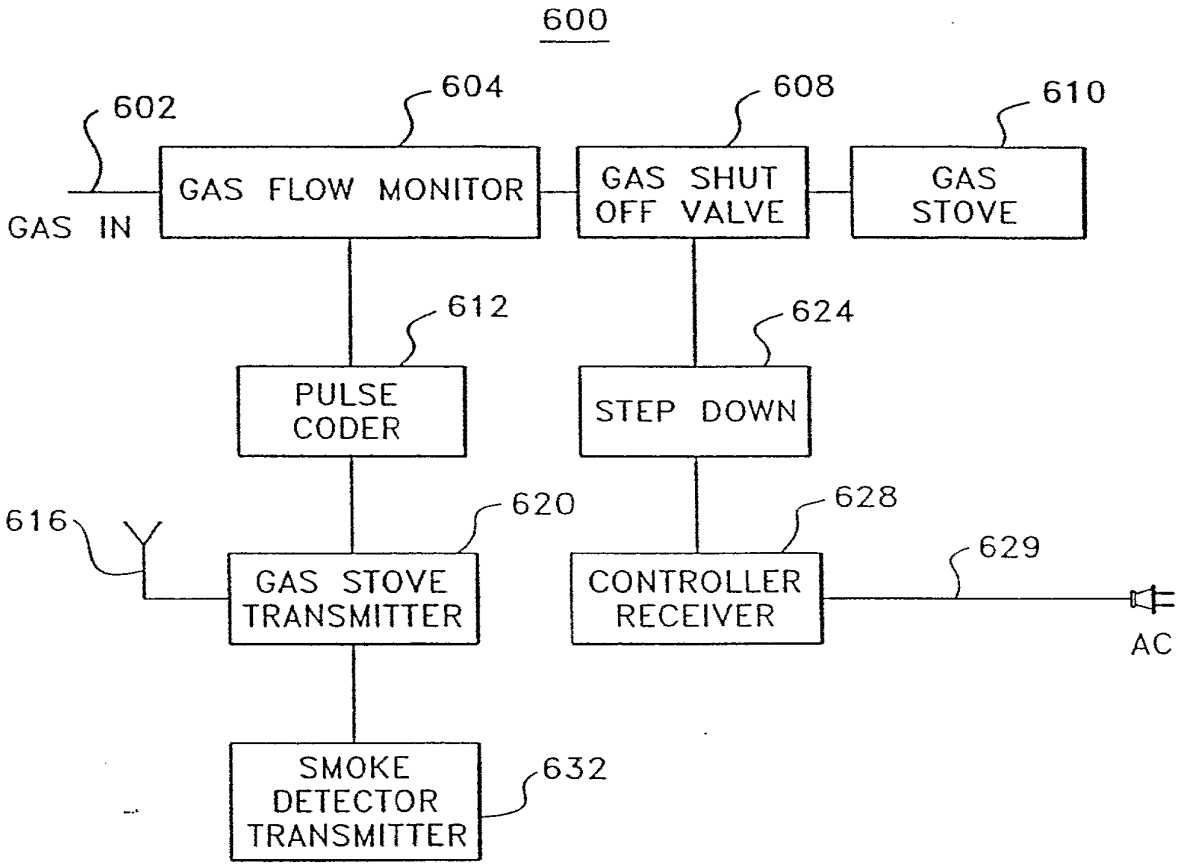

600
602
604
608
610
GAS IN
GAS FLOW MONITOR
GAS SHUT OFF VALVE
GAS STOVE
612
624
PULSE CODER
STEP DOWN
616
620
628
629
GAS STOVE TRANSMITTER
CONTROLLER RECEIVER
AC
SMOKE DETECTOR TRANSMITTER
632

FIG. 6

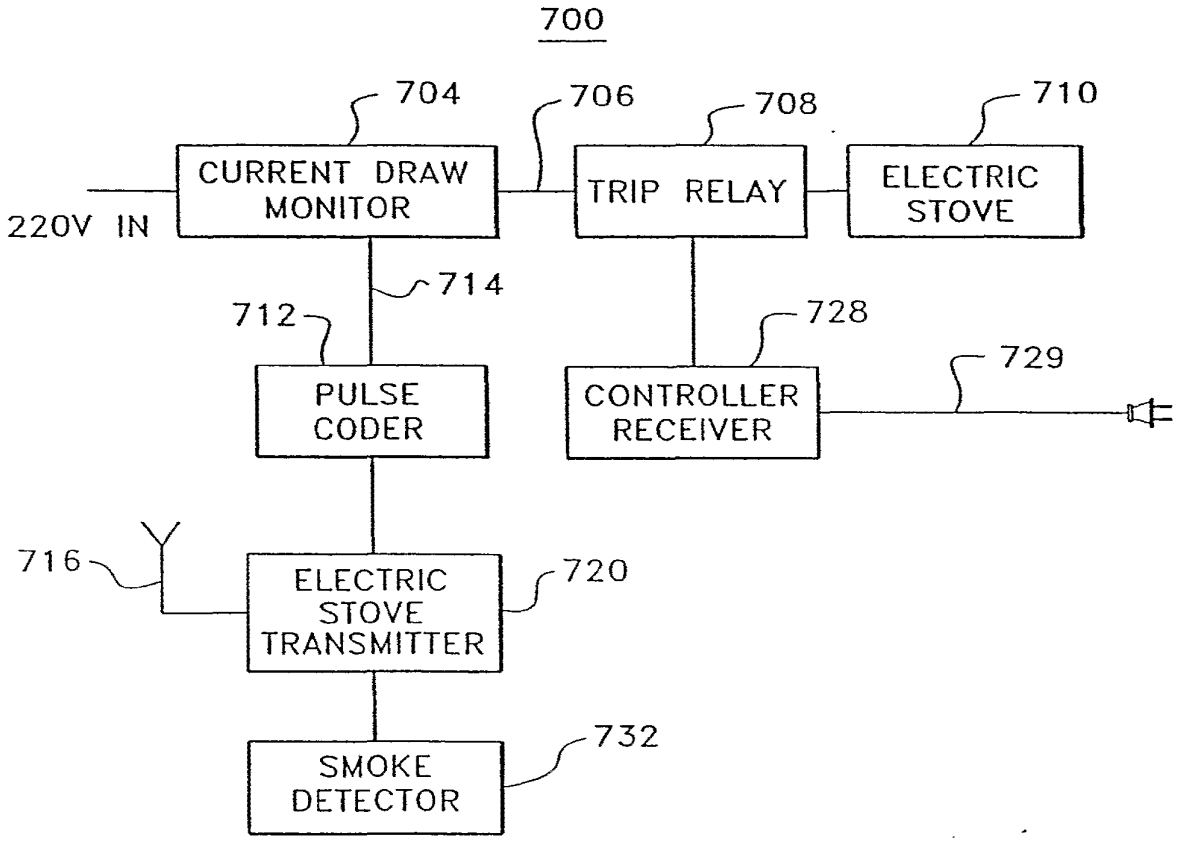

700
704
706
708
710
CURRENT DRAW MONITOR
TRIP RELAY
ELECTRIC STOVE
220V IN
714
712
728
729
PULSE CODER
CONTROLLER RECEIVER
716
ELECTRIC STOVE TRANSMITTER
720
732
SMOKE DETECTOR

FIG. 7

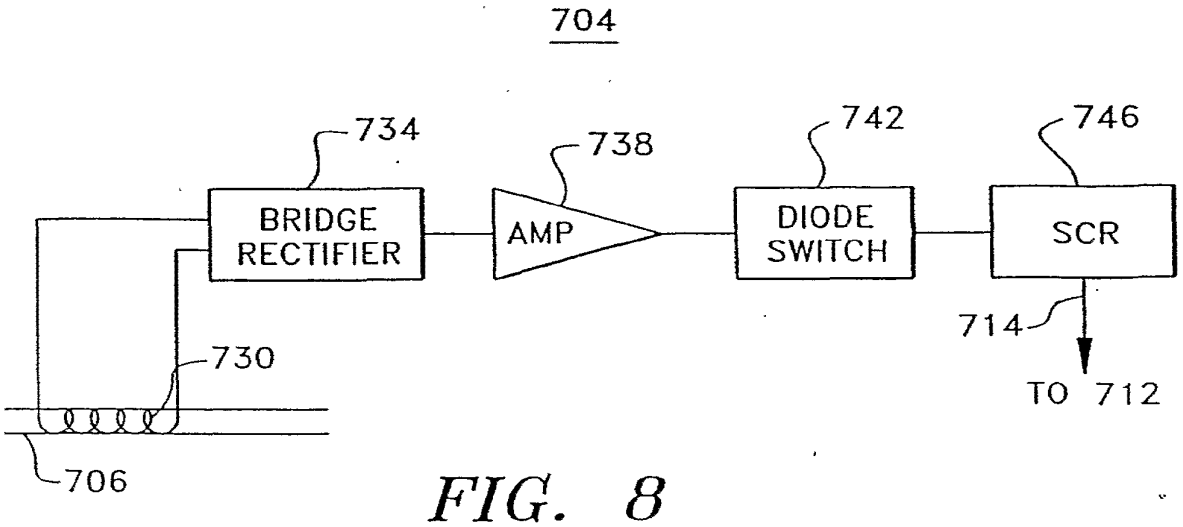

704
734
738
742
746
BRIDGE RECTIFIER
AMP
DIODE SWITCH
SCR
714
TO 712
730
706

FIG. 8

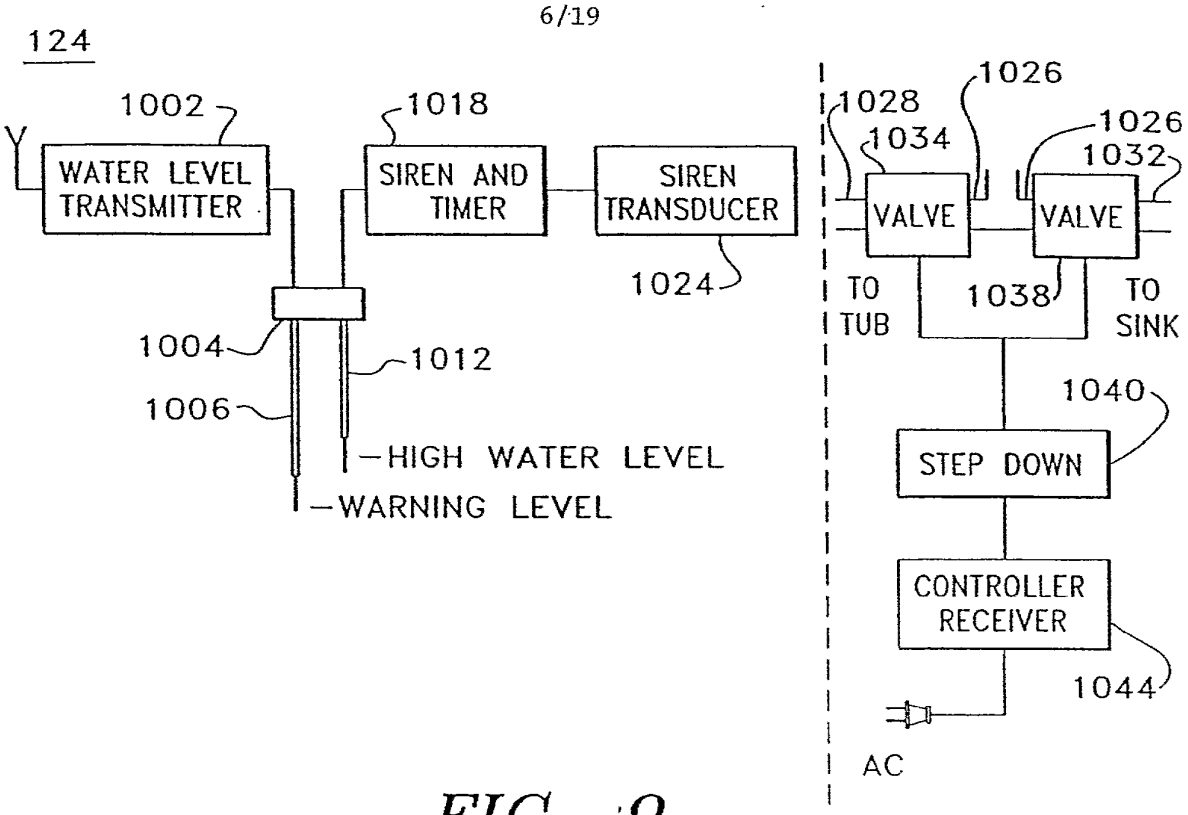

124
1002
WATER LEVEL TRANSMITTER
1018
SIREN AND TIMER
SIREN TRANSDUCER
1024
1004
1012
1006
HIGH WATER LEVEL
WARNING LEVEL
1026
1028
1034
1026
1032
VALVE
VALVE
TO TUB
1038
TO SINK
1040
STEP DOWN
CONTROLLER RECEIVER
1044
AC

FIG. 9

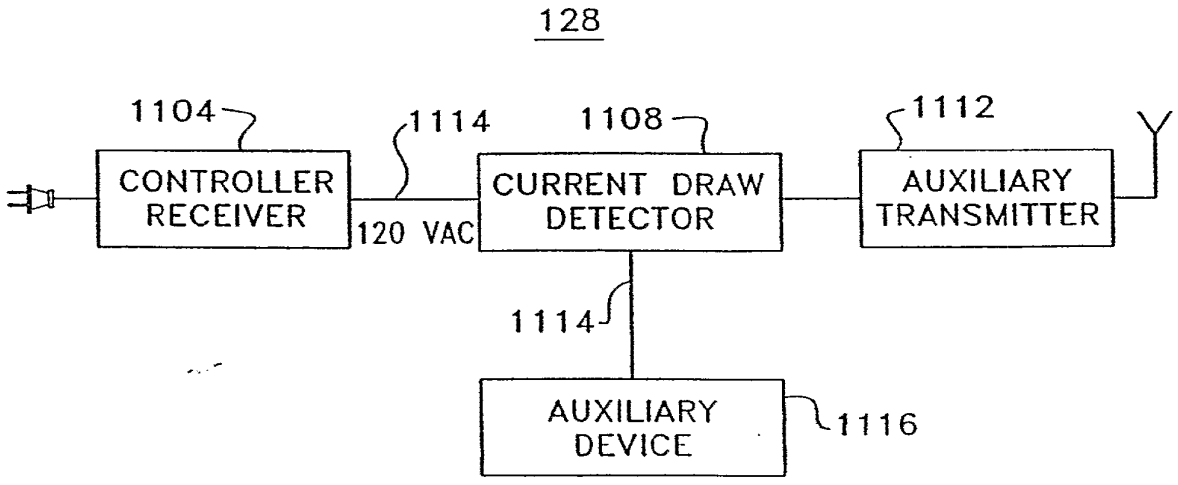

128
1104
CONTROLLER RECEIVER
1114
120 VAC
1108
CURRENT DRAW DETECTOR
1112
AUXILIARY TRANSMITTER
1114
AUXILIARY DEVICE
1116

FIG. 10

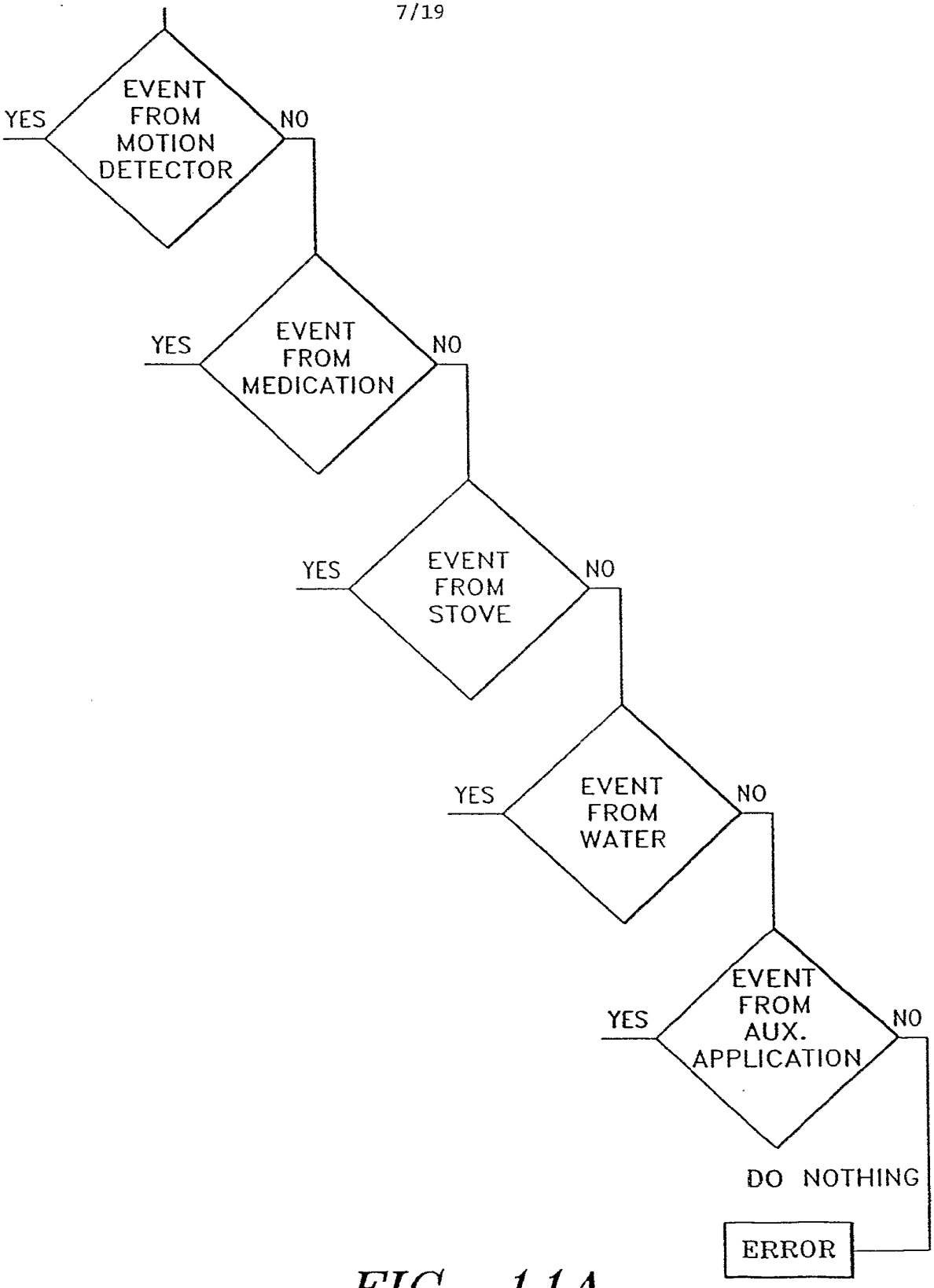

EVENT FROM MOTION DETECTOR
YES
NO
EVENT FROM MEDICATION
YES
NO
EVENT FROM STOVE
YES
NO
EVENT FROM WATER
YES
NO
EVENT FROM AUX. APPLICATION
YES
NO
DO NOTHING
ERROR

FIG. 11A

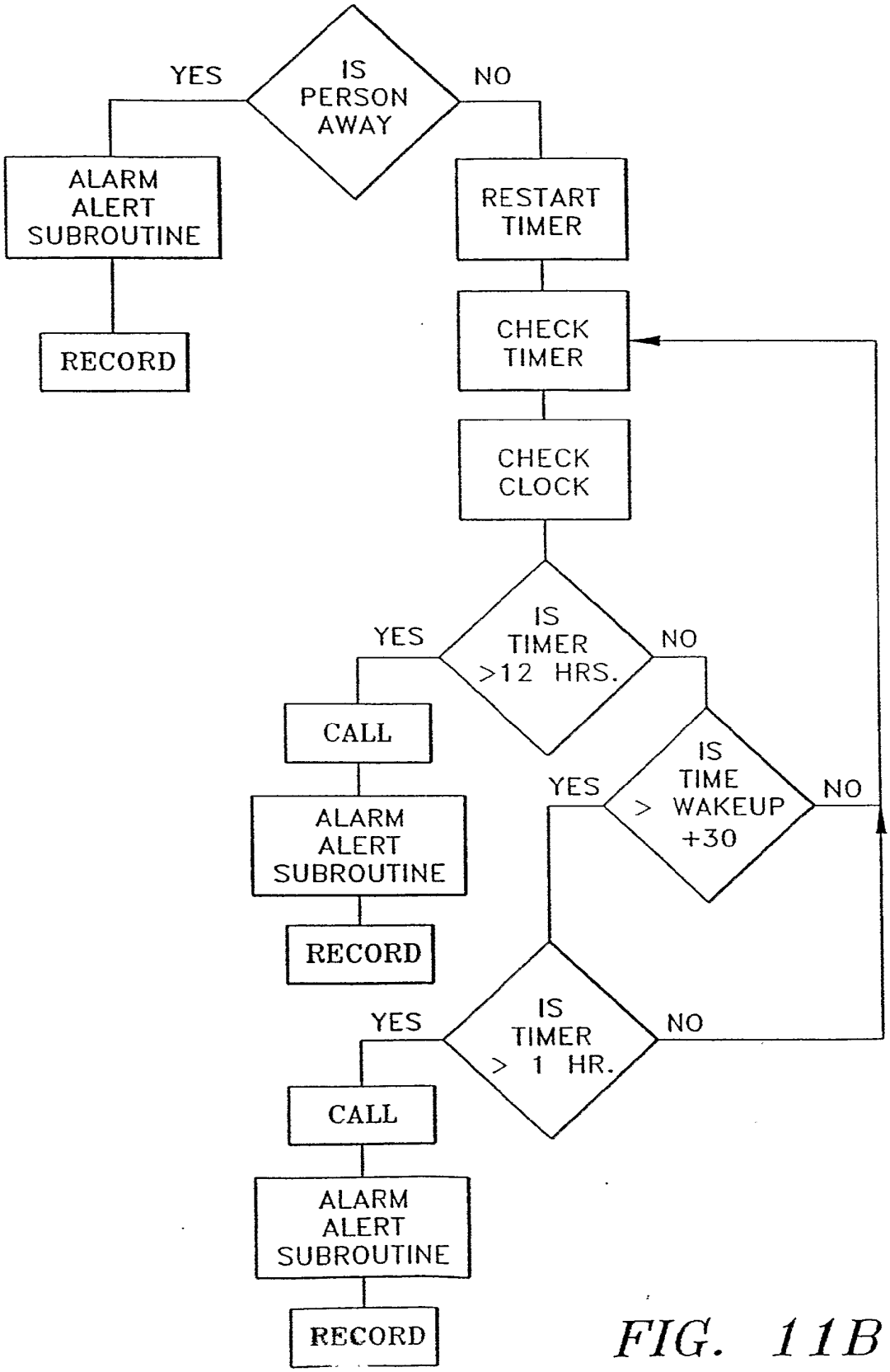

IS PERSON AWAY
YES
NO
ALARM ALERT SUBROUTINE
RECORD
RESTART TIMER
CHECK TIMER
CHECK CLOCK
IS TIMER >12 HRS.
YES
NO
CALL
ALARM ALERT SUBROUTINE
RECORD
IS TIME > WAKEUP +30
YES
NO
IS TIMER > 1 HR.
YES
NO
CALL
ALARM ALERT SUBROUTINE
RECORD

FIG. 11B

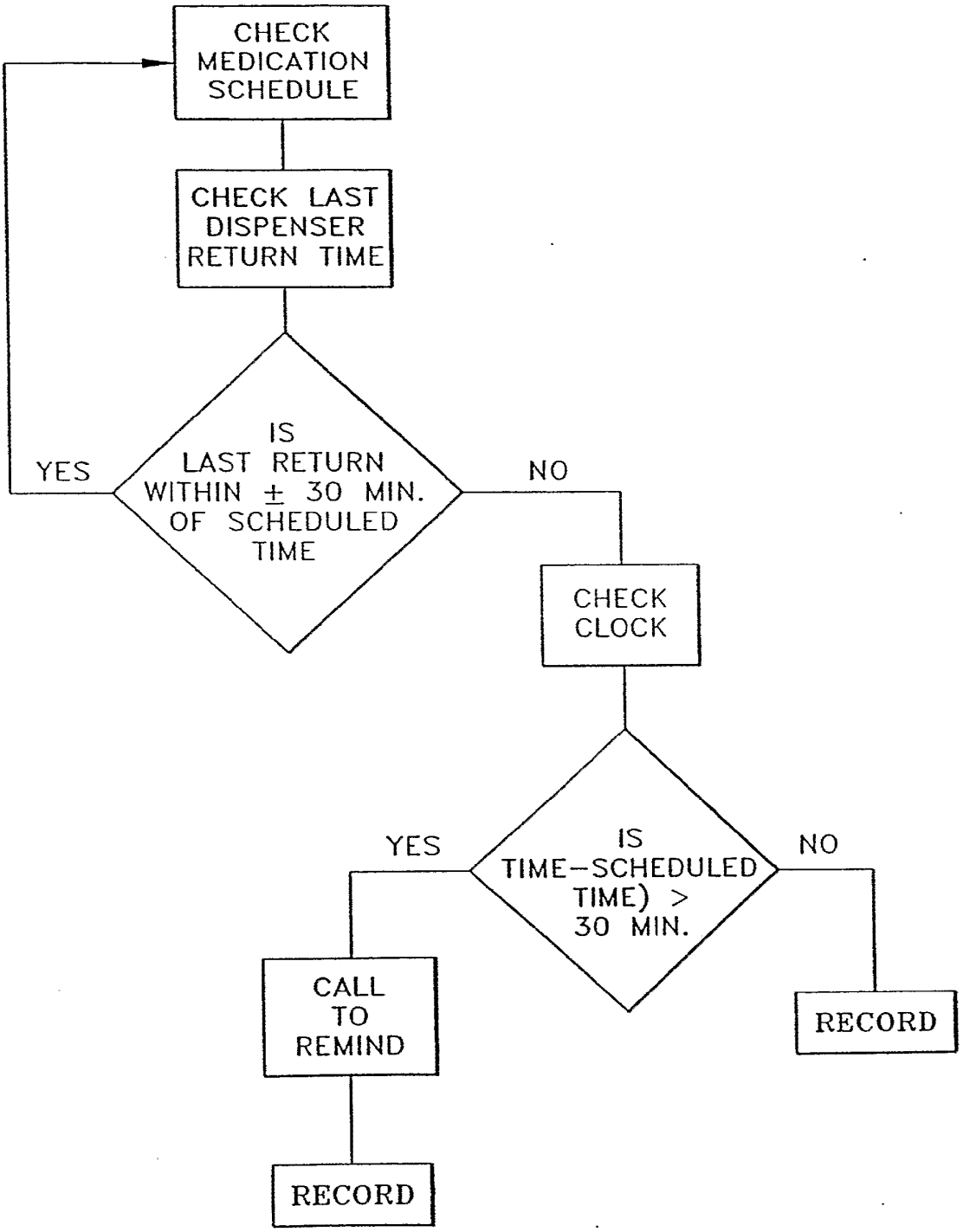

CHECK MEDICATION SCHEDULE
CHECK LAST DISPENSER RETURN TIME
IS LAST RETURN WITHIN ± 30 MIN. OF SCHEDULED TIME
YES
NO
CHECK CLOCK
IS TIME−SCHEDULED TIME) > 30 MIN.
YES
NO
CALL TO REMIND
RECORD
RECORD

FIG. 11C

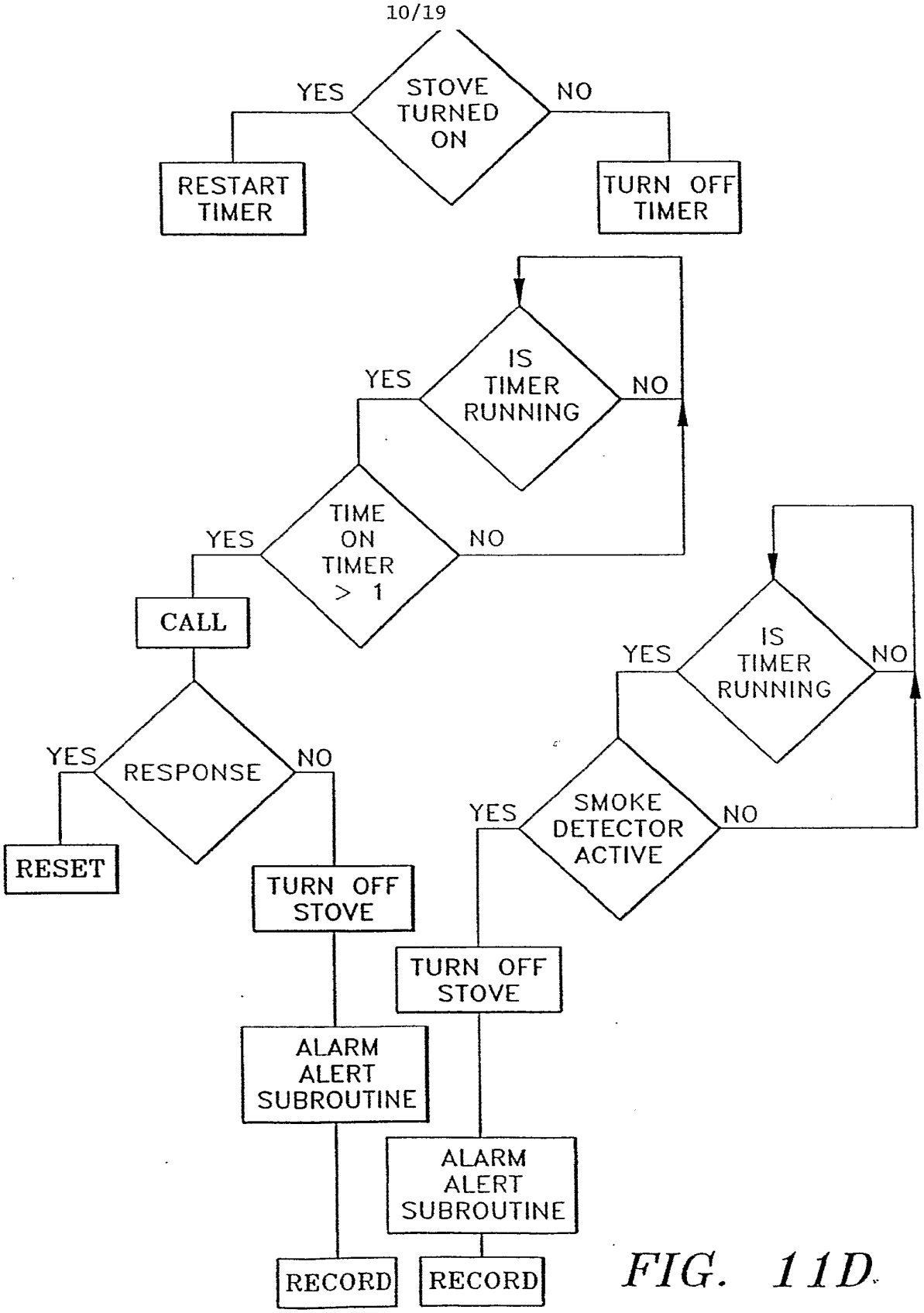

STOVE TURNED ON
YES
NO
RESTART TIMER
TURN OFF TIMER
IS TIMER RUNNING
YES
NO
TIME ON TIMER > 1
YES
NO
CALL
RESPONSE
YES
NO
RESET
TURN OFF STOVE
ALARM ALERT SUBROUTINE
RECORD
IS TIMER RUNNING
YES
NO
SMOKE DETECTOR ACTIVE
YES
NO
TURN OFF STOVE
ALARM ALERT SUBROUTINE
RECORD

FIG. 11D

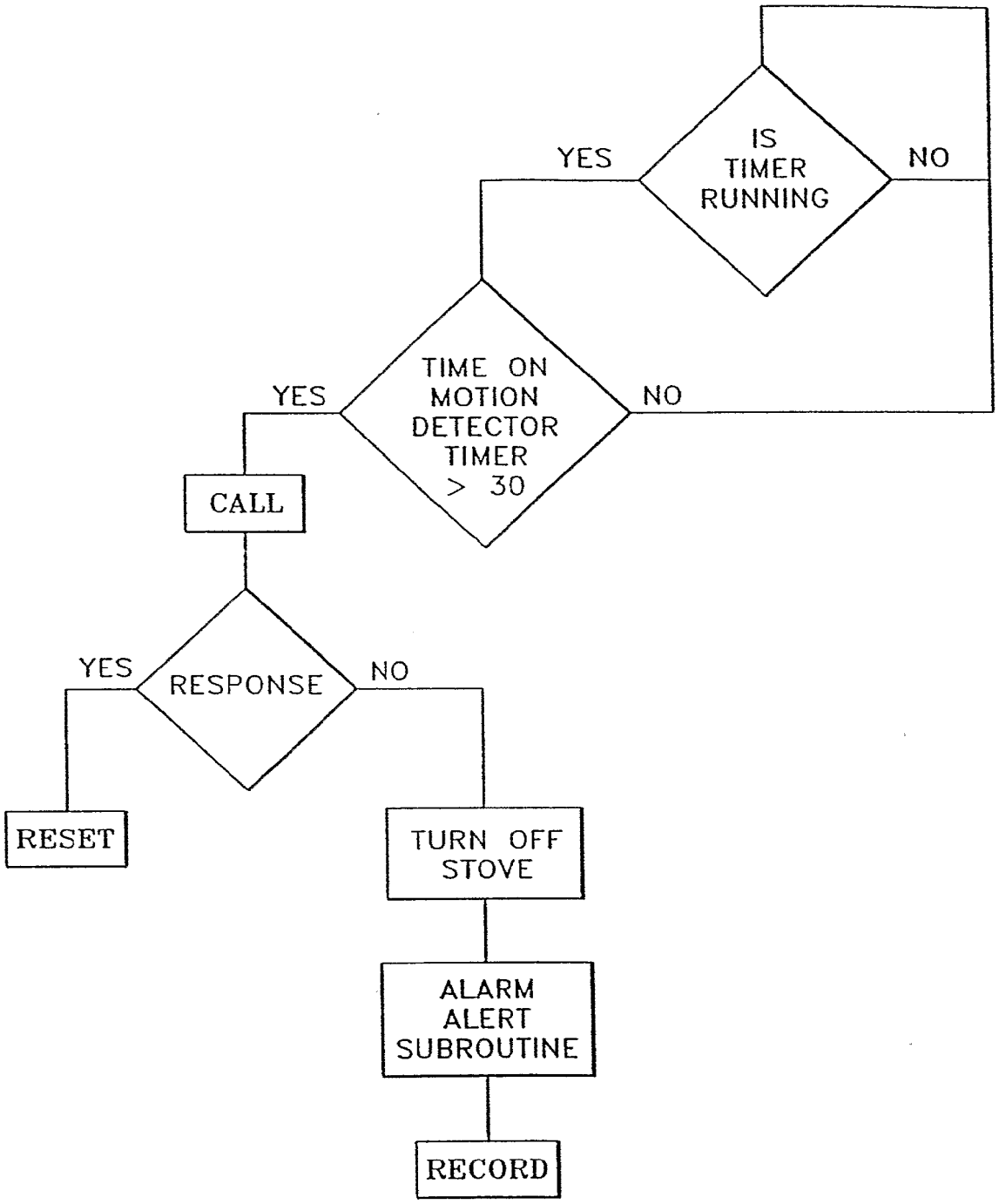

IS TIMER RUNNING
YES
NO
TIME ON MOTION DETECTOR TIMER > 30
YES
NO
CALL
RESPONSE
YES
NO
RESET
TURN OFF STOVE
ALARM ALERT SUBROUTINE
RECORD

FIG. 11E

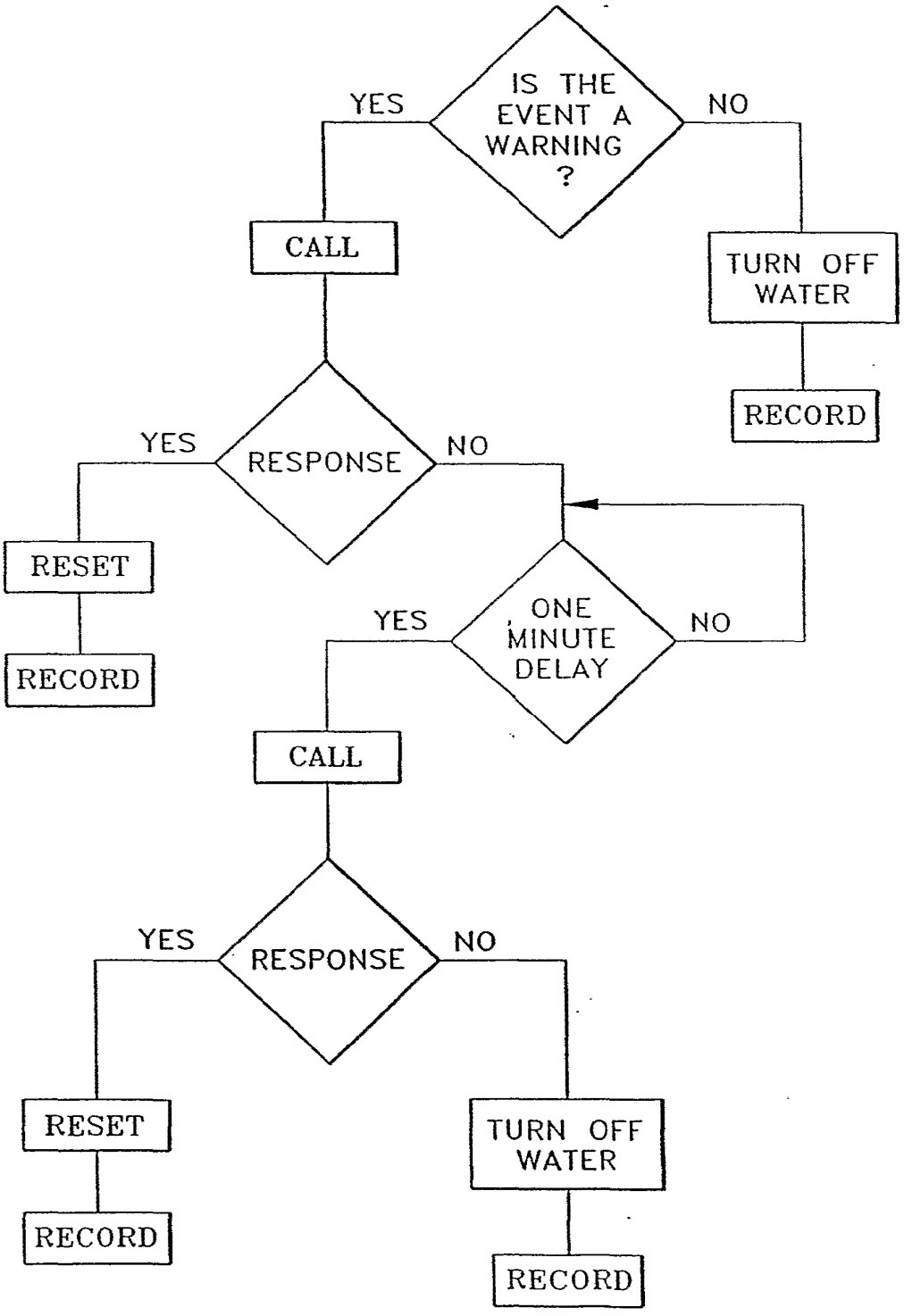

IS THE EVENT A WARNING ?
YES
NO
CALL
TURN OFF WATER
RECORD
RESPONSE
YES
NO
RESET
RECORD
ONE MINUTE DELAY
YES
NO
CALL
RESPONSE
YES
NO
RESET
RECORD
TURN OFF WATER
RECORD

FIG. 11F

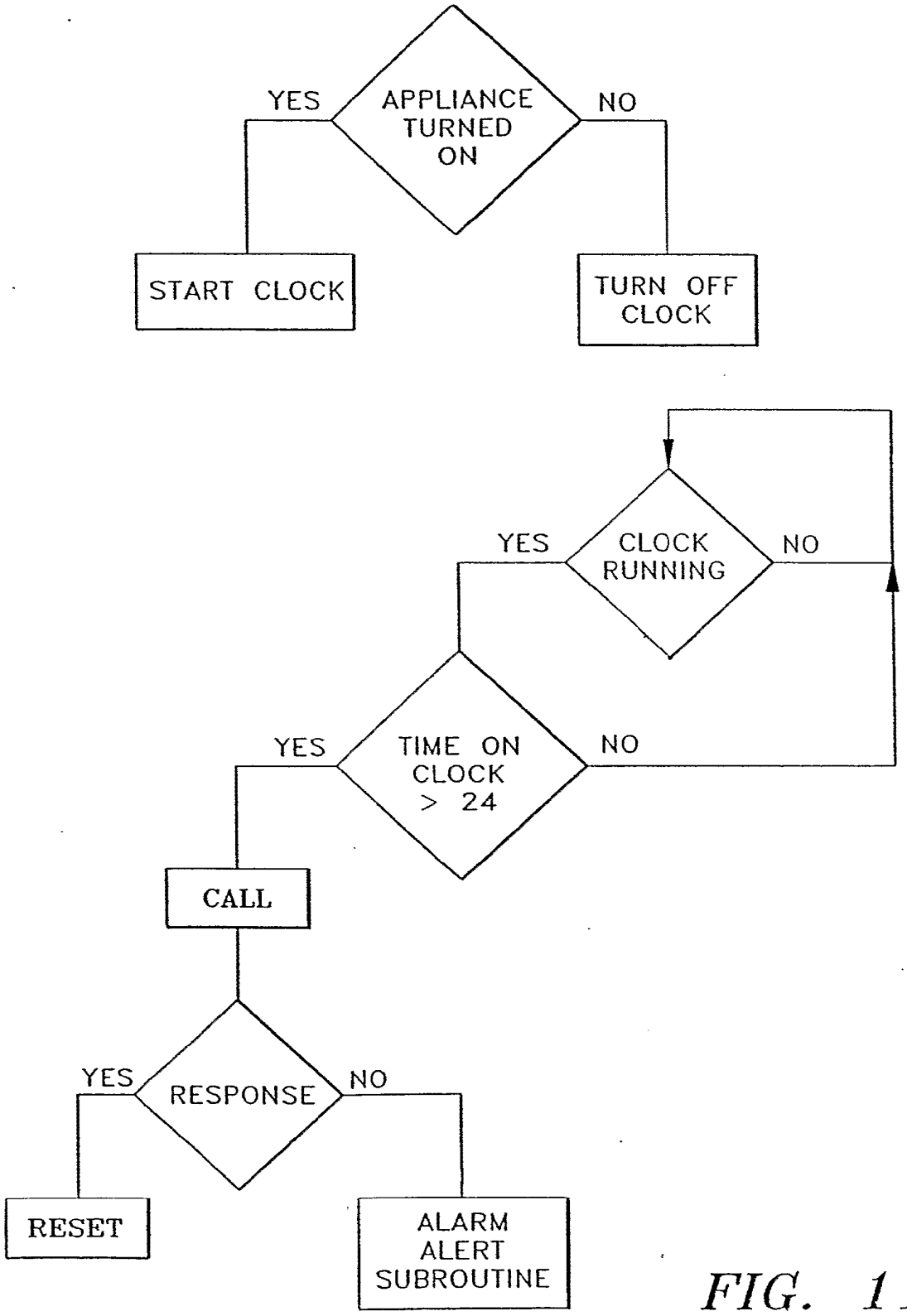

APPLIANCE TURNED ON
YES
NO
START CLOCK
TURN OFF CLOCK
CLOCK RUNNING
YES
NO
TIME ON CLOCK > 24
YES
NO
CALL
RESPONSE
YES
NO
RESET
ALARM ALERT SUBROUTINE

FIG. 11G

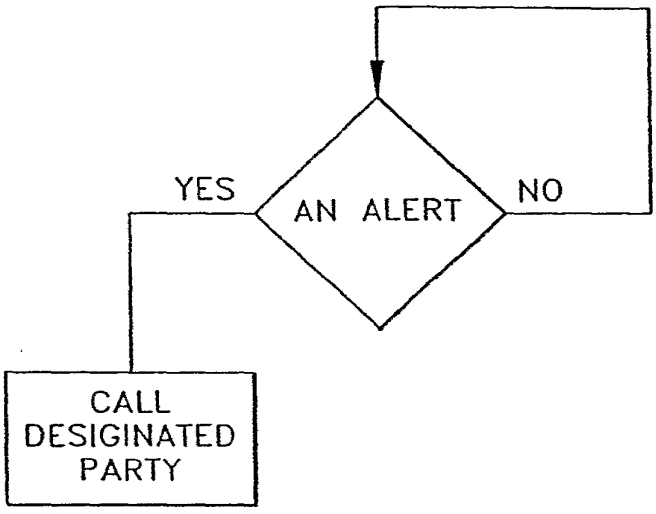


FIG. 11H

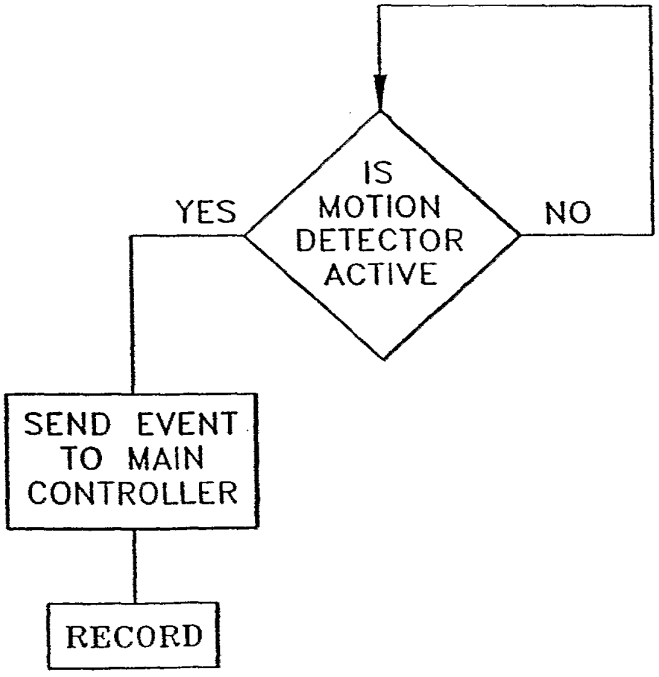


FIG. 11I

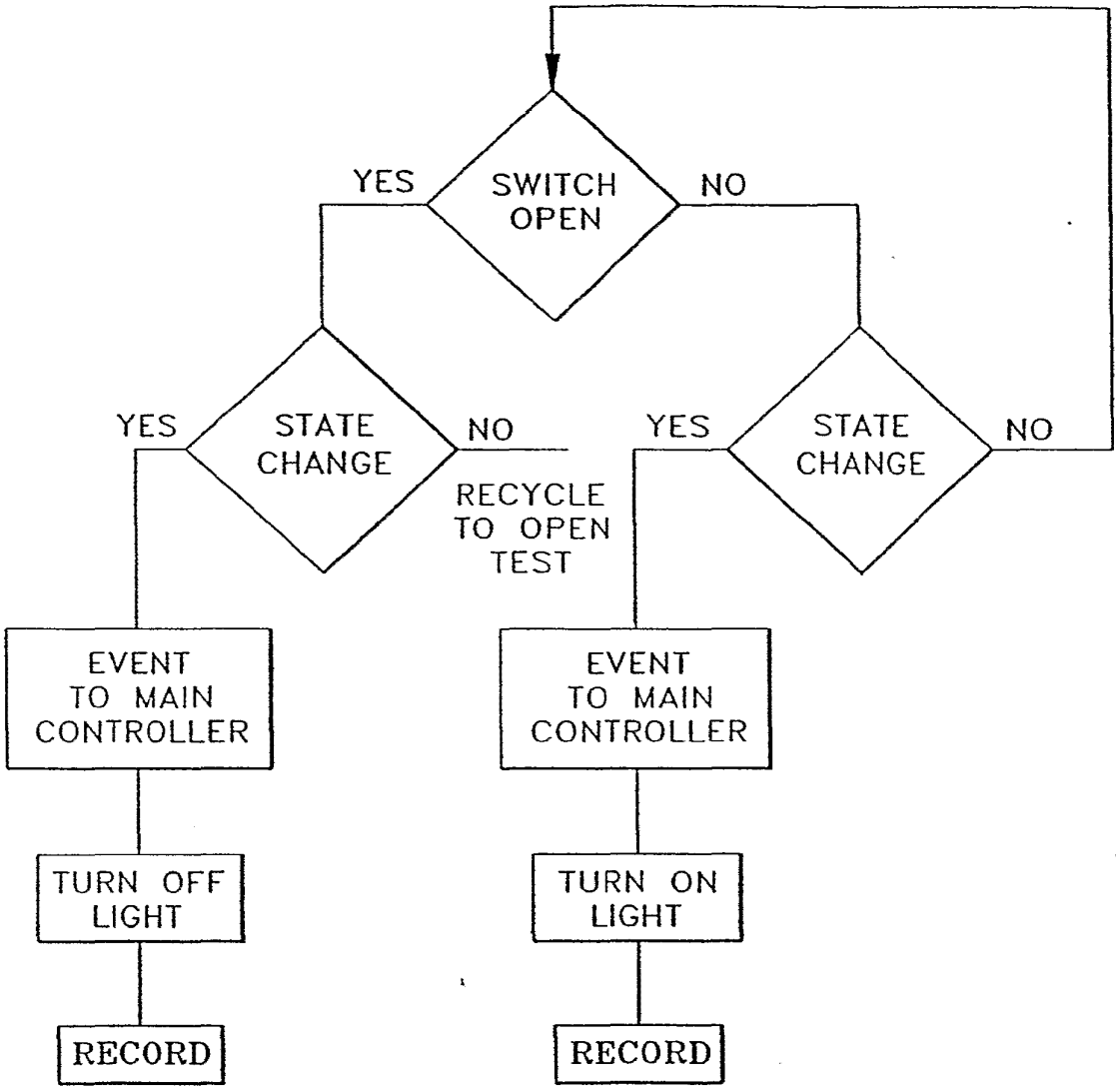

SWITCH OPEN
YES
NO
STATE CHANGE
YES
NO
RECYCLE TO OPEN TEST
STATE CHANGE
YES
NO
EVENT TO MAIN CONTROLLER
EVENT TO MAIN CONTROLLER
TURN OFF LIGHT
TURN ON LIGHT
RECORD
RECORD

FIG. 11J

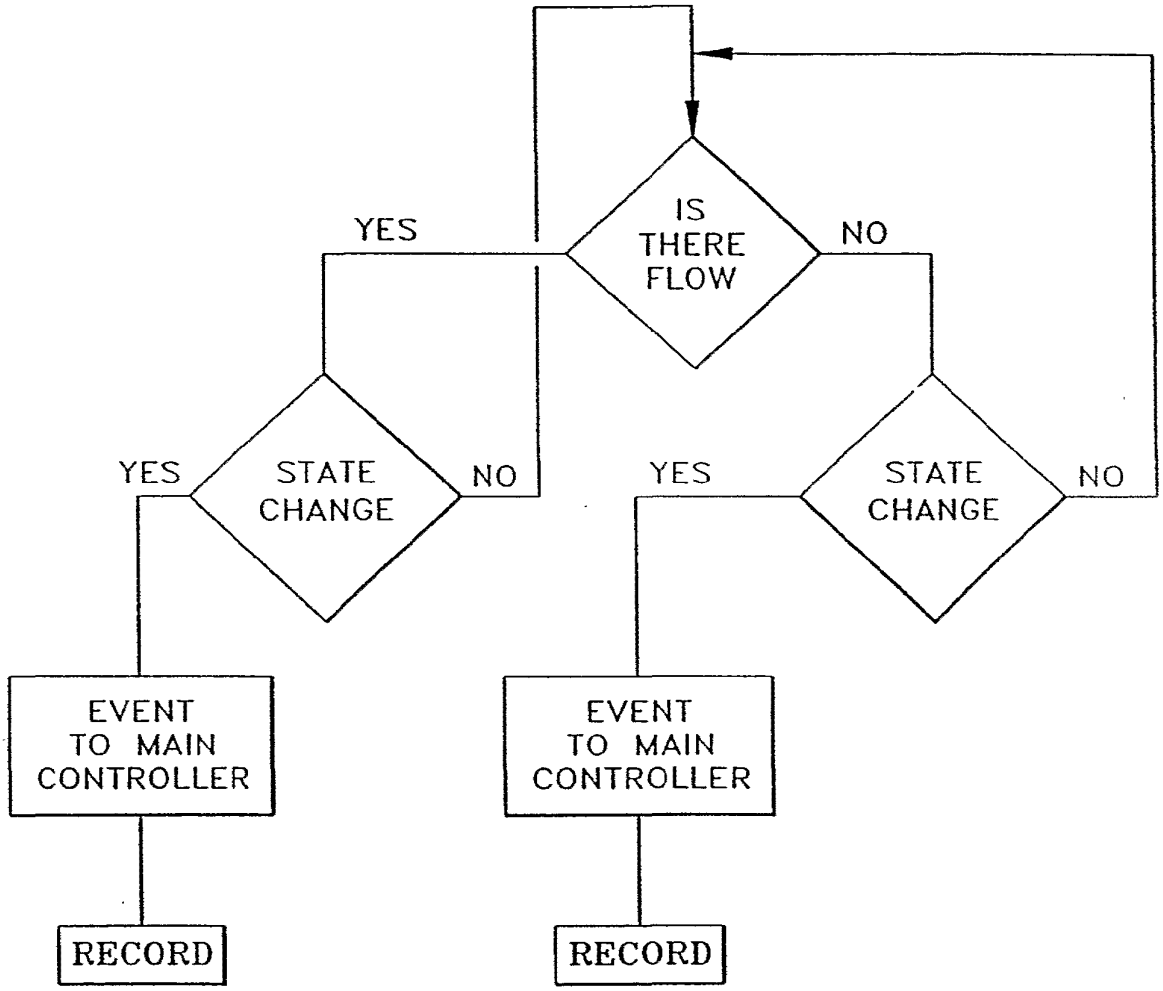

IS THERE FLOW
YES
NO
STATE CHANGE
YES
NO
STATE CHANGE
YES
NO
EVENT TO MAIN CONTROLLER
EVENT TO MAIN CONTROLLER
RECORD
RECORD

FIG. 11K

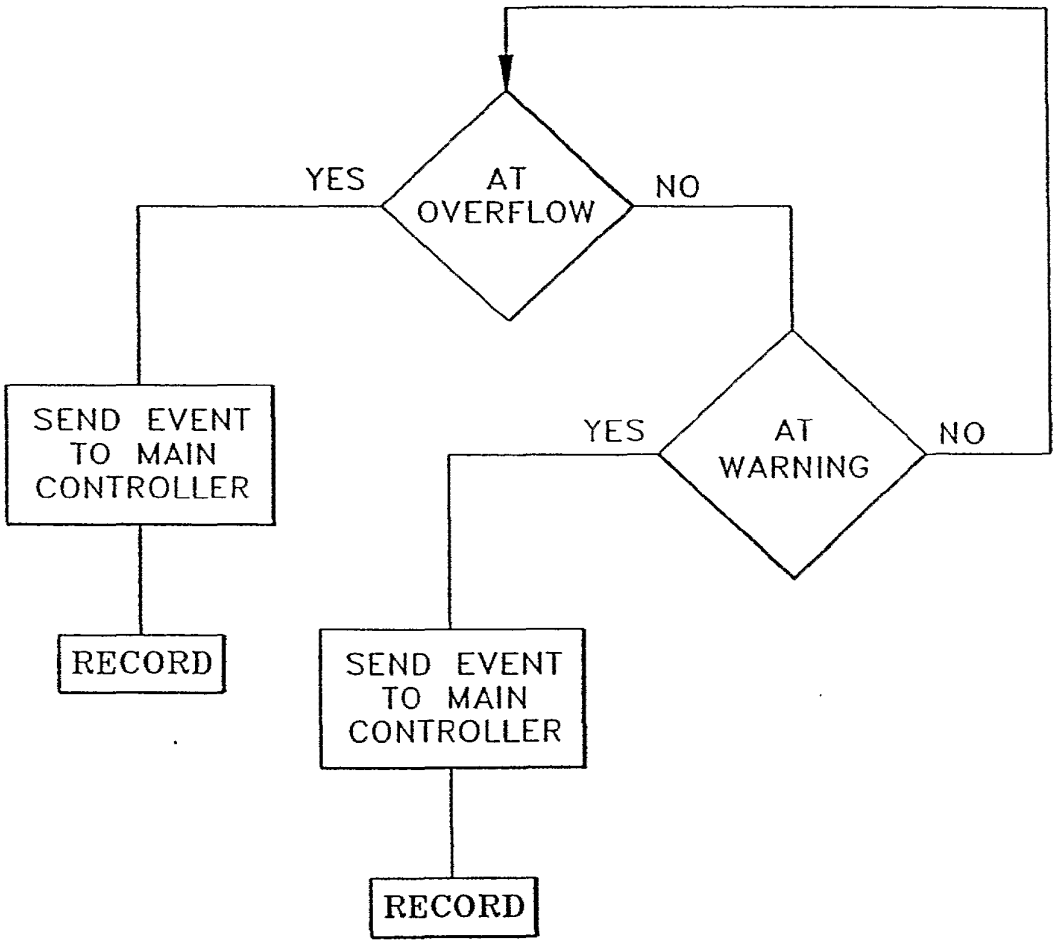

AT OVERFLOW
YES
NO
SEND EVENT TO MAIN CONTROLLER
RECORD
AT WARNING
YES
NO
SEND EVENT TO MAIN CONTROLLER
RECORD

FIG. 11L

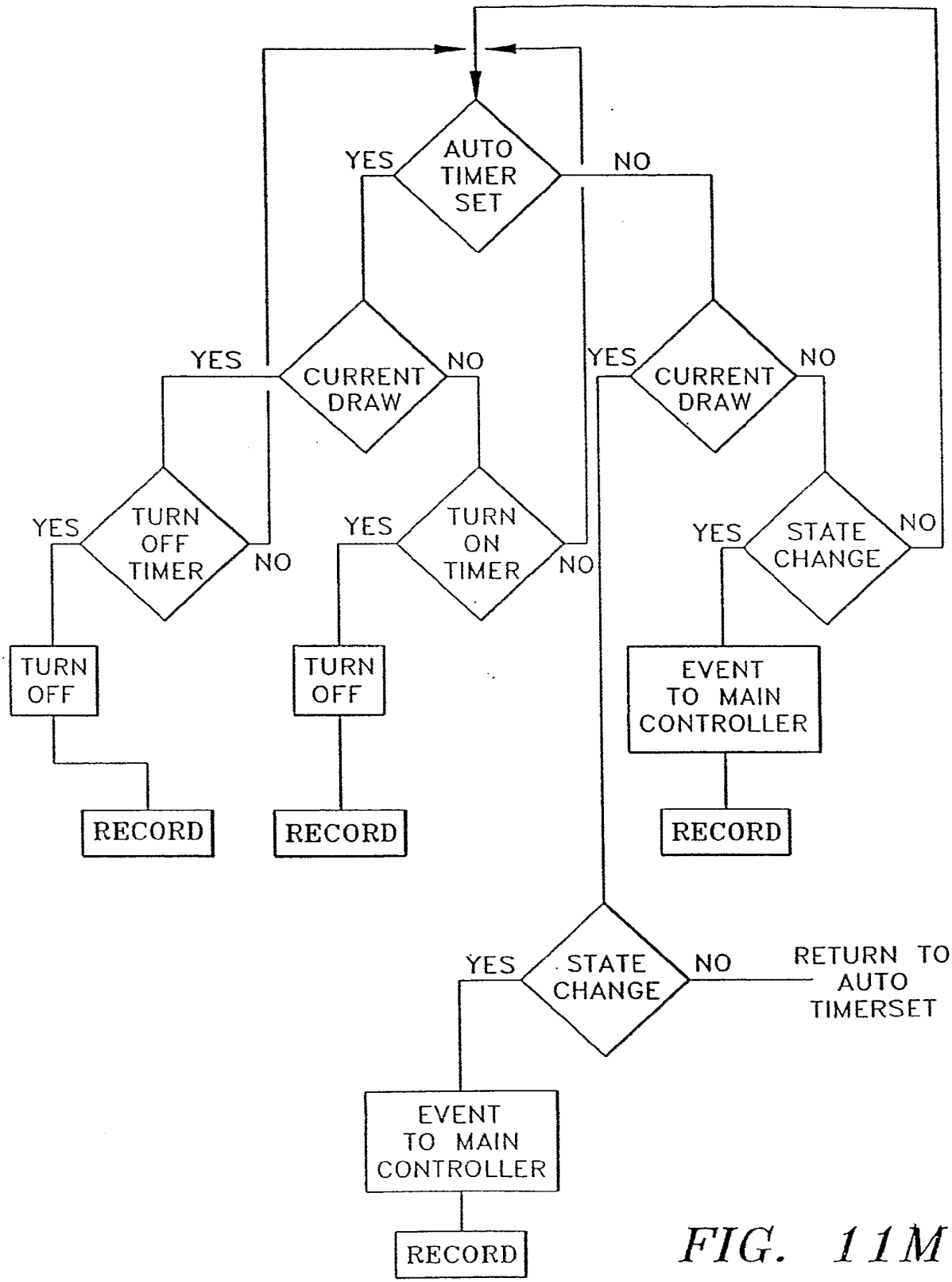

AUTO TIMER SET
YES
NO
CURRENT DRAW
YES
NO
CURRENT DRAW
YES
NO
TURN OFF TIMER
YES
NO
TURN ON TIMER
YES
NO
STATE CHANGE
YES
NO
TURN OFF
TURN OFF
EVENT TO MAIN CONTROLLER
RECORD
RECORD
RECORD
STATE CHANGE
YES
NO
RETURN TO AUTO TIMERSET
EVENT TO MAIN CONTROLLER
RECORD

FIG. 11M

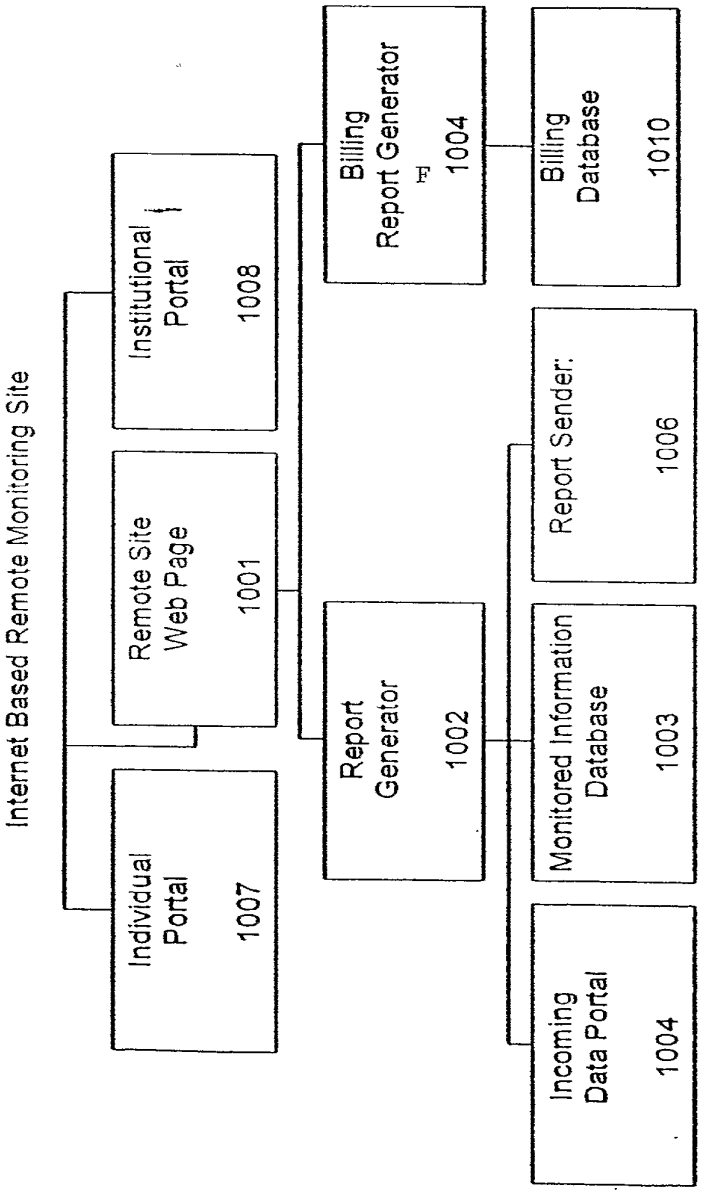

Internet Based Remote Monitoring Site
Individual Portal 1007
Remote Site Web Page 1001
Institutional Portal 1008
Report Generator 1002
Billing Report Generator F 1004
Incoming Data Portal 1004
Monitored Information Database 1003
Report Sender: 1006
Billing Database 1010

Fig. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/47518

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G08C 19/04, 19/10, 19/22; G05B 23/02; H04Q 9/00; G06F 3/00
US CL : 340/870.11, 870.07, 825.19, 825.06; 710/18

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)
U.S. : 340/870.11, 870.07, 825.19, 825.06; 710/18

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,002,994 A (LANE et al) 14 December 1999 (14.12.1999) see entire document.	1-30
x	US 5,692,215 A (KUTZIK et al) 25 November 1997 (25.11.1997) see entire document.	1-30

☐ 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 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	Date of mailing of the international search report
23 March 2002 (23.03.2002)	19 APR 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Michael Horabik Telephone No. 703/305-4700

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/47518

Continuation of B. FIELDS SEARCHED Item 3:
EAST
search terms: monitoring, activity, physiological

VIZIO Ex. 1002, Page 1153 of 3573
VIZIO v. MMT, IPR2024-00722

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 December 2007 (06.12.2007)

PCT

(10) International Publication Number
WO 2007/137611 A1

(51) International Patent Classification:
H04N 5/44 (2006.01)

(21) International Application Number:
PCT/EP2006/005206

(22) International Filing Date: 31 May 2006 (31.05.2006)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **TELECOM ITALIA S.P.A.** [IT/IT]; Piazza Degli Affari, 2, I-20123 Milan (IT).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **CONTIN, Laura** [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT). **PELIZZA, Maurizio** [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT). **QUATTROCCHI, Luigi** [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT). **MOZZONE, Piero** [IT/IT]; Telecom Italia S.p.A., Via G. Reiss Romoli, 274, I-10148 Torino (IT).

(74) Agents: **GIANNESI, Pier, Giovanni** et al.; Pirelli & C. S.p.A., Viale Sarca, 222, I-20126 Milano (IT).

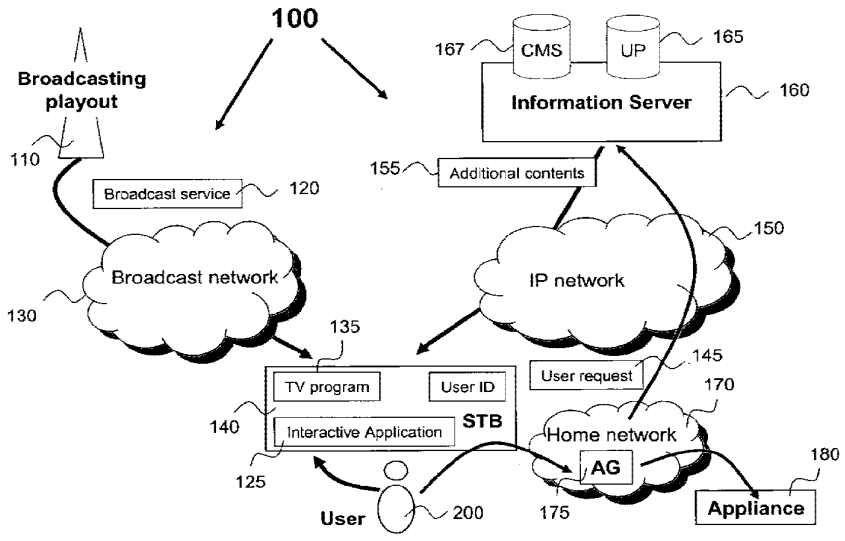
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

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

(54) Title: METHOD AND TV RECEIVER FOR STORING CONTENTS ASSOCIATED TO TV PROGRAMS



(57) Abstract: In order to offer contents on demand services triggered by broadcasted TV programs in an efficient and effective way, there is provided that notifications are received by a TV receiver, for example a set-top box (140), on the availability of additional contents (such as movie tracks, back stages, audio and/or video interviews, written articles, songs, photos, games, software programs, catalogues, brochures, electronic books, electronic tickets, electronic discounts, electronic bonuses,...) together with TV programs, and these additional contents are automatically collected and stored into electronic appliances, for example a portable electronic appliance (180), at the request of a user (200).

WO 2007/137611 A1

METHOD AND TV RECEIVER FOR STORING CONTENTS ASSOCIATED TO TV PROGRAMS

DESCRIPTION

The present invention relates primarily to a method for storing contents associated to TV programs and additionally to a TV receiver adapted to carry out this method.

Field of the Invention

In the past, some TV broadcasters provided teletext information in addition to broadcast video using the same signal; the teletext service is provided still nowadays.

With the advent of digital TV transmission technology, TV broadcasters are now able to provide much more than broadcast video and teletext. Transmission of digital signals may occur in different ways. In digital terrestrial television (DTT) systems, the broadcast signal is transmitted "over the air" to an antenna. Other widespread systems include cable TV systems and satellite TV systems. Finally, IP systems are viable means to bring television into a household and provide users a means to receive video, audio and data content.

Today, many viewers receive digital television via a set-top box [STB], which decodes digital signals and displays them on a TV monitor usually of a TV set. Advanced STBs can also be programmed to execute applications that can interact with the user through the use of the remote control device of the STB and with service centers using a modem and a communications network, typically the public switched telephone network

CONFIRMATION COPY

[PSTN]. The STB comprises a computer that runs a program which decodes the TV signal and executes the software that is transmitted either through a broadcast channel (together with the audio or video streams) or through a return channel. Return channel is the physical path used by the STB to let the client interact with a server. For example, through the return channel, interactive TV users can transmit information (e.g. votes, questionnaires, ...) to a service center or request the transmission of information (e.g. timetable of trains, stock exchange quotes, ...) from a service center. The physical path can be a wired connection, such as a telephone line or an xDSL line, or a wireless connection, e.g. GPRS or UMTS.

Concerning the type of services provided to the user, we can distinguish between two different paradigms to access the contents: the Broadcasting and the Content on Demand, in short form CoD.

Broadcasting is typical for broadcasting TV networks (i.e. terrestrial, cable or satellite), even if it can be used also on IP networks, sometimes called with different names depending on the distribution network (e.g. "webcasting" on Internet). According to this paradigm, the service provider can decide what contents to distribute and their schedule independently from any direct user request. The user can only tune its STB on a suitable "channel" to access the contents. The schedule of each channel can be made available in many ways, e.g. on magazines or on so-called Electronic Program Guide (EPG) or Broadband Content Guide (BCG).

CoD is typical for IP networks. The user selects a piece of contents among those offered by the service provider and requests either its streaming or (if the STB is equipped with a Hard Disk) its download at a specific time. Broadcasting is a push service (that is a service where the service provider, in this case the broadcaster,

sends information out regardless of whether anyone has requested it or even is tuned in), while CoD is a pull service (that is a service where the service provider sends information out only when someone has requested it).

Background of the Invention

From patent n° US6789106, it is known a method and a structure that allows a user who has access to an audio/visual object to cause an interactive control element of an interactive multimedia system to grab and store for future retrieval and peruse the audio/visual object by simply activating a selection mechanism of the interactive multimedia system. The interactive control element of the interactive multimedia system receives a plurality of audio/visual objects for play from the content provider and causes each such object to be stored to a temporary storage element as it is played. In response to the user activating the selection mechanism of the interactive multimedia system, it is determined whether the interactive control element has completed storing an audio/visual object to the temporary storage element that the user has selected via the selection mechanism. If the interactive control element has completed storing the selected audio/visual object to the temporary storage element, the selected audio/visual object is transferred from the temporary storage element to a long-term storage element. If, however, the interactive control element has not completed storing the selected audio/visual object to the temporary storage element, it is determined whether the selected audio/visual object is currently being played. If it is not currently being played, this means that the selected object may not be available locally and the interactive control element retrieves the selected audio/visual object from the content provider (if necessary) and stores it in the long-term storage element. If

the selected audio/visual object is being currently played, then the interactive control element continues to store the selected audio/visual object within the temporary storage element until the selected audio/visual object is stored in its entirety (has finished playing) and then transfers it from the temporary storage element to the long-term storage element, where it can be retrieved at some later time when desired.

From patent application n° US2002/0087988, it is known an interactive TV contextual content surfing method, system and program product that enables viewers to surf from one related program to another program through hyperlinking. A TV broadcast station receives interactive TV program content generated by creators. The content is categorized by the creator and provided to the broadcast station in the MPEG or webstreaming video/audio formats. A broadcast server stores a dynamic table of correspondence between TV program categories and TV channel numbers. The hyperlinking information contains a list of channels that broadcast the same nature of programs by referencing the correspondence table. The server broadcasts the hyperlinking information to the list of channels. The broadcast network carries the TV programs and associated classification information in separate channels to the local TV station for retransmission to TV devices including set-top boxes. The set-top box stores program information by categories in classification tables, contents of a TV program guide section, and recorded programs.

From patent n° US6215483, it is known a method and apparatus for receiving logical address links in advance of a television program and combining such links with those links that may be received in real-time during a television broadcast. According to one aspect of this

invention, content associated with a TV program may be automatically displayed by a client system, such as an Internet terminal or a computer equipped with a TV tuner. Prior to broadcast of a TV program, TV listing information is stored in the client system. The TV listing information includes one or more batch mode logical addresses, e.g. Uniform Resource Locators (URLs), that identify content, such as Internet content. The client system alerts the viewer of the existence of an active logical address associated with the current TV program by providing a visual indication. After the visual indication has been selected by the viewer, the client system displays the content identified by the logical address. Additionally, one or more real-time logical addresses may be received by the client system embedded in a video signal associated with the TV program. The real-time logical addresses may be embedded in either a text service channel (e.g., T1, T2, T3, T4) or a captioning service channel (e.g., CC1, CC2, CC3, CC4) of the vertical blanking interval (VBI) of the video signal. When both real-time logical addresses and batch mode logical addresses are associated with a TV program, the client system determines which to bring to the attention of the user of the client system based upon a set of predefined rules. Features of the present invention are applicable to many broadcast television (TV) systems including National Television Standards Committee (NTSC), Phase Alternate Lines (PAL), and Sequential Couleur Avec Memoire (SECAM) as well as the proposed High Definition Television (HDTV) standard.

From patent application n° WO02/085024, it is known a video-processing method and system for enriching one or several primary video signals by association of additional data in a video scene encoded in accordance with the MPEG4 standard, this associating allowing

simultaneous display of a primary video signal and said additional data, and enabling a user to interact with and access the contents of said additional data.

From patent application n° US2005/0193425, it is known a method for delivery and presentation of information relevant to the contents of frames in an audio/video program that enables TV viewers to retrieve information on the contents (for example, objects, items, concepts and the like) contained in a frame or a set of frames (video segments) when they watch TV or video programs. The information relevant to the contents of frame(s) is delivered to a STB or DVR by third-party service providers through back channels such as the Internet if the information of how to accurately access the frames pointed by STB users are delivered to the service providers, and the content-relevant information may be presented in the form of a GUI for the TV viewer. This disclosure relates to the processing of program guide information and, more particularly, to techniques for delivering information on video segments of broadcast TV programs to STBs.

Summary of the Invention

The Applicant has noted that, due to their structure, present commercial STBs are not adapted to delivery of CoD services requested by a user in an efficient, effective and flexible way, easy to be used by ordinary people while watching TV and using electronic appliances, particularly portable ones.

The Applicant has found that it can be possible to overcome the above cited problems by receiving notifications on the availability of additional contents (such as movie tracks, back stages, audio and/or video

interviews, written articles, songs, photos, games, software programs, catalogues, brochures, electronic books, electronic tickets, electronic discounts, electronic bonuses, ...) together with TV programs, and by automatically collecting and storing these additional contents on electronic appliances, for example a portable electronic appliance, at the request of a user.

This can be achieved through appropriately designed TV receivers, such as a set-top boxes, and appropriately assembled TV signals.

The additional contents are downloaded directly or indirectly (but without user intervention) into the electronic appliance for future use by the user.

Particularly, the present invention provides for an STB with a return channel (e.g. PSTN, xDSL, GPRS, etc.), a home network and a mass storage device, such as an external HDD, an USB storage or an MP3 player. The STB and the mass storage device are connected to the home network and communicate through it and the home network is connected to an external IP network through an access gateway (this connection is used to implement the return channel of the STB). Additionally, the STB could be univocally identifiable, for example by data stored on a smart card, permanent storage, serial number, etc. The synchronization between a TV program and the starting of an interactive application can be achieved by means of different techniques: for example the streaming events can be used in the case of MHP [Multimedia Home Platform], the standard middleware specified by DVB [Digital Video Broadcasting] for interactive TV.

According to a typical embodiment of the present invention, a user, while he is watching a TV program, is

notified on the screen of his TV set that some additional contents associated to this TV program are available through e.g. a red button appearing in a corner of the screen; then the user may check what the available contents are and select the one (or the ones), for example an MP3 file, he is interested to download on his portable electronic appliance, for example an MP3 player, through e.g. a menu appearing on the screen. Automatically, the selected contents are downloaded into the electronic appliance and the user can enjoy e.g. the music at any later time and place he likes.

Brief Description of the Drawings

The present invention will become more clear from the following description to be considered in conjunction with the annexed drawing in which:

Fig.1 shows a system that is able to implement some embodiments of the present invention, and

Fig.2 shows a flowchart of an embodiment of the method according to the present invention.

Detailed Description of the Invention

In Fig.1, the overall system is indicated with reference 100 and comprises:

- a broadcasting playout 110,
- an information server 160,
- a set-top box (STB) 140,
- an access gateway (AG) 175,
- an electronic appliance 180;

Set-top box 140 is connected to broadcasting playout 110 through a broadcast TV network 130; set-top box 140 is connected to information server 160 through the access gateway 175 and an IP network 150; set-top box 140 is connected to electronic appliances 180 through the access

gateway 175 and a home network 170; set-top box 140 is also connected to a traditional television set that is not shown in the figure. The connection between set-top box 140 and access gateway 175 is advantageously an Ethernet connection. Additionally, in Fig.1, a user 200 is shown that uses the set-top box, the television set and the electronic appliance. In general, system 100 comprises a plurality of STBs as there is usually at least one STB for each household. Within some of the households there will be a home network to which a plurality of electronic appliances are connected.

Broadcasting playout 110 distributes broadcast services 120, including TV programs 135 and associated interactive applications 125; broadcasting playout 110 is connected to the users' STBs through the broadcast TV network, such as DTT [Digital Terrestrial Television], satellite television or cable television.
Preferably, the format of the broadcast services is the MPEG-2 TS [Moving Picture Expert Group Transport Stream]; a clear and quite brief description of this standard can be found e.g. in patent application n° US2005/0193425 which is incorporated herein by reference.
The kind of modulation depends on the kind of TV network, as specified by the DVB [Digital Video Broadcasting] consortium. In a single MPEG-2 TS many components are multiplexed together, for example: TV program, interactive applications and additional information, such as the AIT [Application Information Table]. The multiplexing can be done by the broadcaster at the playout or by a content provider.

Information server 160 stores, manages and distributes additional contents 155 (such as related audio track) usually by using a content management system (CMS) 167. Additionally, it could manage a user profiling

system (UP) 165 and the interaction with the end-user STBs. Typically it communicates to STB 140 (and to the other STBs of system 100) through an IP network being fixed (e.g. based on ADSL) and/or mobile (e.g. based on GPRS). Preferably, the protocol used for the communication between information server 160 and STB 140 is HTTP [Hyper Text Transfer Protocol], but other protocols could be used such as e.g. FTP [File Transfer Protocol] for downloading and RTP [Real-time Transport Protocol] for streaming.

STB 140 can receive broadcast services, decode them, play the TV programs and run the interactive applications.

The interactive applications can be embedded in the broadcast services, but they can also be natively available on the STB or sent to it through the IP network. Among the functionalities that can be supported by the interactive applications, we can mention: the presentation of information sent through the broadcast network (e.g. a notification of additional contents available on demand); the management of the graphical user interface (e.g. conversion of a key selection into a specific action, such as to send a request to an information server, specifically information server 160); the management of the return channel, in order to enable the bidirectional communication between the user and an information server, specifically information server 160; the management of the communication with a smart card that could be located within an STB, specifically STB 140, or connected to a home network, specifically home network 170, and that would be used to store sensitive information, such as identification data and decryption keys, in order to read and update data recorded on the smart card. Additionally, the interactive applications

could also manage the transfer of additional contents 155 toward electronic appliance 180 through home network 170. The protocol used for the communication between STB 140 and electronic appliance 180 could be HTTP, but also proprietary protocols could be used. In this case, typically a conversion of protocols should be performed either by STB 140 or by access gateway 175.

Access gateway 175 provides two basic functionalities: it is the bridge between home network 170 and the IP network 150 and it is the router among the devices connected to home network 170, including set-top box 140 and electronic appliances 180 but not excluding e.g. one or more PCs. Access gateway 175 could be advantageously provided with intelligent features, such as discovery of devices on the network, protocol conversion, association between file format and device, etc.

Electronic appliance 180 could be for example a media player or an MP3 portable player (others of the many possible examples will be provided in the following) where the additional contents received by STB 140 from information server 160 will be stored.

In the following, the overall working of an embodiment of the method according to the present invention is described. In order to represent the core components of the invention, a simple case is illustrated, where no other systems are considered, such as e-payment system, DRM [Digital Rights Management] system, user profiling system, parental control system, etc.; in practice, these other systems are likely to be involved and used.

The flowchart of the main actions are depicted in Fig.2.

Action 0 : User 200 switch on the TV set and STB 140.

Action 1 : The TV set is tuned on a specific channel and user 200 is watching a TV program. The interactive application that controls the CoD [Content on Demand] service according to the present invention is downloaded to STB 140, but it keeps the "sleeping" status until it receives a specific event. Many different techniques can be used for managing the life cycle of the application, in case the MHP [Multimedia Home Platform] stack is implemented on STB 140, the application can be controlled by means of stream events. DSM-CC [Digital Storage Media Command and Control] stream events are markers that are embedded in a transport stream via MPEG-2 private sections, with each marker consisting of an identifier and a time reference. The identifier allows each stream event to be uniquely identified, while the time reference indicates at what point in the stream the event should trigger the change of the interactive application status, from "sleeping" into "running".

Action 2 : User 200 sees e.g. a red sign in a corner of the screen of the TV set and pushes the red button of the remote control device of STB 140. The red sign is produced by the interactive application that now is in the 'running' status.

Action 3 : The interactive application shows a GUI [Graphic User Interface], that presents on the screen of the TV set a list of additional contents available on demand, preferably together with additional information, such as dimension of the file, time needed for downloading, etc. .

Action 4 : User 200 checks the offer and decides whether to request the download of any content.

Action 5 : If User 200 is not interested in downloading any content, he pushes again the red button of the remote

control device of STB 140 and come back watching the TV program.

Action 6 : If User 200 is interested in downloading any content, he selects from the GUI the items he is interested in and sends a request 145 to an information server, specifically information server 160, indicating what is the target electronic appliance (in the case of Fig.1, there is only one electronic appliance shown, namely appliance 180, but many others can be provided).

Action 7 : The interactive application checks whether the indicated appliance is on and connected.

Action 8 : If the indicated appliance is not ready, a notification appears on the screen of the TV set, inviting the user to check the status of his home network, specifically network 170, and of the indicated appliance, specifically appliance 180.

Action 9 : If the indicated appliance is on and connected, the interactive application converts the commands received from user 200 into a message and send it to information server 160. This message includes the IP address associated to STB 140 and the content items requested by user 200, but it could also include additional information such as ID of STB 140, TV channel on which STB 140 is currently tuned on, etc. .

Action 10 : Information Server 160 downloads the contents, that are routed by access gateway 175 to electronic appliance 180. When download is finished, a notification appears on the screen of the TV set.

Action 11 : User 200 can disconnect appliance 180 from home network 170 and bring it with him for enjoying the downloaded content items at a convenient occasion.

The above described specific embodiment is subject to many variations and extensions; some of these will be considered in detail in the following.

A first extension is related to the network to be used for delivering the CoD service. In fact, if the same content items are of interest to a certain number of users or if return cannel becomes not available or has a limited bandwidth, the additional content items can be sent through a broadcast channel, in particular the broadcast TV channel. This can be achieved for example by a mechanism similar to that used in the PPV [Pay-Per-View] services, using a suitable identification system to identify the user and/or the STB, where television viewers can purchase events to be seen on a TV set and pay for the private telecast of that event to their homes later.

In case the return channel is available, the interactive application in STB 140, after sending the request to information server 160, triggered by user 200, receives an acknowledgement from information server 160 and keeps waiting for receiving an event on a specific TV channel; the event may indicate not only that the requested content items are coming but also the channel used for transferring the requested content items that can be e.g. the same TV channel or on a different TV channel of the same multiplex.

After receiving any event, the interactive application checks whether the contents are associated to its previous request; this can be done e.g. simply by comparing the ID of the contents with the ID provided with the acknowledgement; anyway, more complex and tamper-resistant techniques based on certificates can be used. When the event corresponding to the requested contents arrives, the application checks that the electronic appliance is operative and connected and starts the download and storage into the appliance.

In case the return channel becomes not available or has a limited bandwidth,information server 160 should send to

broadcasting playout 110 the correspondence between the STB and/or User and the requested items. Broadcasting playout 110 can multiplex on a same stream the additional contents and the ID of the recipient (STB and/or User), in order to make the STB to recognize the content items that should be downloaded into appliance 180.

A second extension relates to the download time of the contents requested by the user. The download may start immediately after information server 160 receives the user's request, but a mechanism to delay the delivery of the contents to an appropriate timeframe can be set up in addition or in replacement to the immediate download. This would be particularly useful for example in case of a subscription model service or for more efficient bandwidth occupancy (e.g. downloads could be concentrated during the night). This can be implemented for example in the following way. The acknowledgement from information server 160 could include the information about the time frame when the contents are available for the download (starting time and duration). Then, the application set up the connection with information server 160 at the indicated time in the indicated time frame.

A third extension relates to the personalization of the CoD service, i.e. the offer of additional contents could be personalized to the specific users and/or STBs. Assuming that an STB can communicate with a smart card, either physically inserted in the STB or in some device connected to the home network (e.g. physically inserted in access gateway), the list of contents proposed to the user on the TV screen could depend on the user profile associate to that smart card. For example, the user will be able to download any item in the list only if he has applied for a premium service, or in the other case he

will be able to choose and/or to receive only free contents.

Some variations require the possibility of the STB to write information on a smart card. In this case, for example, the reward for viewing a TV program could be the access to PPV services or games. In this case, a certificate is downloaded on the smartcard through the interactive application on the STB. In the case of games, if necessary, also the game could be downloaded on an appliance connected to the STB.

Finally, one interesting possibility is that the system according to the present invention can be connected with an e-commerce infrastructure; in fact, the download of contents may be subject to a payment to be carried out through an e-commerce infrastructure.

As it is apparent from the preceding description, the present invention can be implemented in many different ways and can find many different applications. Therefore, in the following, the present invention will be set out in general terms in line with the annexed claims.

Essentially the present invention relates to a method for storing contents associated to a TV program into an electronic appliance.

In general, this method comprises the steps of:

A) receiving a TV signal through a TV receiver, the TV signal carrying at least the TV program and data relating to contents associated to said TV program,

B) decoding the TV signal and identifying said contents data,

C) asking the user his interest in said contents,

D) getting a reply from the user specifying which of said contents he is interested in,
E) collecting said specified contents, and
F) storing said collected contents into an electronic appliance;

wherein said steps are carried out sequentially and automatically, i.e. without the intervention of the user with the exception of his reply at step D.

The TV receiver may be a TV STB, but can also be a TV set with an integrated STB or other kinds of electronic devices able to receive TV signals and to show video on a screen directly or indirectly connected to the receiver. It can be noted that depending on how the present invention is implemented step E and step F can be strictly connected and partially overlapping; in fact, the collecting step comprises all the activities that precedes the storage of the contents into the electronic appliance. If, for example, the contents is first temporary stored into the TV receiver or STB and then permanently stored into the electronic appliance, the temporary storage may be regarded as part of step E or as part of step F.

Typically, according to the present invention, the collected contents are stored into non-volatile storage means of the electronic appliance for future use by the user; such storage means can be e.g. semiconductor integrated circuit as it would be the case of an MP3 player or a PDA or a mobile cellular phone.

Typically, according to the present invention, the contents associated to the TV program are multimedia contents, i.e. a combination of different media for example audio and video.

Anyway, important application of the present invention may provide that the stored contents are not directly multimedia contents but are keys for decrypting multimedia contents or licenses for using multimedia contents or keys for accessing multimedia contents. In this case, typically, the user can freely download multimedia contents at any time and in any way but can use these downloaded multimedia contents only if he has downloaded the key or license during or as a consequence of the TV program. The electronic appliance where storage is to take place according to the present invention may be any device separate from the TV receiver and from the STB that is provided with a non volatile storage capability and is adapted to store in a non volatile manner the content specified by the user, i.e., to store the content for a time sufficient to allow the user to play it at a time of her/his choice.

The electronic appliance where storage is to take place according to the present invention may be connected directly or indirectly to the TV receiver. An example of a direct connection would be through an USB port or a Bluetooth link or some dedicated cable. An example of indirect connection would be through e.g. a home local area network. In this case, the storage of contents into the electronic appliance may takes place through the TV receiver.

One further possibility is that the electronic appliance is a smartcard (or chip card), for example a SIM card. This is a typical case when the contents correspond to keys; anyway, it is also applicable to Java games, sounds or images for mobile cellular phones.

The electronic appliance where storage is to take place according to the present invention may be connected

directly or indirectly to the Internet. In this case, the transfer of contents into the electronic appliance may take place directly from an information server via the Internet and e.g. through the access gateway without the help of the TV receiver.

The electronic appliance where storage is to take place according to the present invention may be connected directly or indirectly to a fixed or mobile telephone network. In this case, the transfer of contents into the electronic appliance may take place directly from an information server through the telephone network without the help of the TV receiver.

One or more of the steps set out above may be carried out taking into account the identity of a user and/or of the TV receiver, the identity being stored in the TV receiver or in a smartcard associated to the TV receiver. This feature is useful for limiting or discriminating the possibility of storage e.g. according to service subscriptions or regional/national preferences.

One or more of the steps set out above may be carried out taking into account a user profile, the user profile being stored in the TV receiver or in a smartcard associated to the TV receiver. This feature is useful for personalizing the offer of contents to the various different users; as it is known more and more users expect personalized services; for example, if a user is interested only in classic music no red dot will appear on his screen when only pop music contents are associated to the TV program he is watching.

Typically, step C and said step D are carried out by the TV receiver through an interactive application stored or downloaded into the TV receiver.

Typically, step C provides that at least one image is displayed on a display associated to the TV receiver; this image could be a menu partially superimposed to the TV video sequence.

Typically, step D provides that the TV receiver receives input from the user; this input could derive from the keys of the remote control device of the TV receiver.

Typically, step E provides that the TV receiver sends at least one message to an information center through a wired data network or wireless data network or telephone network.

Many possibilities exist for the content of such message sent from the TV receiver to the information center; additionally, a number of consecutives messages may be provided.

If at step C only one single content item was offered to the user, at step E the message should indicate (explicitly or implicitly) the interest of the user to this single item; if at step C some content items were offered to the user, at step E the message should contain information identifying the contents specified by the user.

At step E, the message may indicate the identity of the TV receiver and/or of the user; this may be useful for billing the cost of the contents specified by the

user or for checking the authorization of the user to store the contents specified.

As already mentioned, step E may provide that the TV receiver detects the operative status of the electronic appliance before sending one or more messages to the information center; additionally, step E may provide that the TV receiver alerts the user if it detects that the electronic appliance is not operative, i.e. not ready or able to store contents.

At step E, the message may indicate a telecommunication address, for example the IP address, of the electronic appliance. This is useful for allowing that the information center is able to communicate directly with the electronic appliance e.g. for carrying out the transfer of the contents. For example, the information center might transfer an image (to be used as background image) to a mobile cellular phone by making a direct phone call.

At step E, the message may indicate a service request for the provision of contents to the user in push mode. It is in fact possible that during a TV program it is offered to the user not simply one or more contents items but e.g. a subscription for the regular reception of content items. For example, a user may be interested in regularly updating his MP3 player with the song of a certain singer or in regularly updating his PDA with the stock rates of a certain company or in regularly receiving on his UMTS cellular phone the trailers of the new films etc.

Step E (collection) and step F (storage) may be carried out through two different communication channels; in fact, collection may require a narrow bandwidth while

storage may require a wide bandwidth; additionally, collection is primarily carried out by the TV receiver while storage is primarily carried out by the electronic appliance.

As already mentioned, the contents specified by the user may be transmitted by the information center in step E and/or in step F to the TV receiver for temporary storage or directly to said electronic appliance.

A first possibility for such transmission of contents (used in the embodiment described herein in detail) is to use the return channel of a TV system which is a bidirectional communication link.

A second possibility for such transmission of contents is broadcast transmission through the same TV signals; as the bandwidth for such transmission of contents within a TV signal is limited, the transfer of contents may be rather slow.

As already mentioned, other possibilities exist. The storage of the contents specified by the user at step F may be carried after a certain period of time from the collection at step E, in particular it may be carried out immediately after.

The storage of the contents specified by the user at step F may be carried at a time specified by the user or at a time specified by the information center.

According to a further aspect the present invention relates also to a TV receiver having the features (hardware and/or software) adapted to carry out the method set out above, particularly only steps from A to E or all the steps from A to F.

CLAIMS

1. Method for storing contents associated to a TV program into an electronic appliance (180), comprising the steps of:

A) receiving a TV signal through a TV receiver (140), the TV signal carrying at least the TV program and data relating to contents associated to said TV program,

B) decoding the TV signal and identifying said contents data,

C) asking the user (200) his interest in said contents,

D) getting a reply from the user specifying which of said contents he is interested in,

E) collecting said specified contents, and

F) storing said collected contents into an electronic appliance (180);

wherein said steps are carried out sequentially and automatically.

2. Method according to claim 1, wherein said collected contents are stored into non-volatile storage means of said electronic appliance.

3. Method according to claim 1, wherein said contents associated to said TV program are multimedia contents.

4. Method according to claim 1, wherein said contents associated to said TV program are keys for decrypting multimedia contents or licenses for using multimedia contents or keys for receiving multimedia contents.

5. Method according to claim 1, wherein said electronic appliance is connected directly or indirectly to said TV receiver.

6. Method according to claim 5, wherein said electronic appliance is a smart card.

7. Method according to claim 1, wherein said electronic appliance is connected directly or indirectly to the Internet.

8. Method according to claim 1, wherein said electronic appliance is connected directly or indirectly to a fixed or mobile telephone network.

9. Method according to claim 1, wherein one or more of said steps is carried out taking into account the identity of said user and/or of said TV receiver, said identity being stored in said TV receiver or in a smartcard associated to said TV receiver.

10. Method according to claim 1, wherein one or more of said steps is carried out taking into account a user profile, said user profile being stored in said TV receiver or in a smart card associated to said TV receiver.

11. Method according to claim 1, wherein said step C and said step D are carried out by said TV receiver through an interactive application stored or downloaded into said TV receiver.

12. Method according to claim 1, wherein said step C provides that at least one image is displayed on a display associated to said TV receiver.

13. Method according to claim 1, wherein said step D provides that said TV receiver receives input from the user.

14. Method according to claim 1, wherein said step E provides that said TV receiver sends at least one message to an information center through a wired or wireless data or telephone network.

15. Method according to claim 14, wherein said step E provides that said TV receiver sends to said information center information identifying said specified contents.

16. Method according to claim 14, wherein said step E provides that said TV receiver sends to said information center the identity of said TV receiver and/or of said user.

17. Method according to claim 14, wherein said step E provides that said TV receiver detects the operative status of said electronic appliance before sending said at least one message to said information center.

18. Method according to claim 17, wherein said step E provides that said TV receiver alerts the user if it detects that said electronic appliance is not operative.

19. Method according to any of claims from 14 to 18, wherein said step E provides that said TV receiver sends to said information center a telecommunication address of said electronic appliance.

20. Method according to any of claims from 14 to 19, wherein said at least one message comprises a service request for the provision of contents in push mode.

21. Method according to claim 1, wherein said step E and said step F are carried out through two different communication channels.

22. Method according to claim 1, wherein said step E and/or said step F provides that an information center sends said specified contents to said TV receiver for temporary storage or directly to said electronic appliance.

23. Method according to claim 22, wherein said step E and/or said step F provides that said information center sends said specified contents through the return channel of a TV system.

24. Method according to claim 22, wherein said step E and/or said step F provides that said information center sends said specified contents in broadcast mode in particular through TV signals.

25. Method according to claim 1, wherein said step F is carried out at a time specified by said user.

26. Method according to claim 1, wherein said step F is carried out at a time specified by an information center.

27. Method according to claims 25 or 26, wherein said step F is carried out after a certain period of time from said step E.

28. TV receiver (140) characterized by being adapted to carry out at least steps from A to F of the method according to any of claims from 1 to 29 when connected to an electronic appliance provided with non volatile storage capability.

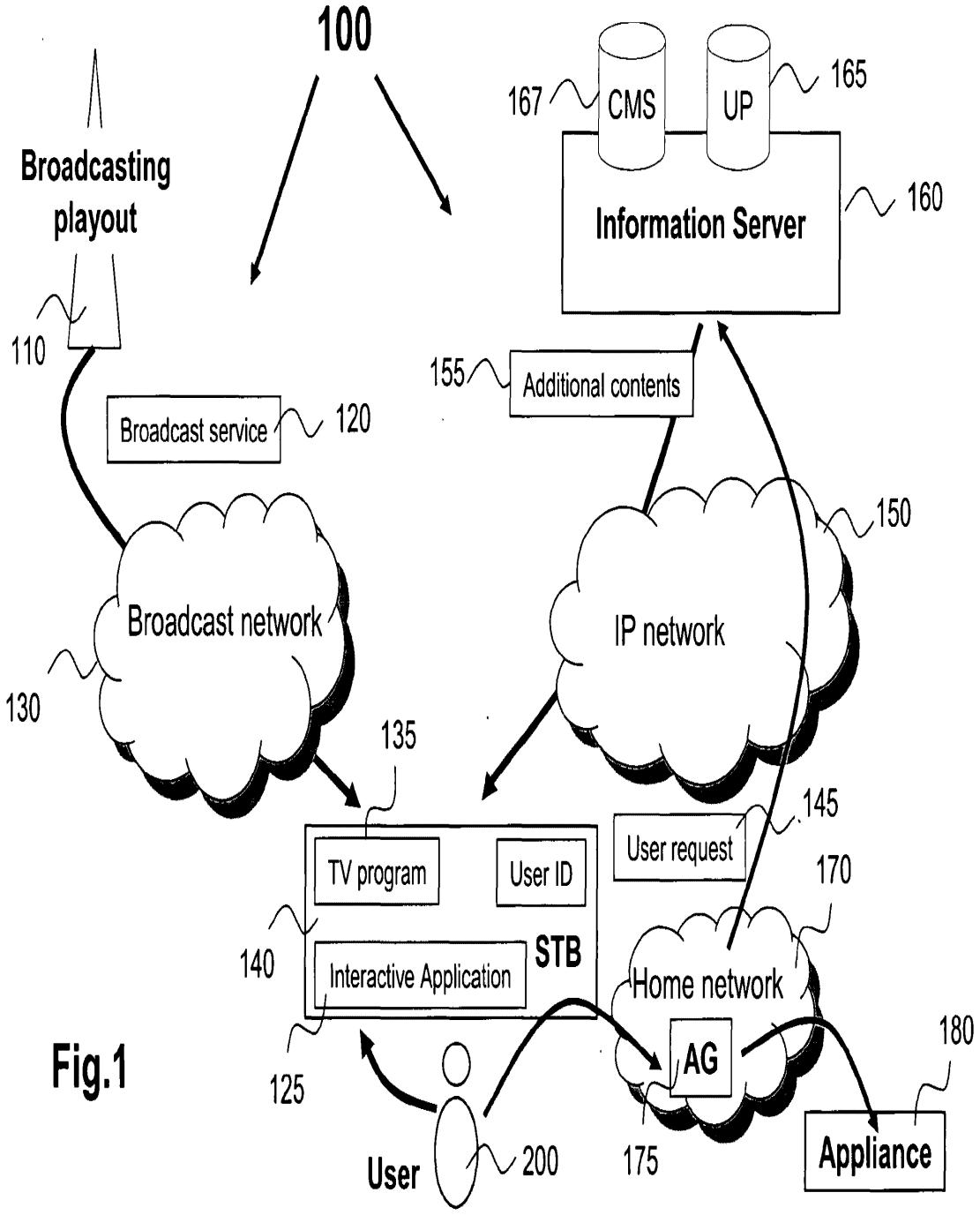

100
Broadcasting playout
110
167
CMS
UP
165
Information Server
160
155
Additional contents
Broadcast service
120
150
Broadcast network
IP network
130
135
145
User request
TV program
User ID
170
140
Interactive Application
STB
Home network
AG
180
125
User
200
175
Appliance

Fig.1

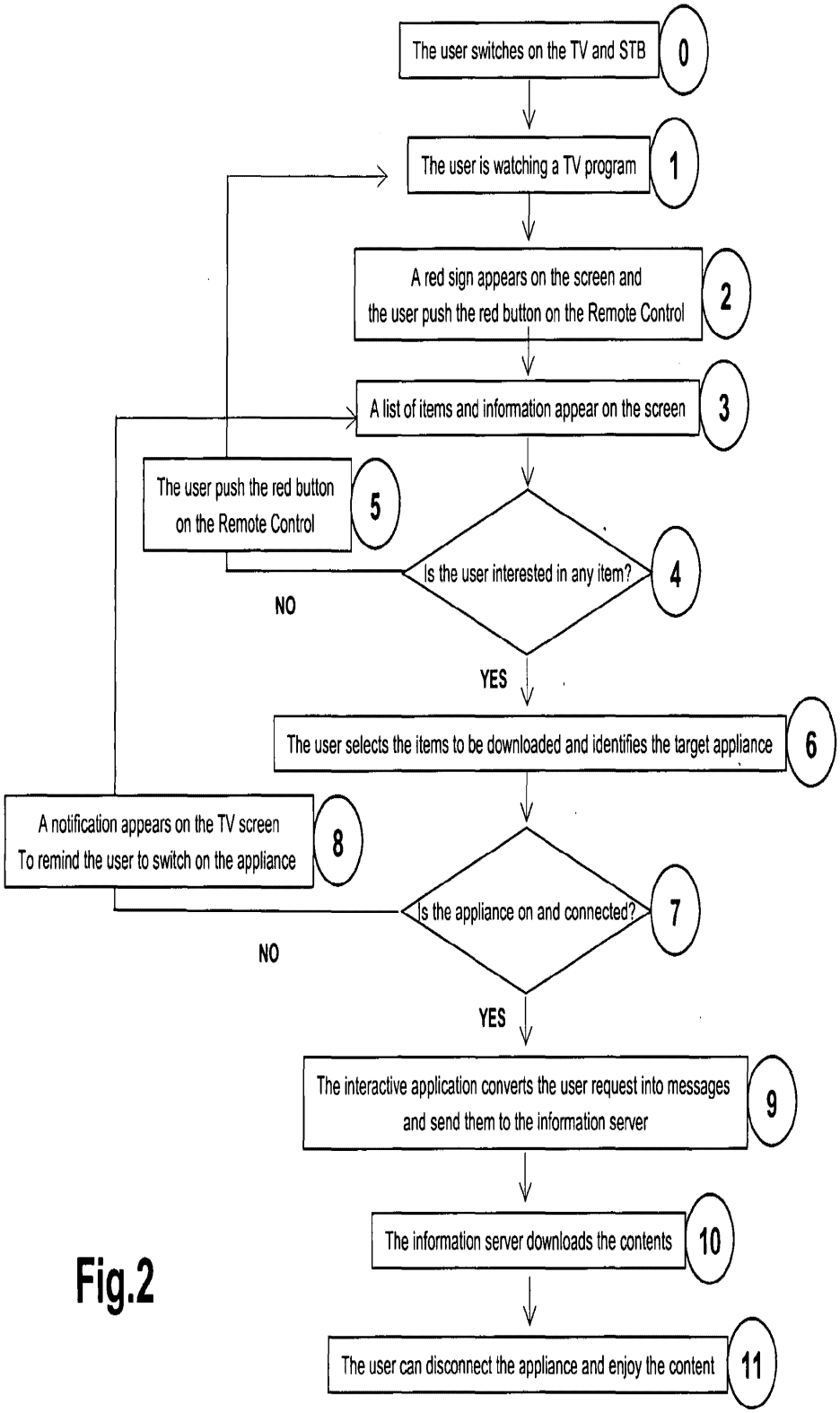

The user switches on the TV and STB
0
The user is watching a TV program
1
A red sign appears on the screen and
the user push the red button on the Remote Control
2
A list of items and information appear on the screen
3
The user push the red button
on the Remote Control
5
Is the user interested in any item?
4
NO
YES
The user selects the items to be downloaded and identifies the target appliance
6
A notification appears on the TV screen
To remind the user to switch on the appliance
8
Is the appliance on and connected?
7
NO
YES
The interactive application converts the user request into messages
and send them to the information server
9
The information server downloads the contents
10
The user can disconnect the appliance and enjoy the content
11

Fig.2

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/005206

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N5/44

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

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 101 39 669 A1 (RTL NEWMEDIA GMBH [DE] RTL INTERACTIVE GMBH [DE]) 27 February 2003 (2003-02-27)	1,3,5, 7-28
Y	paragraph [0011]; figures 1,5	2,4
Y	US 5 907 350 A (NEMIROFSKY FRANK R [US]) 25 May 1999 (1999-05-25)	2,4
A	column 2, line 59 - column 4, line 64	1,28
X	US 2004/172662 A1 (DANKER DANIEL [US] ET AL) 2 September 2004 (2004-09-02) paragraph [0003]; figures 1-4 paragraph [0018] - paragraph [0046]	1,3,5, 7-28
A	US 2002/194264 A1 (UCHIYAMA KOICHIRO [JP] ET AL) 19 December 2002 (2002-12-19) figure 8	1-28

-/--

[X] Further documents are listed in the continuation of Box C.

[X] 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 document 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	Date of mailing of the international search report
11 January 2007	19/01/2007

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

2

Form PCT/ISA/210 (second sheet) (April 2005)

VIZIO Ex. 1002, Page 1183 of 3573
VIZIO v. MMT, IPR2024-00722

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/005206

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/061607 A1 (HUNTER CHARLES ERIC [US] ET AL) 27 March 2003 (2003-03-27) figures 1-3	1-28
A	US 2005/086690 A1 (GILFIX MICHAEL [US] ET AL) 21 April 2005 (2005-04-21) figures 4-6	1-28
A	EP 1 304 876 A2 (ATI TECHNOLOGIES INC [CA]) 23 April 2003 (2003-04-23) figures 1,2	1-28

2

VIZIO Ex. 1002, Page 1184 of 3573
VIZIO v. MMT, IPR2024-00722

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2006/005206

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

VIZIO Ex. 1002, Page 1185 of 3573
VIZIO v. MMT, IPR2024-00722

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2006/005206

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 10139669 A1	27-02-2003	NONE	
US 5907350 A	25-05-1999	NONE	
US 2004172662 A1	02-09-2004	NONE	
US 2002194264 A1	19-12-2002	WO 02099696 A2 JP 2004530390 T	12-12-2002 30-09-2004
US 2003061607 A1	27-03-2003	NONE	
US 2005086690 A1	21-04-2005	CN 1610405 A	27-04-2005
EP 1304876 A2	23-04-2003	US 2003079224 A1	24-04-2003

VIZIO Ex. 1002, Page 1187 of 3573
VIZIO v. MMT, IPR2024-00722

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 December 2011 (01.12.2011)

PCT

(10) International Publication Number
WO 2011/148054 A1

(51) International Patent Classification:
G06F 17/30 (2006.01) *H04N 5/445* (2011.01)

(21) International Application Number:
PCT/FI2011/050472

(22) International Filing Date:
24 May 2011 (24.05.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
20105574 25 May 2010 (25.05.2010) FI

(71) Applicant *(for all designated States except US)*: **AXEL TECHNOLOGIES** [FI/FI]; Tykistökatu 4 A, FI-20520 Turku (FI).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **PEKONEN, Harri** [FI/FI]; Upalingontie 64, FI-21260 Raisio (FI). **PAKARINEN, Teemu, Johannes** [FI/FI]; Luolavuorentie 52 A 2, FI-20720 Turku (FI).

(74) Agent: **ESPATENT OY**; Kaivokatu 10 D, FI-00100 Helsinki (FI).

(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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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.

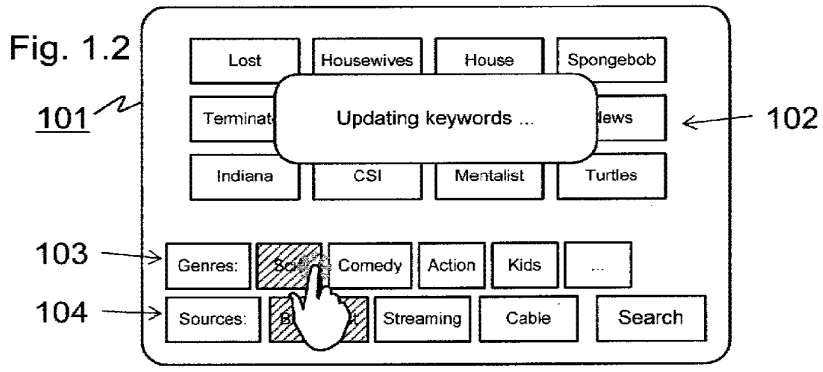
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, 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, ML, MR, NE, SN, TD, TG).

Published:

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

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(54) **Title**: USER INTERFACE FOR MEDIA DEVICE



(57) **Abstract**: A user interface for a media device for: determining a present context of a media usage application; determining search terms based on metadata related to media items that are available within the present context; forming a search criteria collection comprising a plurality of search criteria from the determined search terms; graphically displaying the search criteria collection to a user; allowing the user to select desired search criteria; detecting user selection of a search criterion in the search criteria collection and responsively after each selection of a search criterion updating the search criteria collection such that the search criteria in the updated search criteria collection match with all the selected search criteria; and searching for media items that are available within the present context to filter media items the metadata of which matches with the selected search criteria.

WO 2011/148054 A1

USER INTERFACE FOR MEDIA DEVICE

TECHNICAL FIELD

The present invention generally relates to a user interface for a media device. The invention relates particularly, though not exclusively, to a user interface of mobile television with a touch display.

BACKGROUND ART

Television sets have become increasingly intelligent appliances. Some television sets feature recording, electronic program guide and even time shifting capabilities. On the other hand, similar features are being provided for mobile devices such as portable television receivers and dedicated portable television sets. Moreover, other sources of media are also being used for rendering media to a user by various media devices. However, the portable devices in particular may suffer from restricted display size such that typical menu based access to various functions and operations may appear laborious and unintuitive. This problem is further accented by the increasing number of new functions and decreasing size of mobile televisions or media devices in general. Hence, it is an object of the invention to further enhance the user interface of media devices.

SUMMARY

According to a first aspect of the invention there is provided a method comprising:

determining a present context of a media usage application;

determining search terms based on metadata related to media items that are available within the present context;

forming a search criteria collection comprising a plurality of search criteria from the determined search terms;

graphically displaying the search criteria collection to a user;

allowing the user to select desired search criteria;

detecting user selection of a search criterion in the search criteria collection and responsively after each selection of a search criterion updating the search criteria collection such that the search criteria in the updated search criteria collection match with all the selected search criteria; and

searching for media items that are available within the present context to filter media items the metadata of which matches with the selected search criteria.

Advantageously, the method may enable performing context-sensitive searches without need to type search words. Moreover, by automatically adapting the search criteria collection, the search may rapidly be focused to media items desired by the user.

The determining of the present context may involve determining a broadcast context in which broadcast media items are being defaulted to content source.

The determining of the present context may involve determining a streaming context in which streaming media items are being defaulted to content source.

The determining of the present context may involve determining a cable context in which cable television media items are being defaulted to content source.

The method may further comprise selecting one or more alternative content sources of media items. Advantageously, when checking other television programs while watching terrestrial TV, the user may quickly expand or shift the search to other media sources.

The method may further comprise determining one or more attributes related to presently consumed media content and determining the present context using said one or more attributes. The attributes may relate to metadata items, genres and content sources.

The method may further comprise allowing the user to define a group of search criteria for producing a representative single Boolean value for combining with one or more other search criteria or groups of search criteria.

Advantageously, the method may allow forming powerful searches by combining conditions related to two or more different search criteria into a single representative Boolean value.

The method may further comprise modifying search conditions that link different search criteria together. The search conditions may comprise one or more of the following: AND; NOT; OR; NEAR; XOR (exclusive OR).

Advantageously, the search may be easily and intuitively modified by the user. The modification of the search may be implemented by selecting again a selected search criterion and cycling associated search condition through a set of different alternatives for the search condition.

The method may further comprise removing a given search criterion from the selected search criteria by selecting said given search criterion again. The removing may be performed when the search condition has been selected again so many times that all the available search conditions have been cycled through.

The method may further comprise additionally searching for media items that are available within the present context to filter media items the metadata of which matches at least partially with the selected search criteria. The additional searching may be carried out simultaneously with the searching for media items that are available within the present context to filter media items the metadata of which matches with the selected search criteria. The results (or their subset) of the additional searching may be presented on or after presenting the results of the searching for media items that are available within the present context to filter media items the metadata of which matches with the selected search criteria.

According to a second aspect of the invention there is provided an apparatus configured to perform a method according to the first aspect of the invention. The apparatus may be configured to perform any embodiment of the first aspect.

According to a third aspect of the invention there is provided a computer program configured to cause a computer, when performing the computer program, to perform a method according to the first aspect of the invention. The computer program may be configured to cause the computer to perform any embodiment of the first aspect.

According to a third aspect of the invention there is provided a memory medium carrying any foregoing computer program.

The memory medium may comprise a digital data storage such as a data disc or diskette, optical storage, magnetic storage, holographic storage, opto-magnetic storage, phase-change memory, resistive random access memory, magnetic random access memory, solid-electrolyte memory, ferroelectric random access memory, organic memory or polymer memory. The memory medium may be formed into a device without other substantial functions than storing memory or it may be formed as part of a device with other functions, including but not limited to a memory of a computer, a chip set, and a sub assembly of an electronic device.

Different non-binding aspects and embodiments of the present invention have been illustrated in the foregoing. The above embodiments are used merely to explain selected aspects or steps that may be utilized in implementations of the present invention. Some embodiments may be presented only with reference to certain aspects of the invention. It should be appreciated that corresponding embodiments may apply to other aspects as well.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described, by way of example only, with reference to the accompanying drawings, in which:

Figs. 1.1 to 1.6 show a set of different drawings illustrating different screens and acts by a user in a use case according to a first example of the invention;

Figs. 2.1 to 2.8 show a set of different drawings illustrating different screens and acts by a user in a use case according to a second example of the invention;

Figs. 3.1 to 3.6 show a set of different drawings illustrating different screens and acts by a user in a use case according to a third example of the invention;

Figs. 4.1 to 4.4 show a set of different drawings illustrating different screens and acts by a user in a use case according to a first example of the invention;

Figs. 5.1 and 5.2 show a set of different drawings illustrating different screens and acts by a user in a use case according to a fifth example of the invention; and

Fig. 6 shows a schematic drawing of a mobile media device according to an embodiment of the invention.

DETAILED DESCRIPTION

In the following description, like numbers denote like elements.

This description discloses various embodiments of the invention. The description uses only for illustration an example apparatus a mobile media device with a touch screen and also with a television receiver or more decoder. It is appreciated that other input methods are likewise applicable for use, such as input methods as the following: computer mouse, multi-touch track pad, keyboard and remote controller. Moreover, it is not intended to restrict the invention to mobile media devices: to the contrary, embodiments of the invention exist in which a desktop computer, set top box, television set, game console or other fixed applicance or home appliance is used to provide one or more features of the invention.

Numerous different embodiments are explained here in connection with one another solely to demonstrate at least one way in which these embodiments can interwork without intention to restrict the invention to use of all or any of these embodiments. Instead, each of these embodiments is intended to serve as an invention for this patent application or any continuation or divisional application.

In this document, the term television decoder is intended to cover both television broadcast signal reception (and decoding) devices for cable, terrestrial or satellite networks as well as packet data and other distribution networks provided media reception.

Fig. 6 shows a schematic drawing of a mobile media device 100 according to an embodiment of the invention. The mobile media device 100 comprises an antenna connection 110 that either is configured for coupling with an antenna connector or is connected with a mobile antenna. The mobile media device 100 further comprises a display 120, a memory 130 comprising work memory 140 and non-volatile memory 150 with computer executable program code 160. The mobile media device 100 further comprises a television decoder or receiver 170, a user input device 180 and a processor 190 configured to control operation of the mobile media device 100 according to the program code 160 by executing the program code in place in the non-volatile memory 150 or in the work memory 140. The user input device 180 may comprise dedicated parts such as one or more keys, a cursor control device or the like, or the user input device 180 may be formed using the display 120 if the display 120 is a touch display.

The mobile media device 100 may be, for instance, a portable television, game device, mobile phone, personal digital assistant, or a navigation device.

The inventors have realized that when the amount of available audio and video content is large, the user may not easily find the things he is looking for by just browsing. Moreover, entry of text with small media devices is also often challenging because of lack of a proper keyboard. For instance, many devices that have a touch screen user interface are lacking keyboards but instead sport virtual keyboards that are displayed on-screen.

It is next described how using a sophisticated search functionality the user may easily find available desired content. This search functionality provides the user with ability to gather information of the context in which the user invoked the

search and to propose different context-sensitive search criteria (e.g. search key strings) to the user. This search functionality provides the user with ability to modify the proposed search criteria by adding search criteria, removing search criteria and changing search conditions (such as Boolean operators) that are applied to combine the search criteria.

In the following example, a graphical user interface (GUI) is used with an advantage of ease of use to modify search criteria. The GUI has a presentation output for show to the user context related keywords which include pre-selected criteria and other criteria (or criterion) which the user may add to the search criteria.

USE CASE EXAMPLES

Use case 1: sci-fi tonight

The user desires to check if there will be a sci-fi movie broadcasted tonight. This use case is described in the following with reference to Figs. 1.1 to 1.6.

1.1. The user opens a search view from a media management application – initial keywords 102 are shown to the user in a criteria collection. Fig. 1.1 illustrates step 1.1. This is the initial view for a search window 101. The keywords 102 as well as genres 103 and content sources 104 are selected based on existing data and user viewing habits. With shown keywords, it is guaranteed to be found at least one result. At least one content source 104 has to be selected in this particular embodiment. Here the broadcast content source has been automatically selected. In other words, in this phase, a present context of a media usage application is determined, search criteria are formed and displayed to the user.

1.2. The user selects desired program genres 103. The selected genres form part of search criteria and the keywords in the criteria collection are updated based on the selected one or more genres. The user has selected one genre (sci-fi) which is then identified by highlight. As content source, broadcasting has been selected by the user or automatically based on the determined present context. In response to the selection of a search

criterion (the genre), the keywords in the criteria collection are automatically updated, based on the selected genre and content source.

1.3. In response, remaining keywords in the criteria collection are updated based on the user keyword selection. New keywords are shown in the collection of criteria. At this point, all the shown keywords match with selected search criteria "sci-fi" and "broadcast". All of the displayed keywords are extracted from available content items e.g. by looking into program guide data or other available metadata.

It is appreciated that selecting either of the desired program genre 103 or desired keywords 102 may correspond to selecting by the user of desired search criteria.

1.4. The user selects the desired keywords 102. The user selects keywords "Star" and "Galactica". The other keywords of the criteria collection are automatically updated.

1.5. The user desires to conduct a search using the selected criteria. The available content is searched by checking metadata of each content item among a plurality of different content items and then a hit list will be produced indicative of found contents and displayed to the user. All the shown keywords match to the search criteria "sci-fi", "broadcast". All the shown keywords and also related to the selected further criteria i.e. keywords "Star" and "Galactica". The user is happy with these search options and selects "Search" 105.

1.6. A hit list 106 is shown in result of searching with the selected search criteria. If the user is not happy with the results, the user may try changing the search criteria and performing the search again. The search results are shown to the user. A back-key 107 may be provided for the user so that if the user is not satisfied with the results, the user can go back and refine the search options using the back-key. Alternatively, or additionally, the user may edit the selected criteria.

The previously presented first use case exemplified how few keystrokes may suffice to identify desired content item. Moreover, the user need not remember

exact keywords by heart as he is provided with different alternatives to choose from. Further advantageously, there is no need to tap in entire words for use in the search so that also problems caused by typographic errors may be avoided simultaneously with accelerating the search process.

Use case 2: context related search

This use case relates to a case in which the user wants to see what else there is to see related to a user-selected program such as the program being presented or the program for which the user has invoked an information display. In this use case it is shown that keywords are updated every time user modifies search criteria. Another alternative is to maintain a static list of keywords. This alternative may suit in cases where the user sees several valid keywords and wants add them all into search criteria. In order to temporarily freeze the search criteria selection i.e. the keyword list, the user may use a corresponding control or enter individual selections in a manner that is indicative of the desire to avoid adapting of the remaining search criteria. For instance, the user may tap and hold for a while an item in order to avoid changing the remaining search criteria, or tap the screen with many fingers (e.g. on two or more different sides about the criteria selection).

An example of this use case is presented in the following with reference to illustrative Figs. 2.1...2.8:

2.1. The user has program event info 201 displayed, user selects search.

2.2. The search window 101 with keywords, and preselected genres and content source based on current event is shown.

2.3. The user adds also streaming sites to the search options by tapping on this option among the shown alternatives in the sources group 104.

2.4. Search view updates the keywords based on data received from streaming media sites.

2.5. Updated keywords 102 are shown.

2.6. The user selects two keywords 102 “Flashforward” and “teaser”, and keywords are updated automatically.

2.7. The user selects “Search” 105.

2.8. The search result view 202 is shown with programs matching to genre “Sci-

fi" and "action" and are from content sources "broadcast" and "streaming" and contain keywords "Flashforward" and "teaser".

Use case 3: Advanced criteria editing

This use case relates to a case in which the user wants to change the way in which the selected search criteria are combined by grouping some search criteria and by excluding some keywords. This use case presents features similar to using parenthesis marks in text-based Boolean search. In the following, a process is explained with reference to Figs. 3.1 to 3.6:

3.1. The user has initiated search and has a search window 301 with a collection of search criteria some of which have been selected, genres and content source based on current event. The selected search criteria are shown as search terms combined by AND function in a search term field 302.

3.2. The user taps to end of the search criteria area as an indication of a desire to modify the search criteria by adding parentheses to the proposed search criteria. In response, parentheses are added around the selected search criteria in the search term field 302.

3.3. The user selects a further keyword 303 from the keyword collection by tapping that word. The selected further keyword 303 is appended to the search criteria with a Boolean operator "AND" in the search term field 302.

3.4. The user taps once more the further keyword 303 in order to change the Boolean operator that links this keyword to the search criteria. In response, the Boolean operator that links this further keyword to other selected keywords is changed to OR operator.

3.5. The user taps the further keyword 303 once more so that the Boolean operator is changed to NOT. The user is happy with this choice of Boolean operator. If the user tapped fourth time on a given keyword (e.g. on the further keyword), that keyword would be removed from the selected keywords.

3.6. The user desires to change the search criteria so that the Boolean operator between two keywords within the parentheses would be connected by the Boolean operator OR. The user taps once the latter of these keywords. In

response, the latter keyword (Scientists in this example) is tapped and the Boolean operator between the two selected search terms in parentheses is changed. In one further example, the tapped search term is moved to the end of the selected search terms within its nesting level (in parentheses or if outside parentheses, then to the last search term in the list outside the parentheses). Using the example of the starting state of Fig. 3.6, if the user taps again the search term Flashforward, then that term is moved to be the latter search term (in reading direction, accounting for such cultural customization). The previously present Boolean operator AND is removed, and the following Boolean operator OR is inserted before the moved search term.

Use case 4: Results view

This use case starts from the state in which the user has completed search for content items and a results window 202 shows the found items.

4.1. The user desires to see more information of the first item, so he taps the screen on the first item area. Some related action buttons are also shown to the user, such as Record 401, Recommend 402, Remind 403 and/or set favourite 404.

4.2. The user desires to see more information of the third item, so he taps that item or an area about that item that is associated to that item.

4.3. The user desires to set reminder for third item, so he taps the shown reminder button 403. In response, a dialog 405 about the taken action is shown for the user. The dialog may be produced e.g. by presenting to the user a callout that provides a response to the user about the taken action. The callout may disappear automatically. Alternatively, the callout may be closed by using a particular closing control or by tapping outside the callout.

4.4. The user decides to start watching first item, so he taps and holds it. Content 406 of the selected item is rendered for the user.

Use case 5: Automatically updating search results

In large and high resolution devices, the search results and criteria may be displayed simultaneously e.g. in single combination window 501. In this case

search results may be updated every time user modifies the selected search criteria.

5.1. The user has opened the combination window 501 and has some search criteria selected. Related results are shown in response to the selecting of the search criteria. The user further modifies the selected search criteria.

5.2. After the selected search criteria have been modified, the displayed search results are automatically updated correspondingly in the combination window 501.

MISCELLANEOUS FURTHER EMBODIMENTS

Some further examples of different alternatives and options involve the possibility to add day or date criteria such as search today, this week, given date or date range; using of parental guidance rating as a search criterion, and using keywords other than contextually related words, such as recently used or frequently used search criteria. Moreover, various implementations have been designed such as grouping of the search criteria of different types (Related, Last, Most used, etc.) on different tabs; indicating the Boolean operator used with each of the selected search criteria by associated appearance (hatch, color, font appearance etc), displaying of a legend that illustrates which Boolean operator is associated with each of the selected search criteria; and providing a list of different content types for use as search criteria. Moreover, the search criteria or a subset of the search criteria (such as the genre, type and/or source) may be presenting with scrolling controls so that a portion of the search criteria is logically outside the presently displayed area. Further still, the search with the search criteria may comprise two parts, including a first part in which it is searched for media items with metadata that matches with the search criteria, and a second part, in which it is searched for media items with metadata that partially matches with the search criteria. The second part of the search may be carried out simultaneously with the first part, or separately from the first part. For instance, the second part of the search may be carried out only if the number of matching media items is lower than a predetermined lower threshold so that the user can then be presented with a desired number of media items. The number of media items searched and / or presented for the second part may be defined using a) a constant amount, b) based on their matching rate (percentage of similarity with search criteria), c) total

number of media items when counting also the found media items of the first part, or d) any combination of the options a) to c).

Various embodiments have been presented. It should be appreciated that in this document, words comprise, include and contain are each used as open-ended expressions with no intended exclusivity.

The foregoing description has provided by way of non-limiting examples of particular implementations and embodiments of the invention a full and informative description of the best mode presently contemplated by the inventors for carrying out the invention. It is however clear to a person skilled in the art that the invention is not restricted to details of the embodiments presented above, but that it can be implemented in other embodiments using equivalent means or in different combinations of embodiments without deviating from the characteristics of the invention.

Furthermore, some of the features of the above-disclosed embodiments of this invention may be used to advantage without the corresponding use of other features. As such, the foregoing description shall be considered as merely illustrative of the principles of the present invention, and not in limitation thereof. Hence, the scope of the invention is only restricted by the appended patent claims.

Claims:

1. A method comprising:
determining a present context of a media usage application;
determining search terms based on metadata related to media items that are available within the present context;
forming a search criteria collection comprising a plurality of search criteria from the determined search terms;
graphically displaying the search criteria collection to a user;
allowing the user to select desired search criteria;
detecting user selection of a search criterion in the search criteria collection and responsively after each selection of a search criterion updating the search criteria collection such that the search criteria in the updated search criteria collection match with all the selected search criteria; and
searching for media items that are available within the present context to filter media items the metadata of which matches with the selected search criteria.

2. The method of claim 1, wherein the determining of the present context involves determining a present content source context in which present content source is defaulted to content source.

3. The method of claim 2, wherein the determining of the present context is based on the metadata of a currently selected program.

4. The method of claim 2 or 3, wherein the determining of the present context involves determining presently available content sources and defaulting to the content source the presently available content sources.

5. The method of any one of the preceding claims, wherein the method further comprises selecting one or more alternative content sources of media items.

6. The method of any one of the preceding claims, wherein the method further comprises determining one or more attributes related to presently consumed media content and determining the present context using said one or more attributes.

7. The method of any one of the preceding claims, wherein the method further comprises allowing the user to define a group of search criteria for producing a representative single Boolean value for combining with one or more other search criteria or groups of search criteria.

8. The method of any one of the preceding claims, wherein the method further comprises modifying search conditions that link different search criteria together.

9. An apparatus comprising a memory comprising operating instructions and a processor configured to cause the apparatus to perform according to the operating instructions the method according to any one of the preceding claims.

10. A computer executable program comprising computer executable program code configured to cause a program, when executing the program code, to perform the method according to any one of the claims 1 to 8.

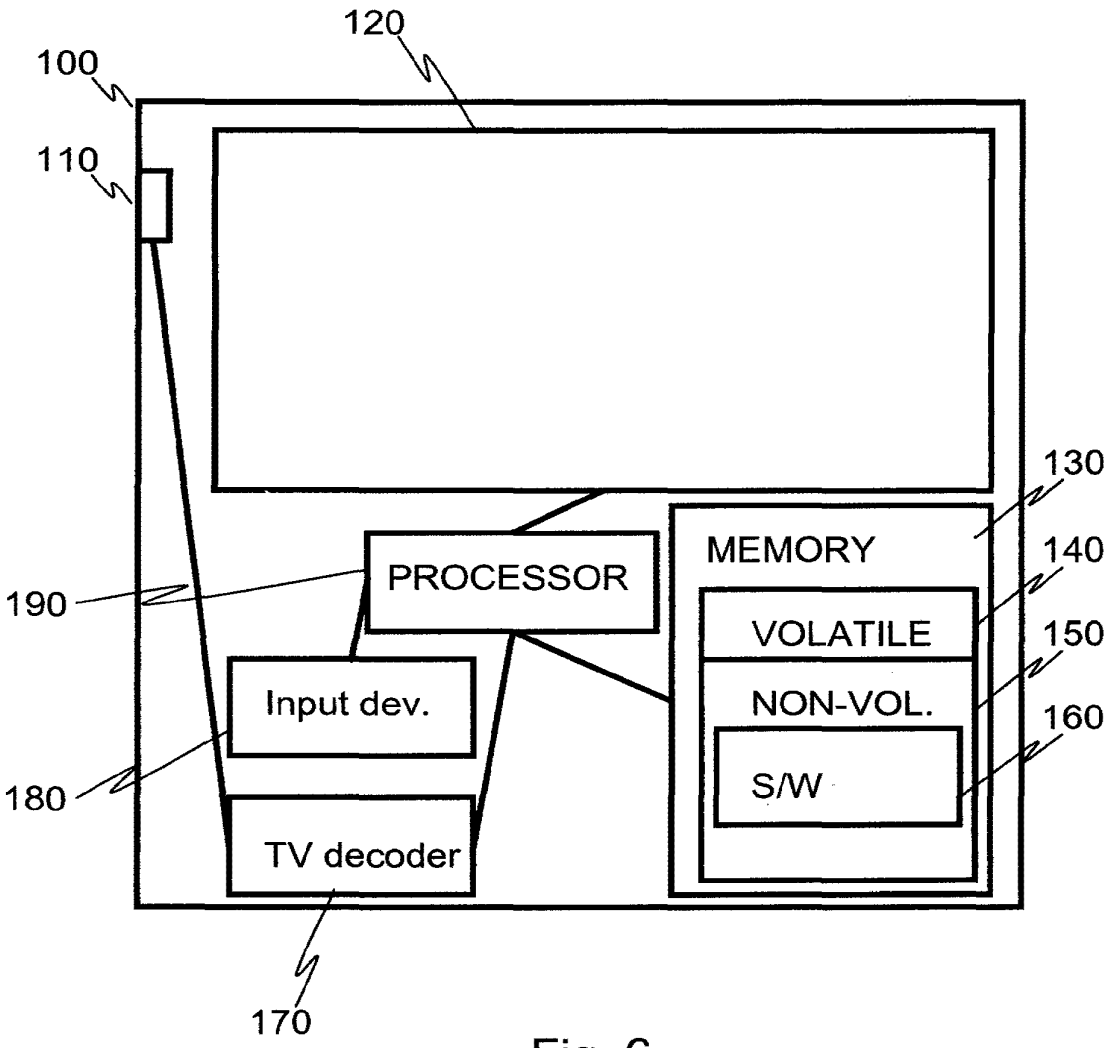

120
100
110
130
MEMORY
PROCESSOR
140
190
VOLATILE
150
Input dev.
NON-VOL.
160
180
S/W
TV decoder
170

Fig. 6

Fig. 1.1

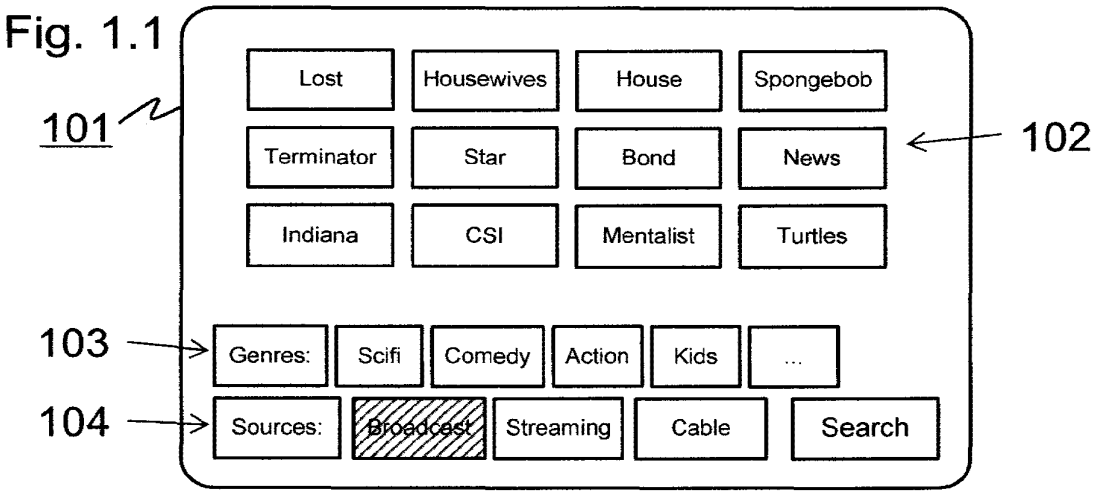


Fig. 1.2

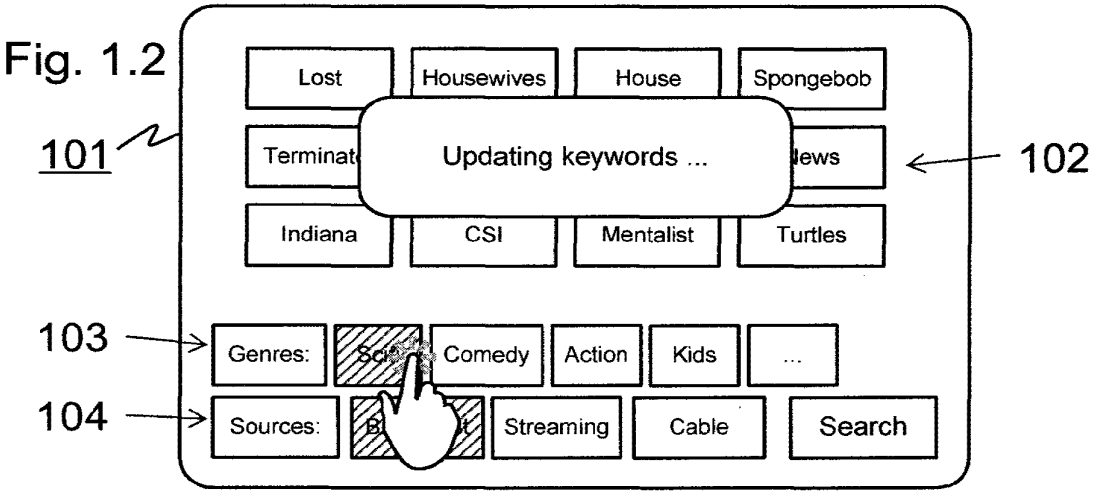


Fig. 1.3

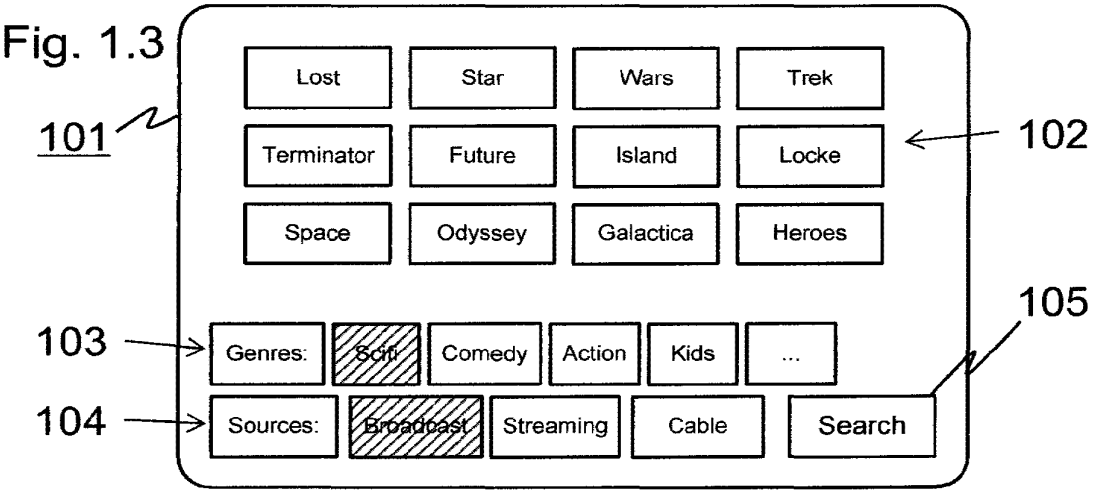


Fig. 1.4

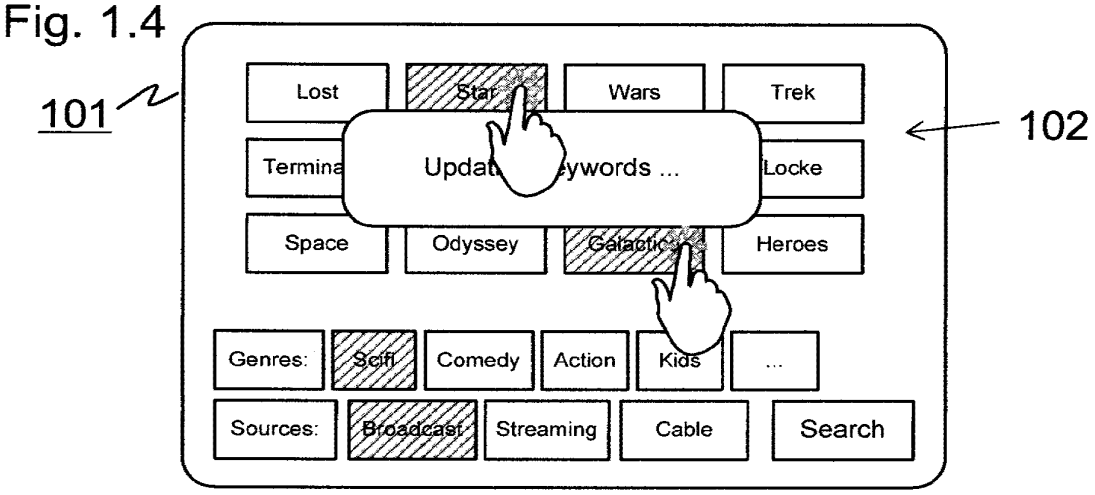


Fig. 1.5

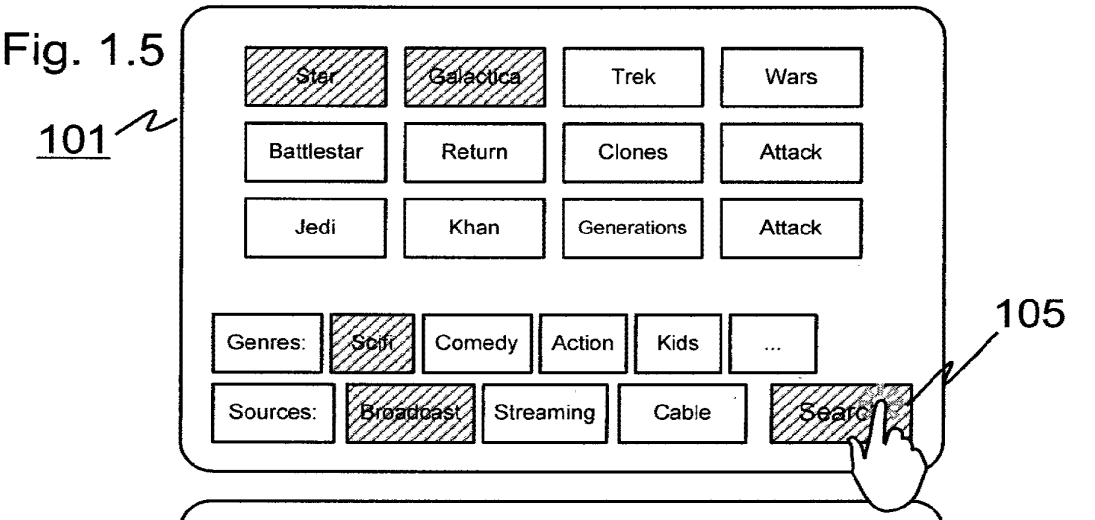


Fig. 1.6

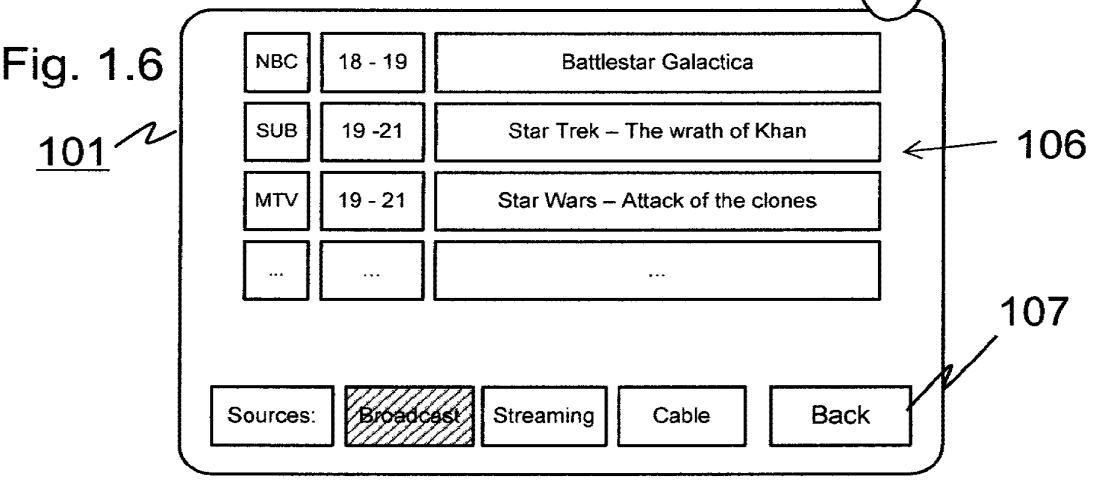


Fig. 2.1

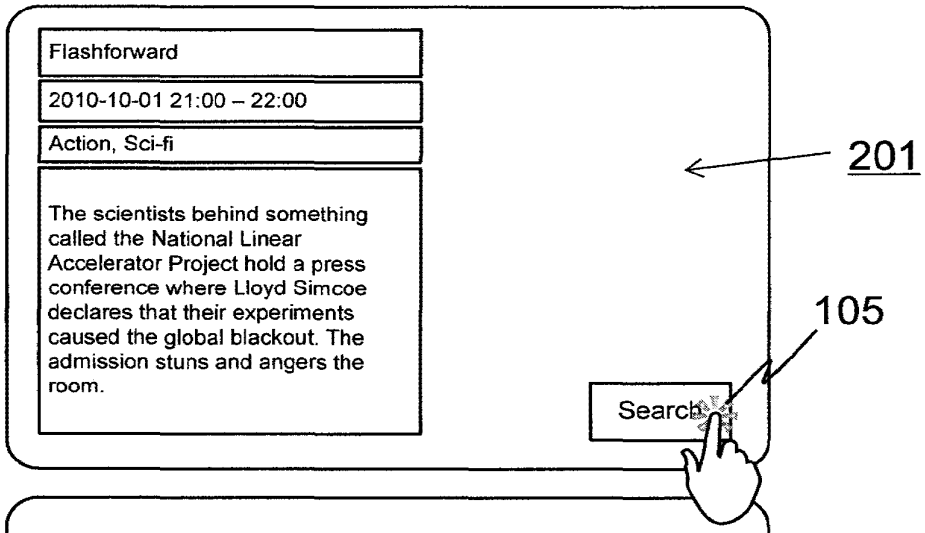


Fig. 2.2

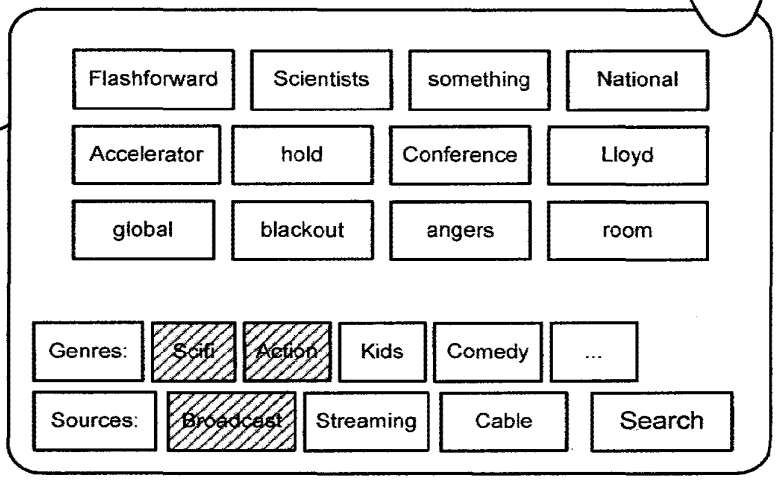


Fig. 2.3

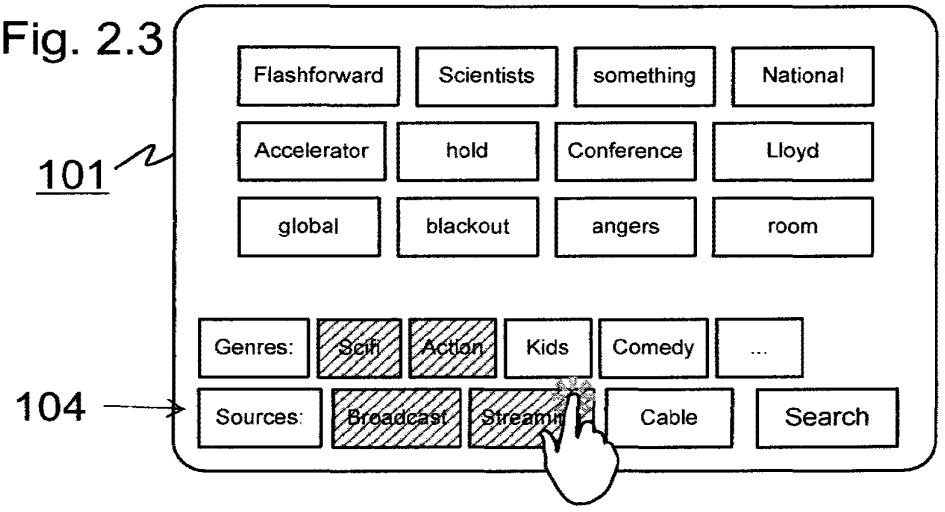


Fig. 2.4

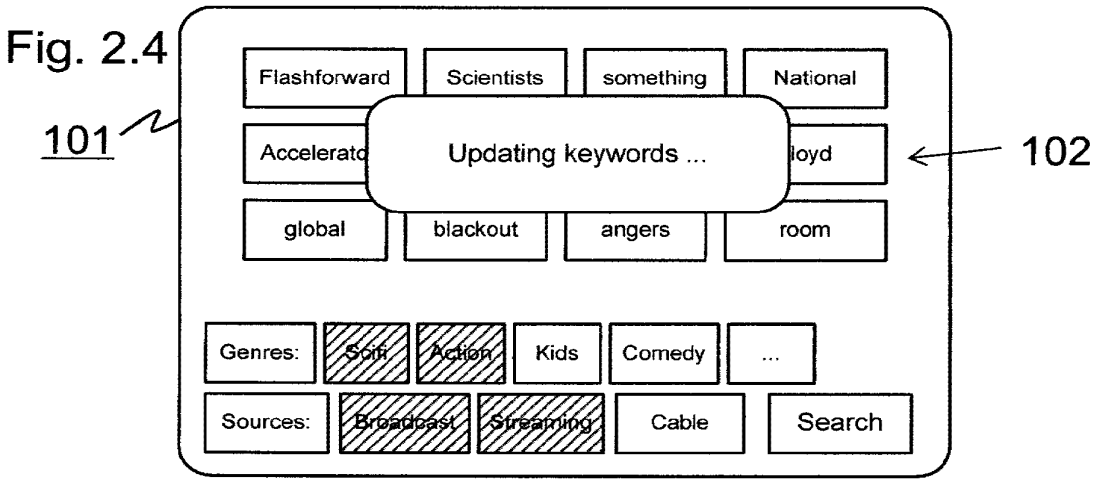


Fig. 2.5

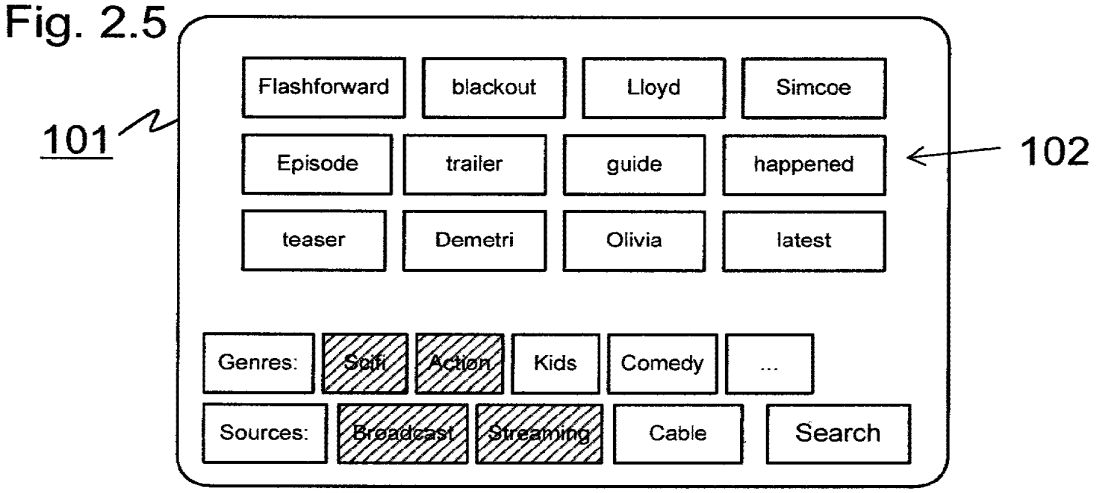


Fig. 2.6

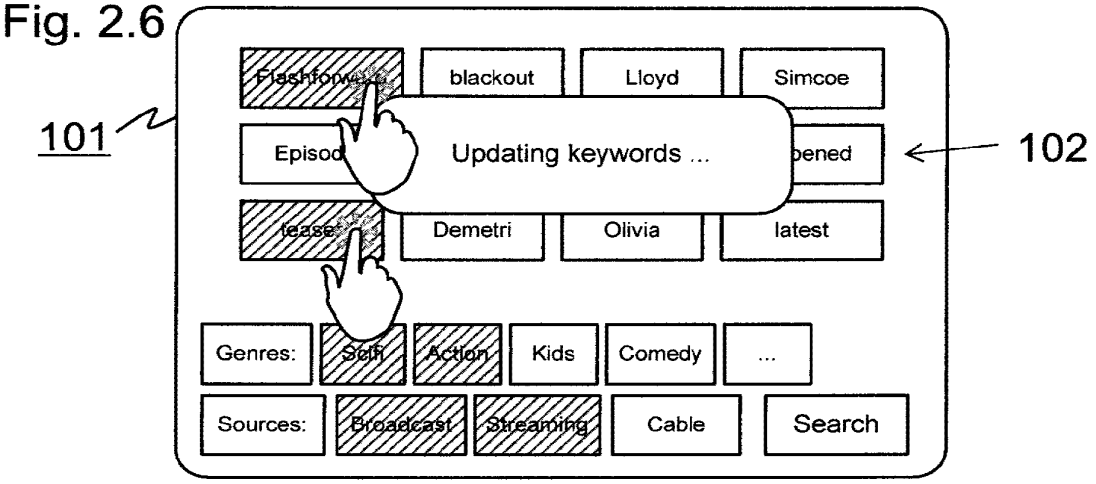


Fig. 2.7

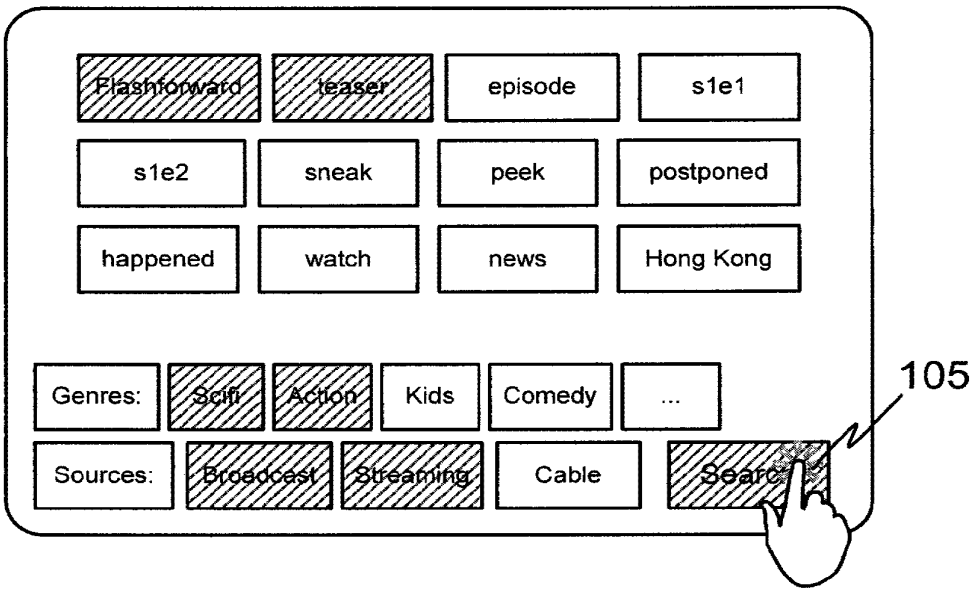
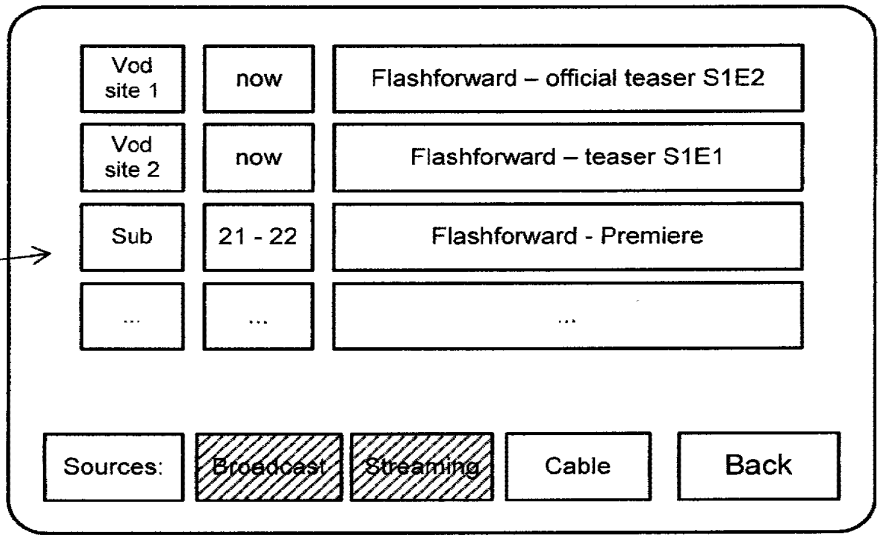

Flashforward
teaser
episode
s1e1
s1e2
sneak
peek
postponed
happened
watch
news
Hong Kong
Genres:
Scifi
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
Cable
Search
105

Fig. 2.8


Vod site 1
now
Flashforward – official teaser S1E2
Vod site 2
now
Flashforward – teaser S1E1
Sub
21 - 22
Flashforward - Premiere
...
...
...
Sources:
Broadcast
Streaming
Cable
Back
202

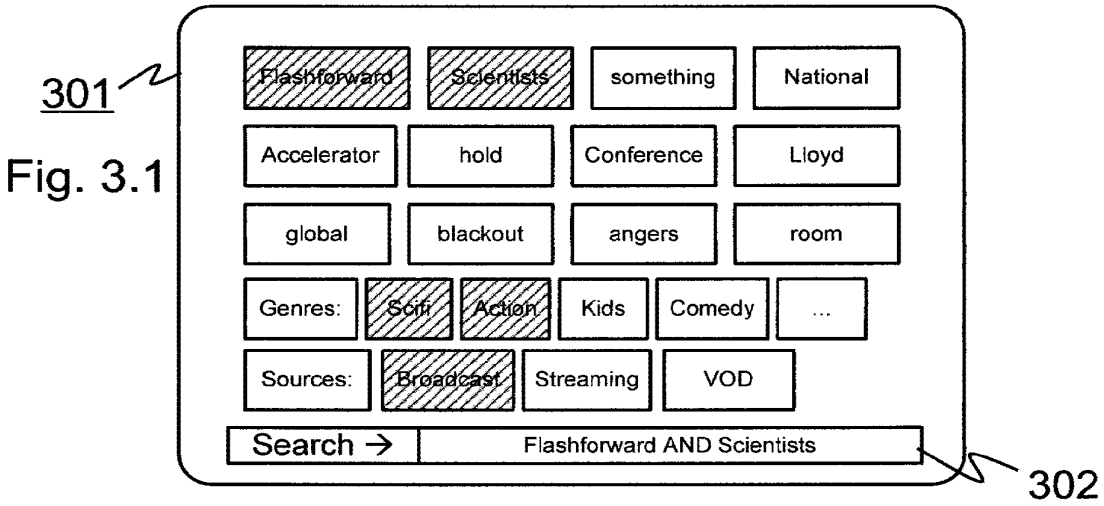

301
Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Scifi
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
Flashforward AND Scientists
302

Fig. 3.1

Fig. 3.2

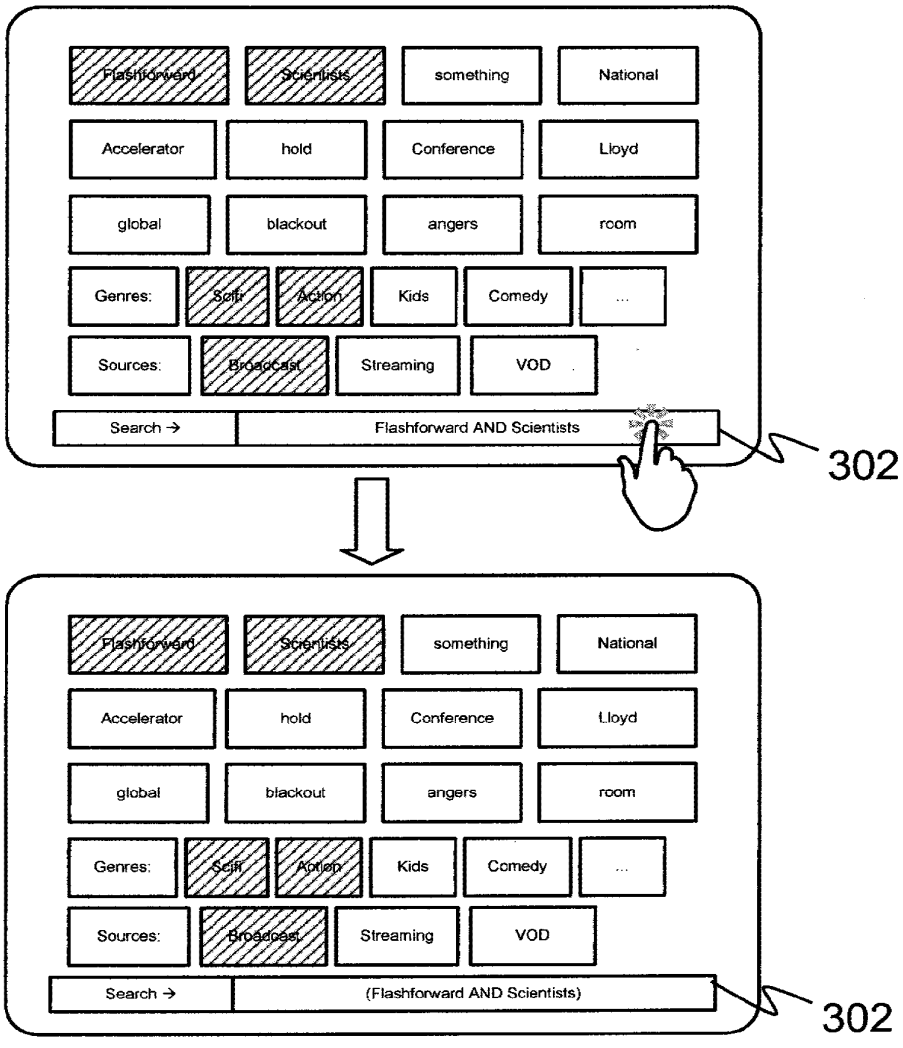

Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Scifi
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
Flashforward AND Scientists
302
Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Scifi
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
(Flashforward AND Scientists)
302

Fig. 3.3

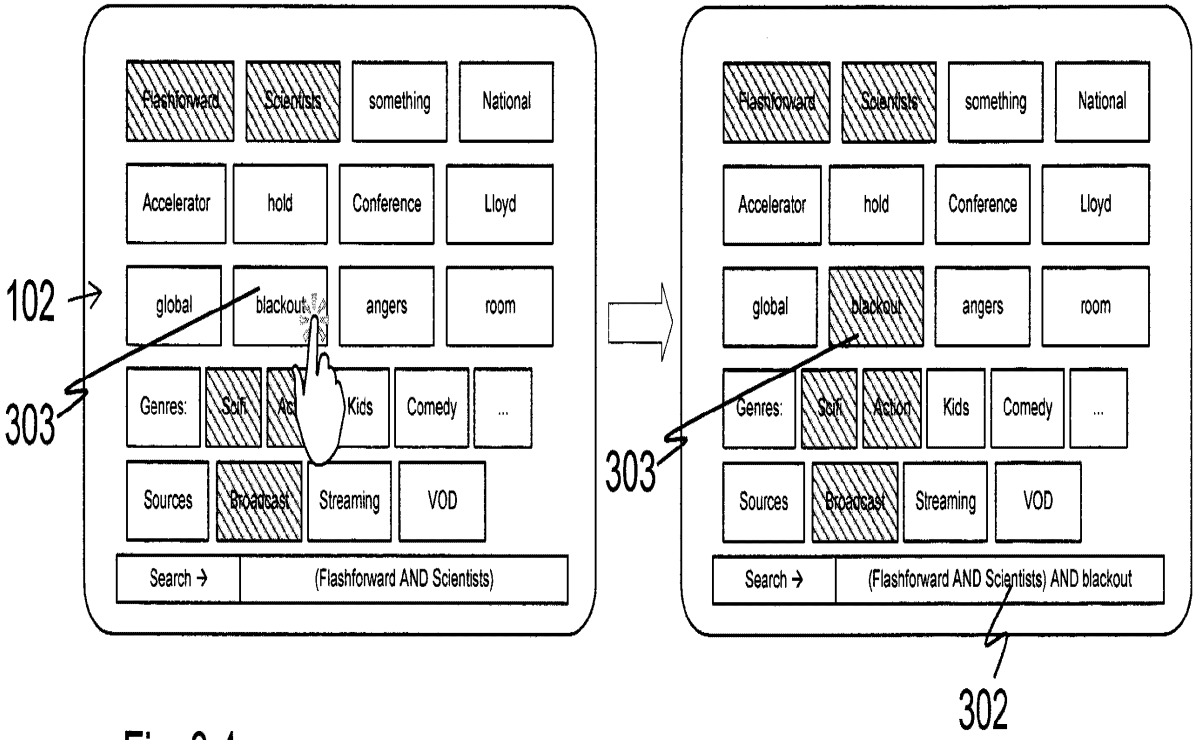

Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Sci-fi
Action
Kids
Comedy
...
Sources
Broadcast
Streaming
VOD
Search →
(Flashforward AND Scientists)
(Flashforward AND Scientists) AND blackout
102
303
303
302

Fig. 3.4

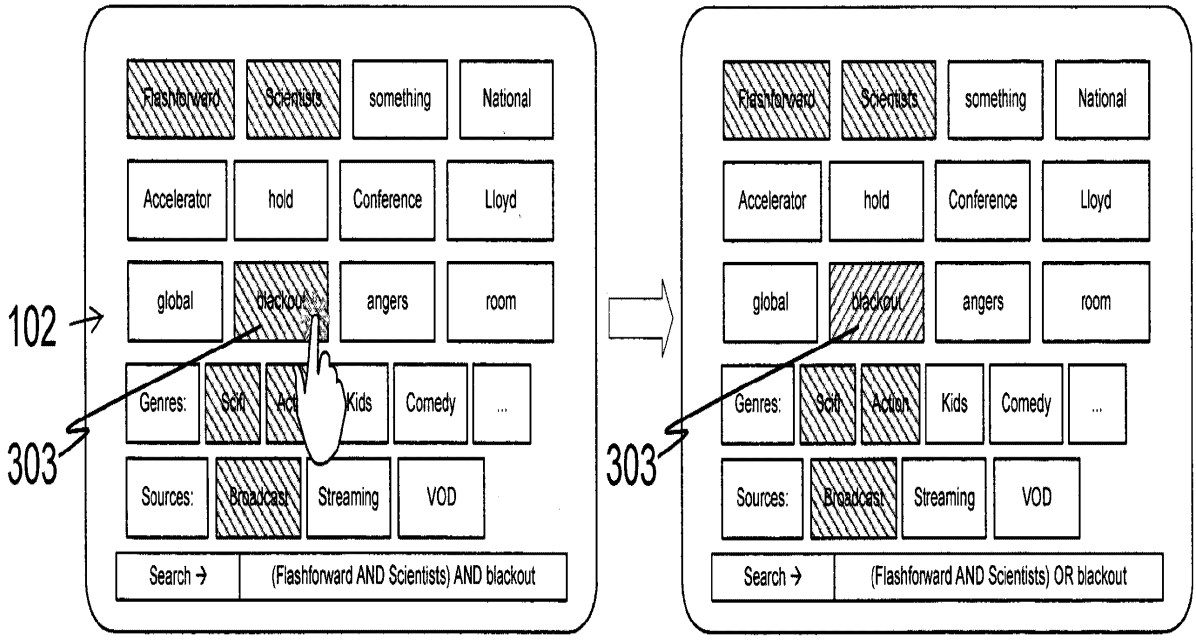

Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Sci-fi
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
(Flashforward AND Scientists) AND blackout
(Flashforward AND Scientists) OR blackout
102
303
303

Fig. 3.5

Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Sci
Act
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
(Flashforward AND Scientists) OR blackout
102
303
Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Sci
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
(Flashforward AND Scientists) NOT blackout
303
302

Fig. 3.6

Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Sci
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
(Flashforward AND Scientists) NOT blackout
Flashforward
Scientists
something
National
Accelerator
hold
Conference
Lloyd
global
blackout
angers
room
Genres:
Sci
Action
Kids
Comedy
...
Sources:
Broadcast
Streaming
VOD
Search →
(Flashforward OR Scientists) NOT blackout

Fig. 4.1

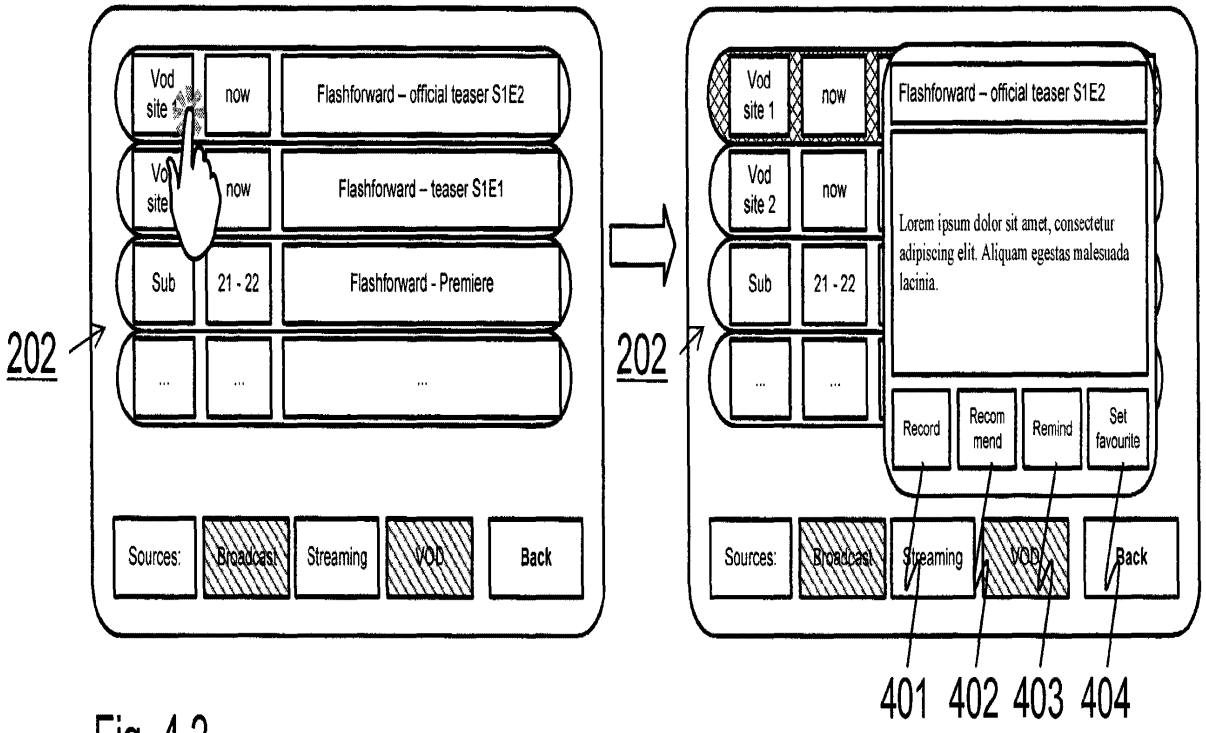
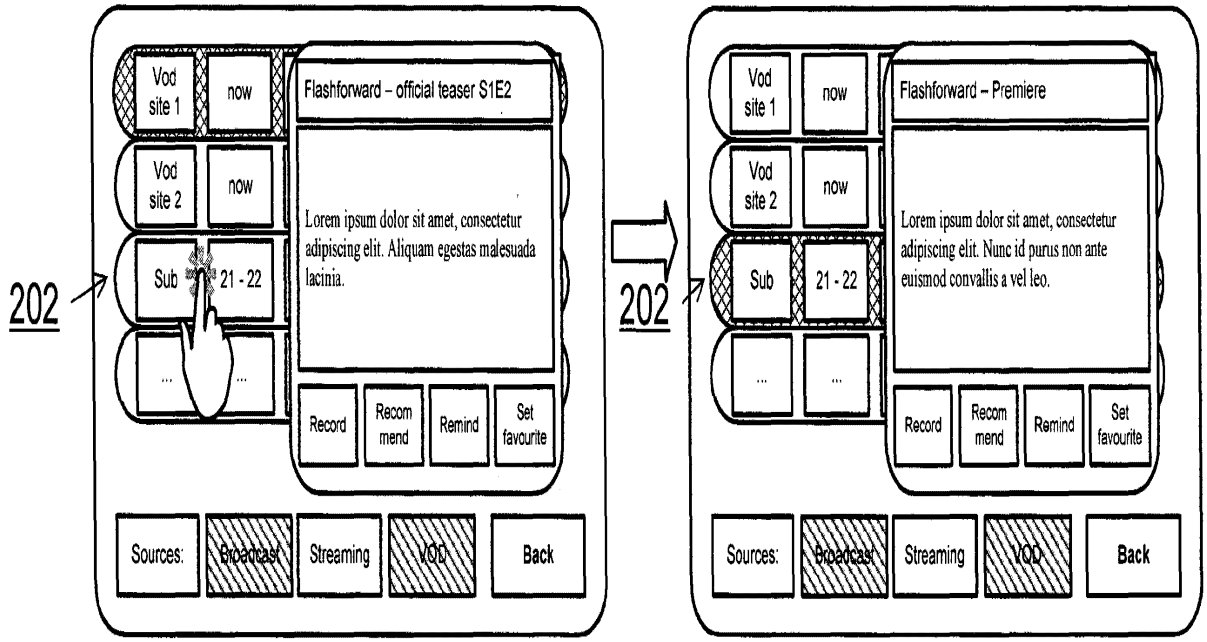


Fig. 4.2



VIZIO Ex. 1002, Page 1213 of 3573
VIZIO v. MMT, IPR2024-00722

Fig. 4.3

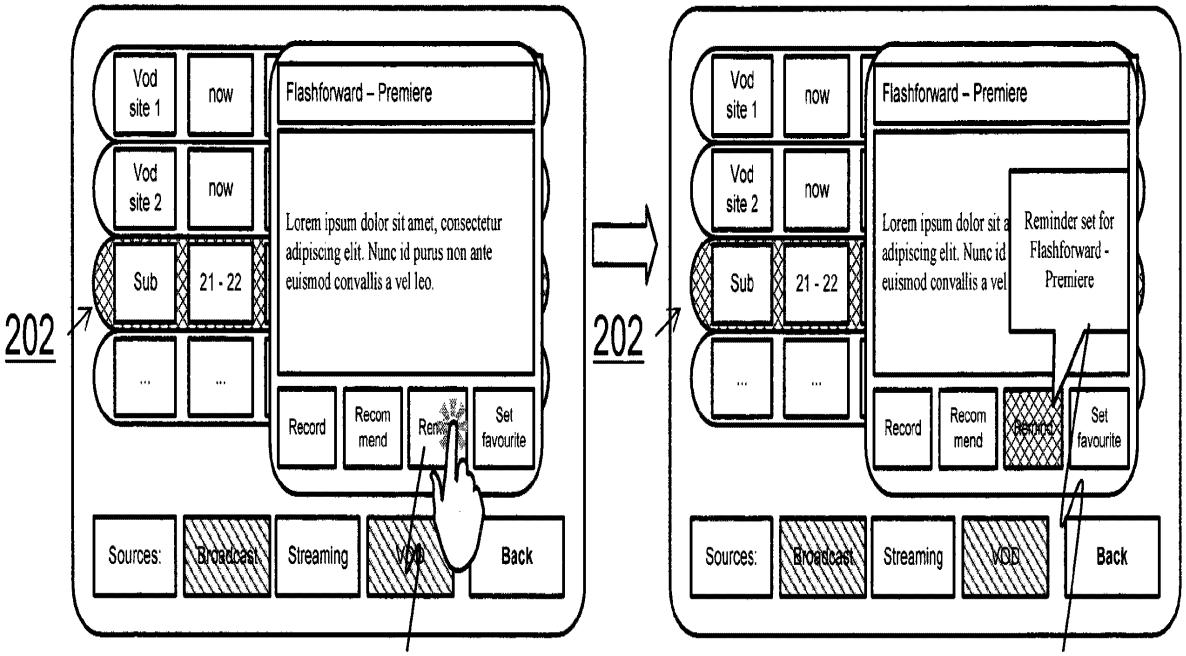
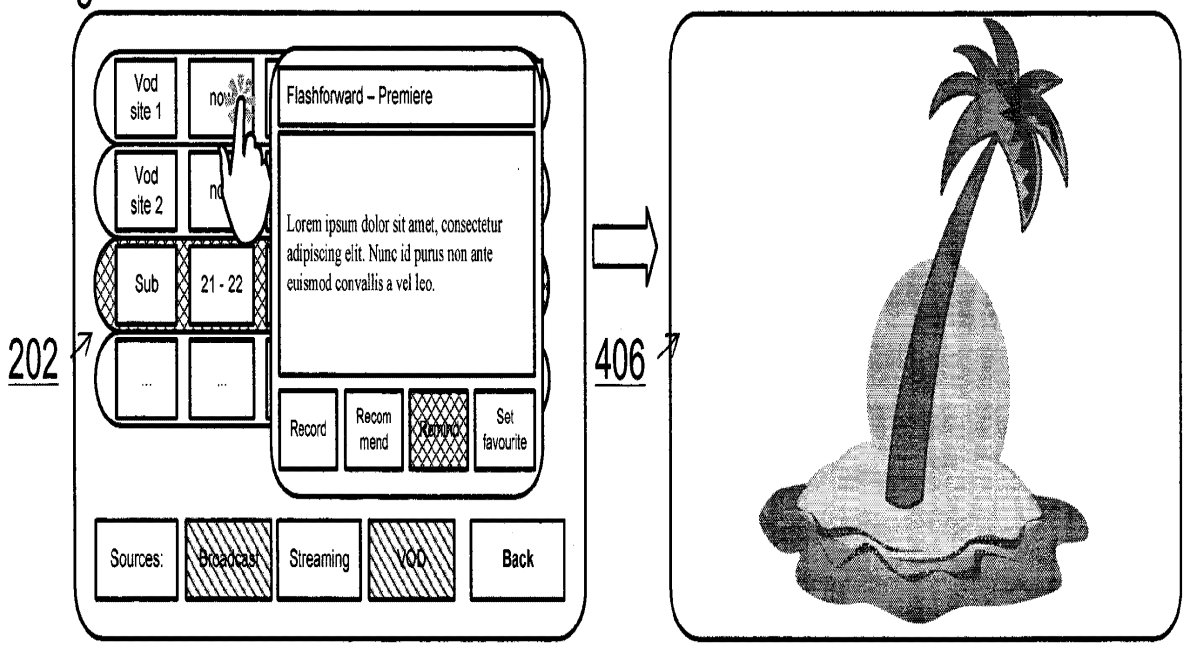


Fig. 4.4



VIZIO Ex. 1002, Page 1214 of 3573
VIZIO v. MMT, IPR2024-00722

Fig. 5.1

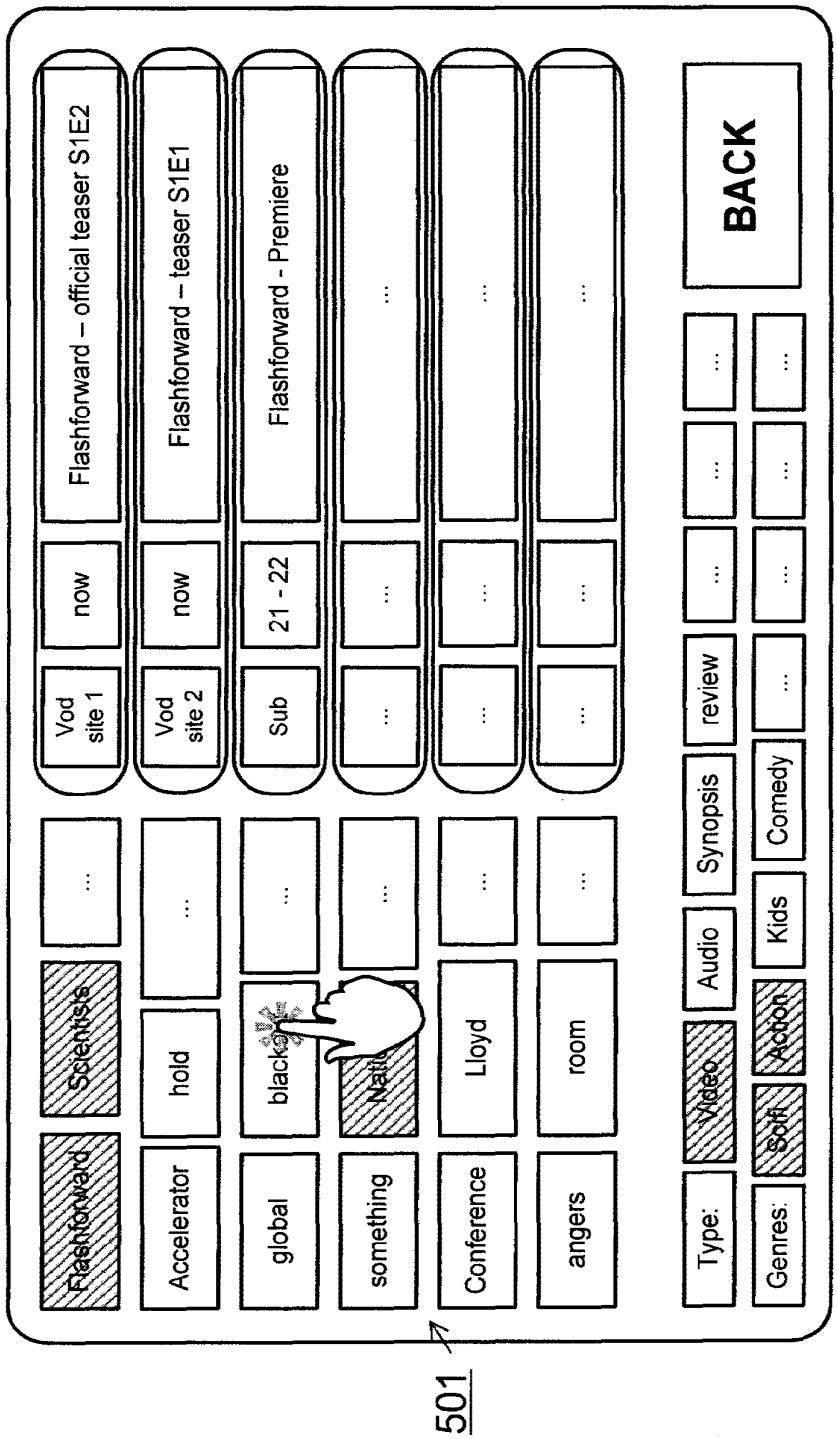
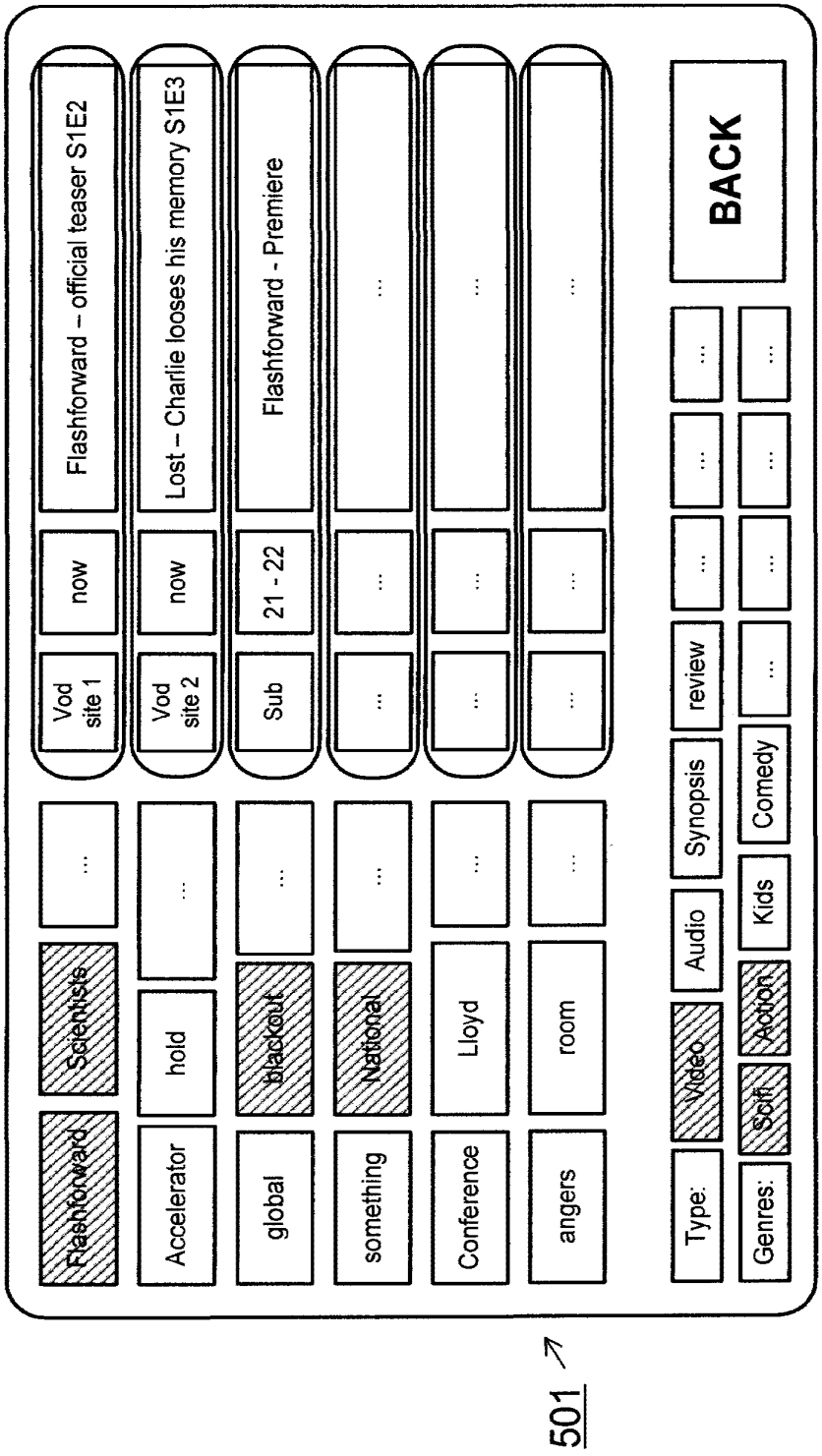

Flashforward
Accelerator
global
something
Conference
angers
Scientists
hold
blackout
Nath
Lloyd
room
...
Vod site 1
Vod site 2
Sub
now
21 - 22
Flashforward – official teaser S1E2
Flashforward – teaser S1E1
Flashforward - Premiere
Type:
Genres:
Video
Soft
Audio
Action
Synopsis
Kids
review
Comedy
BACK
501

Fig. 5.2


Flashforward
Accelerator
global
something
Conference
angers
Scientists
hold
blackout
National
Lloyd
room
...
Vod site 1
Vod site 2
Sub
now
21 - 22
Flashforward – official teaser S1E2
Lost – Charlie looses his memory S1E3
Flashforward - Premiere
Type:
Genres:
Video
Sci-fi
Audio
Action
Kids
Synopsis
Comedy
review
BACK
501

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2011/050472

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: G06F, H04N

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

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009259647 A1 (CURTIS SCOTT) 15 October 2009 (15.10.2009) paragraphs [0003], [0018], [0020], [0022]-[0023], [0028], [0033]-[0036], [0040], Figures 5-7	1-10
X	US 7529743 B1 (ERSHOV ALEXANDER V) 05 May 2009 (05.05.2009) the whole document, especially column 3, lines 2-7, 18-20, 35-41, 43-44, and 51-67; column 4, lines 41-45; column 8, lines 27-28; Figures 1, 2, 3, 8, and 9	1-10
A	US 2010077334 A1 (YANG GYUNG HYE et al.) 25 March 2010 (25.03.2010) paragraphs [0029], [0063]-[0064]; Figures 4A-4C	1-10

☐ 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	Date of mailing of the international search report
04 October 2011 (04.10.2011)	06 October 2011 (06.10.2011)

Name and mailing address of the ISA/FI	Authorized officer
National Board of Patents and Registration of Finland P.O. Box 1160, FI-00101 HELSINKI, Finland	Mari Komulainen
Facsimile No. +358 9 6939 5328	Telephone No. +358 9 6939 500

VIZIO Ex. 1002, Page 1217 of 3573
VIZIO v. MMT, IPR2024-00722

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2011/050472

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
US 2009259647 A1	15/10/2009	CN 101567007 A	28/10/2009
US 7529743 B1	05/05/2009	US 7970764 B1 US 7610185 B1	28/06/2011 27/10/2009
US 2010077334 A1	25/03/2010	KR 20100035043 A	02/04/2010

VIZIO Ex. 1002, Page 1218 of 3573
VIZIO v. MMT, IPR2024-00722

International application No.
PCT/FI2011/050472

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.
G06F 17/30 (2006.01)
H04N 5/445 (2011.01)

VIZIO Ex. 1002, Page 1219 of 3573
VIZIO v. MMT, IPR2024-00722

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 December 2011 (29.12.2011)

PCT

(10) International Publication Number
WO 2011/163481 A2

(51) International Patent Classification:
H04N 21/441 (2011.01) *H04N 21/475* (2011.01)

(21) International Application Number:
PCT/US2011/041642

(22) International Filing Date:
23 June 2011 (23.06.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/357,573 23 June 2010 (23.06.2010) US

(71) Applicant *(for all designated States except US)*: **HILLCREST LABORATORIES INC.** [US/US]; 15245 Shady Grove Road, Rockville, Maryland 20850 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **ROUADY, William** [US/US]; 16687 Hillsboro Road, Purcellville, Virginia 20132 (US). **SCHEIREY, Stephen** [US/US]; 9213 Charterhouse Road, Urbana, Maryland 21704 (US). **RAMAGEM, Daniel** [US/US]; 11710 Old Georgetown Road, North Bethesda, Maryland 20852 (US).

(74) Agent: **DUBOIS, Steven**; POTOMAC PATENT GROUP, P.O. Box 270, Fredericksburg, Virginia 22404 (US).

(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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,

[Continued on next page]

(54) Title: TELEVISION SIGN ON FOR PERSONALIZATION IN A MULTI-USER ENVIRONMENT

(57) Abstract: Systems and methods according to the present invention provide sign on systems for devices, e.g., televisions, which balance ease of use with security and access control that is amenable to, e.g., household usage.

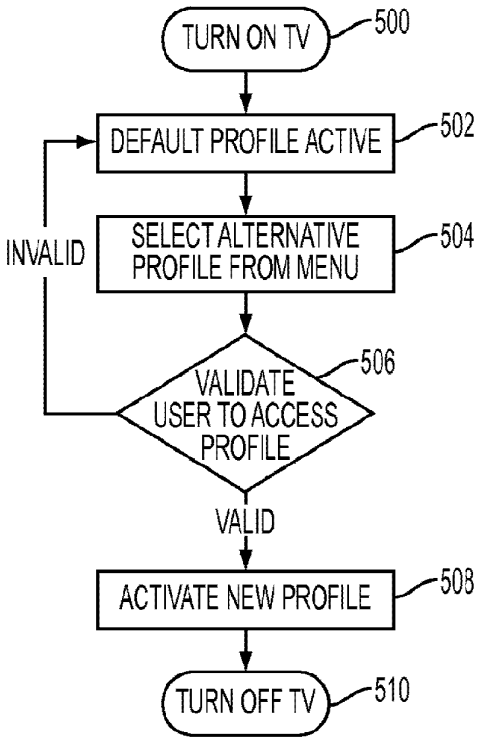


FIG. 5

WO 2011/163481 A2

KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

TELEVISION SIGN ON FOR PERSONALIZATION IN A MULTI-USER ENVIRONMENT

RELATED APPLICATION

[0001] This application is related to, and claims priority from, U.S. Provisional Patent Application Serial No. 61/357,573, filed on June 23, 2010, entitled "Multi-Media System Including Single Sign-On Capability", the disclosure of which is incorporated here by reference.

BACKGROUND

[0002] Technologies associated with the communication of information have evolved rapidly over the last several decades. Television, cellular telephony, the Internet and optical communication techniques (to name just a few things) combine to inundate consumers with available information and entertainment options. Taking television as an example, the last three decades have seen the introduction of cable television service, satellite television service, pay-per-view movies and video-on-demand. Whereas television viewers of the 1960s could typically receive perhaps four or five over-the-air TV channels on their television sets, today's TV watchers have the opportunity to select from hundreds, thousands, and potentially millions of channels of shows and information. Video-on-demand technology, currently used primarily in hotels and the like, provides the potential for in-home entertainment selection from among thousands of movie titles.

[0003] The technological ability to provide so much information and content to end users provides both opportunities and challenges to system designers and service providers. One challenge is that while end users typically prefer having more choices rather than fewer, this preference is counterweighted by their desire that the selection process be both fast and

VIZIO Ex. 1002, Page 1222 of 3573
VIZIO v. MMT, IPR2024-00722

simple. Unfortunately, the development of the systems and interfaces by which end users access media items has resulted in selection processes which are neither fast nor simple. Consider again the example of television programs. When television was in its infancy, determining which program to watch was a relatively simple process primarily due to the small number of choices. One would consult a printed guide which was formatted, for example, as series of columns and rows which showed the correspondence between (1) nearby television channels, (2) programs being transmitted on those channels and (3) date and time. The television was tuned to the desired channel by adjusting a tuner knob and the viewer watched the selected program. Later, remote control devices were introduced that permitted viewers to tune the television from a distance. This addition to the user-television interface created the phenomenon known as "channel surfing" whereby a viewer could rapidly view short segments being broadcast on a number of channels to quickly learn what programs were available at any given time.

[0004] Despite the fact that the number of channels and amount of viewable content has dramatically increased, the generally available user interface, control device options and frameworks for televisions has not changed much over the last 30 years. Printed guides are still the most prevalent mechanism for conveying programming information. The multiple button remote control with up and down arrows is still the most prevalent channel/content selection mechanism. The reaction of those who design and implement the TV user interface to the increase in available media content has been a straightforward extension of the existing selection procedures and interface objects. Thus, the number of rows in the printed guides has been increased to accommodate more channels. The number of buttons on the remote control devices has been increased to support additional functionality and content handling,

VIZIO Ex. 1002, Page 1223 of 3573
VIZIO v. MMT, IPR2024-00722

e.g., as shown in Figure 1. However, this approach has significantly increased both the time required for a viewer to review the available information and the complexity of actions required to implement a selection. Arguably, the cumbersome nature of the existing interface has hampered commercial implementation of some services, e.g., video-on-demand, since consumers are resistant to new services that will add complexity to an interface that they view as already too slow and complex.

[0005] In addition to increases in bandwidth and content, the user interface bottleneck problem is being exacerbated by the aggregation of technologies. Consumers are reacting positively to having the option of buying integrated systems rather than a number of segregable components. An example of this trend is the combination television/VCR/DVD in which three previously independent components are frequently sold today as an integrated unit. This trend is likely to continue, potentially with an end result that most if not all of the communication devices currently found in the household will be packaged together as an integrated unit, e.g., a television/VCR/DVD/internet access/radio/stereo unit. Even those who continue to buy separate components will likely desire seamless control of, and interworking between, the separate components. With this increased aggregation comes the potential for more complexity in the user interface. For example, when so-called "universal" remote units were introduced, e.g., to combine the functionality of TV remote units and VCR remote units, the number of buttons on these universal remote units was typically more than the number of buttons on either the TV remote unit or VCR remote unit individually. This added number of buttons and functionality makes it very difficult to control anything but the simplest aspects of a TV or VCR without hunting for exactly the right button on the remote. Many times, these universal remotes do not provide enough buttons to access many levels of

VIZIO Ex. 1002, Page 1224 of 3573
VIZIO v. MMT, IPR2024-00722

control or features unique to certain TVs. In these cases, the original device remote unit is still needed, and the original hassle of handling multiple remotes remains due to user interface issues arising from the complexity of aggregation. Some remote units have addressed this problem by adding "soft" buttons that can be programmed with the expert commands. These soft buttons sometimes have accompanying LCD displays to indicate their action. These too have the flaw that they are difficult to use without looking away from the TV to the remote control. Yet another flaw in these remote units is the use of modes in an attempt to reduce the number of buttons. In these "moded" universal remote units, a special button exists to select whether the remote should communicate with the TV, DVD player, cable set-top box, VCR, etc. This causes many usability issues including sending commands to the wrong device, forcing the user to look at the remote to make sure that it is in the right mode, and it does not provide any simplification to the integration of multiple devices. The most advanced of these universal remote units provide some integration by allowing the user to program sequences of commands to multiple devices into the remote. This is such a difficult task that many users hire professional installers to program their universal remote units.

[0006] Some attempts have also been made to modernize the screen interface between end users and media systems. However, these attempts typically suffer from, among other drawbacks, an inability to easily scale between large collections of media items and small collections of media items. For example, interfaces which rely on lists of items may work well for small collections of media items, but are tedious to browse for large collections of media items. Interfaces which rely on hierarchical navigation (e.g., tree structures) may be speedier to traverse than list interfaces for large collections of media items, but are not readily

VIZIO Ex. 1002, Page 1225 of 3573
VIZIO v. MMT, IPR2024-00722

adaptable to small collections of media items. Additionally, users tend to lose interest in selection processes wherein the user has to move through three or more layers in a tree structure. For all of these cases, current remote units make this selection process even more tedious by forcing the user to repeatedly depress the up and down buttons to navigate the list or hierarchies. When selection skipping controls are available such as page up and page down, the user usually has to look at the remote to find these special buttons or be trained to know that they even exist. Accordingly, organizing frameworks, techniques and systems which simplify the control and screen interface between users and media systems as well as accelerate the selection process, while at the same time permitting service providers to take advantage of the increases in available bandwidth to end user equipment by facilitating the supply of a large number of media items and new services to the user have been proposed in U.S. Patent Application Serial No. 10/768,432, filed on January 30, 2004, entitled "A Control Framework with a Zoomable Graphical User Interface for Organizing, Selecting and Launching Media Items", the disclosure of which is incorporated here by reference.

[0007] TVs exist in a multi-user environment where the same device is typically used by different members of the household at different times, as well as by groups of individuals from both within and outside the household. The current connected TV environment offers many services originally built for the personal computer or mobile platforms as individual experiences that include private information. In addition, other services contain content that may not be appropriate for all the individual members of the household. Accordingly, it would be desirable to provide some sort of security mechanism which addresses these issues.

[0008] Existing solutions take a PC-style approach to dealing with the situation (if it is dealt with at all). In most cases, there is simply a single log-in to personalized services and

VIZIO Ex. 1002, Page 1226 of 3573
VIZIO v. MMT, IPR2024-00722

all users of the connected TV or device share the information from the service. This login may occur per service. It can be remembered or may require log-in each time it is used. This makes for either a non-private or tedious scenario which discourages use of such services. Similarly, content services often require a login to enable the acquisition of age appropriate content each time such content is requested, which is also a tedious solution.

[0009] Alternatively, some solutions require a login into the entire system by the user in order to enable any private or restricted services. This is a traditional PC approach. It can be effective in single person homes if the login is remembered, however it does not account for the visitor user. The outside visitor is often referred to as the "babysitter factor."

[0010] Accordingly, it would be desirable to provide other sign-on solutions which are, for example, particularly adapted to the TV environment and which balances security and ease of use.

VIZIO Ex. 1002, Page 1227 of 3573
VIZIO v. MMT, IPR2024-00722

SUMMARY

[0011] According to one exemplary embodiment, a method for controlling access to media content and services via a system includes the steps of receiving a first input to turn on the system, activating a default user profile which permits access to a first set of media content and services via the system without requiring validation of a system user's identity, receiving a request to switch from the default user profile to another profile, validating the request, and activating, if the request is validated, the another profile which permits access to a second set of media content and services via the system that is different from the first set of media content and services.

[0012] According to another embodiment, a controller for controlling access to media content and services through a television includes at least one interface configured to receive inputs from a user, a processor configured to receiving a first input associated with turning on the television and, in response to the first input, further configured to activate a default user profile which permits access to a first set of media content and services via the television without requiring validation of a system user's identity, wherein the at least one interface is further configured to subsequently receive a request to switch from the default user profile to another profile, wherein the processor is further configured to validate the request and to activate, if the request is validated, the another profile which permits access to a second set of media content and services via the system that is different from the first set of media content and services.

[0013] According to yet another exemplary embodiment, a television includes a display configured to display media content and service content which is accessible via a user

VIZIO Ex. 1002, Page 1228 of 3573
VIZIO v. MMT, IPR2024-00722

interface, and a processor configured to generate a user interface, and control access to said media content and service content, in accordance with a currently active user profile;

wherein the processor is further configured to use a default user profile as the currently active user profile upon power on of the television.

VIZIO Ex. 1002, Page 1229 of 3573
VIZIO v. MMT, IPR2024-00722

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The accompanying drawings illustrate exemplary embodiments of the present invention, wherein:

[0015] FIG. 1 depicts a conventional remote control unit for an entertainment system;

[0016] FIG. 2 depicts an exemplary media system in which exemplary embodiments of the present invention can be implemented;

[0017] FIG. 3(a) shows a 3D pointing device with which exemplary embodiments can be implemented;

[0018] FIG. 3(b) illustrates a user employing a 3D pointing device to provide input to a user interface on a television according to an exemplary embodiment of the present invention;

[0019] FIG. 4 illustrates an architecture of a television sign-on system according to an exemplary embodiment;

[0020] FIG. 5 is a flow chart showing a method for signing on to a television according to an exemplary embodiment;

[0021] FIG. 6 depicts a data flow according to an embodiment.

VIZIO Ex. 1002, Page 1230 of 3573
VIZIO v. MMT, IPR2024-00722

DETAILED DESCRIPTION

[0022] The following detailed description of the invention refers to the accompanying drawings. The same reference numbers in different drawings identify the same or similar elements. Also, the following detailed description does not limit the invention. Instead, the scope of the invention is defined by the appended claims.

[0023] Exemplary embodiments provide a sign-on system and method that allow for the connected TV and devices interface to be personalized to an individual or a group so that various services can accommodate the viewer. Exemplary aspects of the system according to such embodiments include its streamlined login procedure, remote management features, and default behaviors to minimize inadvertent privacy violations in normal system use. Exemplary embodiments define a framework where the user can customize their experience and utilize a variety of access options based upon their personal tastes, interest and experience. Moreover, these embodiments provide for a "casual" security model that is adapted to TV usage and which prevents inadvertent access to another user's information without excessive security controls.

[0024] Prior to discussing such embodiments in detail, and in order to provide some context for this discussion, an exemplary aggregated media system 200 in which the present invention can be implemented will first be described with respect to Figure 2. Those skilled in the art will appreciate, however, that the present invention is not restricted to implementation in this type of media system and that more or fewer components can be included therein. Therein, an input/output (I/O) bus 210 connects the system components in the media system 200 together. The I/O bus 210 represents any of a number of different of

VIZIO Ex. 1002, Page 1231 of 3573
VIZIO v. MMT, IPR2024-00722

mechanisms and techniques for routing signals between the media system components. For example, the I/O bus 210 may include an appropriate number of independent audio "patch" cables that route audio signals, coaxial cables that route video signals, two-wire serial lines or infrared or radio frequency transceivers that route control signals, optical fiber or any other routing mechanisms that route other types of signals.

[0025] In this exemplary embodiment, the media system 200 includes a television/monitor 212, a video cassette recorder (VCR) 214, digital video disk (DVD) recorder/playback device 216, audio/video tuner 218 and compact disk player 220 coupled to the I/O bus 210. The VCR 214, DVD 216 and compact disk player 220 may be single disk or single cassette devices, or alternatively may be multiple disk or multiple cassette devices. They may be independent units or integrated together. In addition, the media system 200 includes a microphone/speaker system 222, video camera 224 and a wireless I/O control device 226. According to exemplary embodiments of the present invention, the wireless I/O control device 226 is a 3D pointing device. The wireless I/O control device 226 can communicate with the entertainment system 200 using, e.g., an IR or RF transmitter or transceiver. Alternatively, the I/O control device can be connected to the entertainment system 200 via a wire. One or more hard drives (or disks or flash drives) 280 can be provided for storage of recorded video, music or other media.

[0026] The entertainment system 200 also includes a system controller 228. According to one exemplary embodiment of the present invention, the system controller 228 operates to store and display entertainment system data available from a plurality of entertainment system data sources and to control a wide variety of features associated with each of the system components. As shown in Figure 2, system controller 228 is coupled,

VIZIO Ex. 1002, Page 1232 of 3573
VIZIO v. MMT, IPR2024-00722

either directly or indirectly, to each of the system components, as necessary, through I/O bus 210. In one exemplary embodiment, in addition to or in place of I/O bus 210, system controller 228 is configured with a wireless communication transmitter (or transceiver), which is capable of communicating with the system components via IR signals or RF signals. Regardless of the control medium, the system controller 228 is configured to control the media components of the media system 200 via a graphical user interface described below.

[0027] As further illustrated in Figure 2, media system 200 may be configured to receive media items from various media sources and service providers. In this exemplary embodiment, media system 200 receives media input from and, optionally, sends information to, any or all of the following sources: cable broadcast 230, satellite broadcast 232 (e.g., via a satellite dish), very high frequency (VHF) or ultra high frequency (UHF) radio frequency communication of the broadcast television networks 234 (e.g., via an aerial antenna), telephone network 236 and cable modem 238 (or another source of Internet content). Those skilled in the art will appreciate that the media components and media sources illustrated and described with respect to Figure 2 are purely exemplary and that media system 200 may include more or fewer of both. For example, other types of inputs to the system include AM/FM radio and satellite radio.

[0028] More details regarding this exemplary entertainment system and frameworks associated therewith can be found in the above-incorporated by reference U.S. Patent Application entitled "A Control Framework with a Zoomable Graphical User Interface for Organizing, Selecting and Launching Media Items". Additionally, the interested reader is also referred to U.S. Patent Application Serial No.11/437,215, entitled "Global Navigation Objects in User Interfaces", filed on May 19, 2006, the disclosure of which is incorporated

VIZIO Ex. 1002, Page 1233 of 3573
VIZIO v. MMT, IPR2024-00722

here by reference. Alternatively, remote devices and interaction techniques between remote devices and user interfaces in accordance with the present invention can be used in conjunction with other types of systems, for example computer systems including, e.g., a display, a processor and a memory system or with various other systems and applications.

[0029] As mentioned in the Background section, remote devices which operate as 3D pointers are of particular interest for the present specification, although the present invention is not limited to systems including 3D pointers and may be used with 2D devices or remote control devices such as that illustrated in Figure 1. However 3D pointing devices enable the translation of movement of the device, e.g., linear movement, rotational movement, acceleration or any combination thereof, into commands to a user interface. An exemplary loop-shaped, 3D pointing device 300 is depicted in Figure 3(a), however the present invention is not limited to loop-shaped devices. In this exemplary embodiment, the 3D pointing device 300 includes two buttons 302 and 304 as well as a scroll wheel 306 (scroll wheel 306 can also act as a button by depressing the scroll wheel 306), although other exemplary embodiments will include other physical configurations. User movement of the 3D pointing device 300 can be defined, for example, in terms of rotation about one or more of an x-axis attitude (roll), a y-axis elevation (pitch) or a z-axis heading (yaw). In addition, some exemplary embodiments of the present invention can additionally (or alternatively) measure linear movement of the 3D pointing device 300 along the x, y, and/or z axes to generate cursor movement or other user interface commands. An example is provided below. A number of permutations and variations relating to 3D pointing devices can be implemented in systems according to exemplary embodiments of the present invention. The interested reader is referred to U.S. Patent Application Serial No. 11/119,663, entitled (as amended)

VIZIO Ex. 1002, Page 1234 of 3573
VIZIO v. MMT, IPR2024-00722

"3D Pointing Devices and Methods", filed on May 2, 2005, U.S. Patent Application Serial No. 11/119,719, entitled (as amended) "3D Pointing Devices with Tilt Compensation and Improved Usability", also filed on May 2, 2005, U.S. Patent Application Serial No. 11/119,987, entitled (as amended) "Methods and Devices for Removing Unintentional Movement in 3D Pointing Devices", also filed on May 2, 2005, U.S. Patent Application Serial No. 11/119,688, entitled "Methods and Devices for Identifying Users Based on Tremor", also filed on May 2, 2005, and U.S. Patent Application Serial No. 11/480,662, entitled "3D Pointing Devices", filed on July 3, 2006, the disclosures of which are incorporated here by reference, for more details regarding exemplary 3D pointing devices which can be used in conjunction with exemplary embodiments of the present invention.

[0030] It is anticipated that 3D pointing devices 300 will be held by a user in front of a display 308 and that motion of the 3D pointing device 300 will be translated by the 3D pointing device into output which is usable to interact with the information displayed on display 308, e.g., to move the cursor 310 on the display 308. For example, such 3D pointing devices and their associated user interfaces can be used to make media selections on a television as shown in Figure 3(b), which will be described in more detail below. Aspects of exemplary embodiments of the present invention can be optimized to enhance the user's experience of the so-called "10-foot" interface, i.e., a typical distance between a user and his or her television in a living room. For example, interactions between pointing, scrolling, zooming and panning, e.g., using a 3D pointing device and associated user interface, can be optimized for this environment as will be described below, although the present invention is not limited thereto.

VIZIO Ex. 1002, Page 1235 of 3573
VIZIO v. MMT, IPR2024-00722

[0031] Referring again to Figure 3(a), an exemplary relationship between movement of the 3D pointing device 300 and corresponding cursor movement on a user interface will now be described. Rotation of the 3D pointing device 300 about the y-axis can be sensed by the 3D pointing device 300 and translated into an output usable by the system to move cursor 310 along the y_2 axis of the display 308. Likewise, rotation of the 3D pointing device 308 about the z-axis can be sensed by the 3D pointing device 300 and translated into an output usable by the system to move cursor 310 along the x_2 axis of the display 308. It will be appreciated that the output of 3D pointing device 300 can be used to interact with the display 308 in a number of ways other than (or in addition to) cursor movement, for example it can control cursor fading, volume or media transport (play, pause, fast-forward and rewind). Additionally, the system can be programmed to recognize gestures, e.g., predetermined movement patterns, to convey commands in addition to cursor movement. Moreover, other input commands, e.g., a zoom-in or zoom-out on a particular region of a display (e.g., actuated by pressing button 302 to zoom-in or button 304 to zoom-out), may also be available to the user.

[0032] According to exemplary embodiments of the present invention, user interfaces may use, at least in part, zooming techniques for moving between user interface views. The zooming transition effect can be performed by progressive scaling and displaying of at least some of the UI objects displayed on the current UI view to provide a visual impression of movement of those UI objects away from an observer. In another functional aspect of the present invention, user interfaces may zoom-in in response to user interaction with the user interface which will, likewise, result in the progressive scaling and display of UI objects that provide the visual impression of movement toward an observer. More information relating to

VIZIO Ex. 1002, Page 1236 of 3573
VIZIO v. MMT, IPR2024-00722

zoomable user interfaces can be found in U.S. Patent Application Serial No. 10/768,432, filed on January 30, 2004, entitled "A Control Framework with a Zoomable Graphical User Interface for Organizing, Selecting and Launching Media Items", and U.S. Patent Application Serial No. 09/829,263, filed on April 9, 2001, entitled "Interactive Content Guide for Television Programming", the disclosures of which are incorporated here by reference.

[0033] Movement within the user interface between different user interface views is not limited to zooming. Other non-zooming techniques can be used, in addition to zooming or as an alternative thereto, to transition between user interface views. For example, panning can be performed by progressive translation and display of at least some of the user interface objects which are currently displayed in a user interface view. This provides the visual impression of lateral movement of those user interface objects to an observer.

[0034] Returning now to the application illustrated in Figure 3(b), the GUI screen (also referred to herein as a "UI view", which terms refer to a currently displayed set of UI objects) seen on television 320 is a home view. In this particular exemplary embodiment, the home view displays a plurality of applications 322, e.g., "Photos", "Music", "Recorded", "Guide", "Live TV", "On Demand", and "Settings", which are selectable by the user by way of interaction with the user interface via the 3D pointing device 300. Such user interactions can include, for example, pointing, scrolling, clicking or various combinations thereof. For more details regarding exemplary pointing, scrolling and clicking interactions which can be used in conjunction with exemplary embodiments of the present invention, the interested reader is directed to U.S. Patent Application Serial No. 11/417,764, entitled "METHODS AND SYSTEMS FOR SCROLLING AND POINTING IN USER INTERFACE", to Frank J. Wroblewski, filed on May 4, 2006, the disclosure of which is incorporated here by reference.

VIZIO Ex. 1002, Page 1237 of 3573
VIZIO v. MMT, IPR2024-00722

Television Sign-On System

[0035] As mentioned above, exemplary embodiments provide a sign-on system and method that allow for the connected TV and devices interface to be personalized to an individual or a group so that various services can accommodate the viewer. Exemplary aspects of the system according to such embodiments include its streamlined login procedure, remote management features, and default behaviors to minimize inadvertent privacy violations in normal system use. Exemplary embodiments define a framework where the user can customize their experience and utilize a variety of access options based upon their personal tastes, interest and experience. Moreover, these embodiments provide for a "casual" security model that is adapted to TV usage and which prevents inadvertent access to another user's information without excessive security controls.

[0036] Thus exemplary embodiments provide for security mechanisms and sign-on systems which fulfill the user's or viewer's expectation in a "lean back" TV environment wherein he or she is unlikelty to want to engage in extensive interactive actions with the interface. To better exemplify the simple sign on experience and its role in the interactive TV ecosystem according to exemplary embodiments, consider the following exemplary use case.

[0037] Suppose that a particular household is comprised of four individuals: two parents, a teen aged daughter and a 10 year-old son. A television (simple) sign-on system according to embodiments is preferably thus designed to accommodate each of these people individually, as well as all the members of the household in different group configurations. The exemplary sign-on system can thus be set up with a default profile of "Family." Whenever the system is turned on, e.g., when the TV 212 or system controller 228 is powered up, or another profile logs out, the default Family profile becomes active. This Family

VIZIO Ex. 1002, Page 1238 of 3573
VIZIO v. MMT, IPR2024-00722

profile, in this illustrative example, has access to the family Netflix and Hulu account (passwords are already embedded and hidden) but it limits views to PG and TV-14 rated content. Purchases from the app store can be made from this Family profile, but the user must enter a PIN to complete the transaction. This way, one of the parents can access a pay-per-view movie for the family from this shared, Family profile without having to change the active profile and the children can use the TV with the Family profile, but without direct access to services or transactions that require extra fees and that may require PIN code entry to access.

[0038] Continuing with this illustrative example, suppose that the father sits down late one evening to watch a movie and uses the simple profile agent widget to select his icon and enter his password. This changes the profile to "Dad" in the system from the default "Family" profile. The "Dad" profile may have different permissions/restrictions than the "Family" profile. For example, when he enters the Netflix service, there is no ratings limit and all of the content provided by Netflix is available for viewing. In addition, since the father has purchase privileges built in to his profile in this example, when he finds, for example, an app he wants to buy or a pay-per view movie that he wants to watch, he does not need a PIN to complete the transaction, instead the sign on system is automatic.

[0039] On another occasion, the daughter is watching TV alone. Using the profile agent widget, she engages her "Daughter" profile. Now she is able to invoke the Facebook/Twitter overlay so she can see updates in the on-screen ticker that are coming from her personal accounts using her personal access values. This profile according to this example does not allow purchases at all, even with a PIN code. The daughter could go back to the "Family" profile if she surreptitiously learns the PIN code, but she would not be able to

VIZIO Ex. 1002, Page 1239 of 3573
VIZIO v. MMT, IPR2024-00722

add the app to her account or profile without one of the parent administrator's knowledge. When the daughter is done watching, she turns off the TV which automatically returns the profile to the default "Family" when it is turned back on.

[0040] It will be appreciated by those skilled in the art that the foregoing example is purely illustrative in the sense that profile parameters and characteristics may vary in any given system implementation depending, for example, upon the manner in which permissions and restrictions are to be allocated among the various individuals and/or groups that are identified for security purposes as potentially wanting to use the TV system. However, at least two particular points are brought out in this example which illustrate significant (but not necessarily required) aspects of the "casual" security model provided by exemplary embodiments. For example, as seen in the example, a user can invoke a secure profile at will but is not forced to always perform a login/logout model to stay protected, e.g., the turning off of the television (which many users have as an ingrained habit when they are finished watching TV) performs the secondary or dual function of logging them out of their personal profile. Second, while it may be possible to circumvent the lightweight security used in some embodiments (e.g., by the discovery of the PIN in the previous example), such an action can be identified and dealt with as is appropriate for any security "breach" that occurs within the family environment.

[0041] Having provided an illustrative example of a simple sign-on system according to an embodiment, some more details regarding exemplary architectures and functional units of such systems will now be discussed. According to some embodiments, simple sign-on systems can include a set of backend services and client interfaces disposed on a number of platforms as generally illustrated in Figure 4. Therein, the simple sign-on system 700

VIZIO Ex. 1002, Page 1240 of 3573
VIZIO v. MMT, IPR2024-00722

according to an embodiment can be broken down into the following components:

1. A primary account 702 accessible from multiple platforms.
2. A catalog of devices 704 attached to (or associated with) the primary account 702.
3. A catalog of user profiles 706 attached to the primary account 702.
4. A library of applications 708 managed by the primary account 702, including stored application-specific data such as the username and password for each application.
5. Transaction services 710 to facilitate and manage commerce.
6. An interface 712 to an application store linked to the primary account.
7. Web-based user interfaces 714 for access and editing.
8. Device-based user interfaces 716 for access and editing.

Each of these exemplary elements of a simple sign-on system according to an exemplary embodiment will now be discussed in more detail.

[0042] The shared, primary account 702 is an account that aggregates all members of a household's simple sign-on system according to an embodiment. There is a primary account administrator whose name, location, contact information and primary account password is stored. The primary account also optionally stores payment information (e.g.,: credit card or PayPal information) for easy transactions. The payment information can also be PIN-protected so that it can be stored in the account but still require a PIN to complete a transaction. The account administrator(s) also can manage the device catalog 704, user profile catalog 706, and library of applications 708 which are linked to the primary account 702. According to at least some embodiments, the primary account 702 only has one of each of these catalogs/libraries 704, 706 and 708.

[0043] The device catalog 704 is used for the management of devices and includes a

VIZIO Ex. 1002, Page 1241 of 3573
VIZIO v. MMT, IPR2024-00722

set of features to facilitate this effort. In order to verify devices, the catalog 704 will generate an initial activation code which can either be entered on the new device's client software, or can be generated by the device for entry in the catalog. There is a visible definition of the device and an internal definition that is used to determine compatibility with applications. Each device has a default name, but the account manager can create a unique name for easier identification. Finally, a device can have a default profile that is different than the default profile defined for the account 702. Devices can include any device managed by the simple sign-on system 700 including, but not limited to televisions and associated media source devices, e.g., an Internet modem, telephone device, DVD, satellite source/tuner, etc.

[0044] The catalog of user profiles 704 maintains and manages the "users" defined for the account 702. A user can be an individual, a group, or an abstract naming, and any of these types of users can be associated with a user profile. For example, the default profile in a household system 700 may be "family", as in the example provided above, with no password so that whenever a connected device becomes active, it is in a profile that is safe for all household members or visitors. Profiles are mirrored on client devices where possible so that network unavailability does not prevent usage of the device. Parameters that can be set for a profile include, but are not limited to:

a. Name of profile – a simple string which can be an individual name or set of people.
b. PIN – optional and can be used to allow a profile to access payment options.
c. Payment Authorization – a flag that defines whether this profile can make commerce transactions without needing PIN entry.
d. Icon – An image that is used to identify the profile in non-text contexts.

VIZIO Ex. 1002, Page 1242 of 3573
VIZIO v. MMT, IPR2024-00722

e. Ratings Level – definition of the maximum rating level the profile has access to, a form of parental control.

f. Login – username and password for the profile.

g. Manager Enabled – a flag that defines whether the profile has administrative access to the primary account.

h. Application Set – the subset of applications in the application library 708 that are accessible to this profile. This also includes the username/password or other login information required by some applications for personal use and applicable only to the specific profile.

i. "Skin" Interface Information – data used to define a personalized appearance on devices which the profile is active.

[0045] The application library 708 can, for example, be a representation of the various applications that have been installed for use on the system. The applications themselves may run remotely, so the library 708 can be designed as a database to manage applications that may exist in multiple locations. Paid applications would typically include a stored key to verify their paid status. If an application (eg: Netflix) has a single account that is shared completely by the household, than account settings (username, password, etc) are stored in the application library 708, rather than in individual profiles 706. In this way, all profiles 706 with access to the application that has a single account for the household can use the shared account settings. These settings can only be changed by an account administrator according to this embodiment.

[0046] According to an embodiment, any application that is part of any profile is stored in the application library 708. However, a given profile may not have all library

VIZIO Ex. 1002, Page 1243 of 3573
VIZIO v. MMT, IPR2024-00722

applications available to it. For example, some applications may be excluded by choice (and can be added by the profile user at any time), while other applications may be restricted by parental control settings and thus can only be added by an account administrator. The application library 708 also maintains a flag that indicates ability for each application to function on different platforms. For example, a video-based application may be flagged as invalid for an audio-only connected platform. This is used to filter the library view when accessed from platforms that do not support all the applications.

[0047] The transaction services 710 (also referred to herein as a "commerce backend") provides an integrated transaction system to facilitate payment for applications, subscriptions and services. Part of this system involves the storage of relevant transaction information (e.g., name, address, credit card, etc.) so that once set, the user can take advantage of a simplified transaction experience, either directly (if using an authorized profile) or through the input of a PIN. Since the account access is available from the web as well as from the connected platform, the account administrator can use a more convenient web-access from a PC to enter the heavy textual information necessary to set up a transaction account.

[0048] The application store (and interface 712 thereto) provides an integrated application store model to system 700 which provides users with access to applications, subscriptions and services to be added to the account's application library 708. Purchased items (which can include free items) are added directly to the application library 708 for availability to different profiles 706. Access to the application store 712 is filtered by parental controls in the active profile, so a profile can restrict the view of the application store in the same way it restricts the view of content within applications and applications in the

VIZIO Ex. 1002, Page 1244 of 3573
VIZIO v. MMT, IPR2024-00722

application library.

[0049] The web-based interface 714 provides a mechanism by which the simple sign-on system 700 can be accessed and used conveniently from various connected devices, e.g., a families personal computer or PDA which is not directly connected to system 700. As mentioned earlier, some account efforts may be easier to perform when done on a PC instead of on a TV screen with a remote. To facilitate this more convenient and efficient access, the complete system 700 is available via a standard web browser accessed through a PC, or mobile device, using the interface(s) 714. Depending upon the interface capabilities of the connected platform, some account functions may not be available, such as user management on an audio device. All account management, profile, and commerce functionality would typically be available through the web interface 714.

[0050] The device based (client-side) user interfaces 716 provide the primary connections to the system 700 via the various connected devices according to this embodiment. Each interface 716 will be scoped according to the capabilities of the device platform with which it is associated. While some devices may have all the features of the system accessible, others may work with a more limited set, requiring the user to go to the web-based interface 714 to handle some tasks. There can, however, be a set of core features which are required for any client-side variant including, for example, the ability to access a profile and "log-in" by some means, e.g., including a PIN entry. The core set of features could also include the ability to select an application from those available in the profile and use that application. Finally, the system 700 includes an "auto log-off" feature which automatically returns the system to a default profile if the system is turned off and on again. User login is a key aspect of the Simple Sign-On system because it should occur as

VIZIO Ex. 1002, Page 1245 of 3573
VIZIO v. MMT, IPR2024-00722

seamlessly as possible to minimize the demand on the user.

[0051] As mentioned above, according to exemplary embodiments there will be a default profile that is engaged by each connected system 700. According to at least some embodiments, this default profile has no PIN required for entry, i.e., the system will automatically permit at least some access to the controlled system via the default profile albeit some functionality, e.g., purchasing, may later require PIN entry to be enabled. However, other non-default profiles may require an initial PIN entry to engage the access of the profile, i.e., some non-default profiles may require a PIN entry or other identification input prior to the profile being used at all.

[0052] As will be appreciated by the foregoing, casual security measures in accordance with these embodiments are intended to balance ease of use for connected systems (such as the family TV where ease of use, and no or minimal security is traditionally an expectation) and security/control over the rapidly grown number of services which are becoming available on such connected systems. While PIN-entry is overall one easy means of accessing a profile according to the foregoing exemplary embodiments, it will be recognized that there are some other alternatives that could potentially make profile access even more streamlined, such as:

1. Learned Signature: Using a touchpad or in-air gesture device, the user can teach the system a signature that the user can enter at any time in the future to automatically engage a profile. This can be done at any moment, immediately addressing a PIN-entry needed for a purchase, as an example.
2. Tremor Detection: If a device is able to detect individual tremor patterns (such as an in-air gesture device and as described in the above incorporated by reference patent)

VIZIO Ex. 1002, Page 1246 of 3573
VIZIO v. MMT, IPR2024-00722

then these patterns can be identified to automatically offer a profile whenever the tremor is detected during a single session. It could be automatic as well, but the use case is better with a request because if a parent picks up the remote while the family is engaged, they may not want to enter their specific profile at that time.

3. Visual Identification: A more advanced system with built in video capabilities could "watch" the area and identify the individuals who are in position to load the appropriate profile. Since this is a situation where the users can change temporarily (one person leaves and returns a few minutes later) there is a built-in time factor to when the new profile is engaged. A restricted profile may still request the change after this given period of time much like the tremor detection.

[0053] Thus, for example, a login process according to an exemplary embodiment can include the steps illustrated in the method flowchart of Figure 5. Therein, at step 500, a user or viewer turns on a television. This results, as shown in step 502, is to activate a default profile which controls the user's access to media content and services via the television based on at least one control parameter associated with the television, e.g., one or more of the parameters set forth above. The user (or group of users) may then select an alternative profile from among other profiles associated with this account in the catalog 706, as shown in step 506. A validation of the user's right to access the alternative profile is performed at step 508. This step 508 can involve, for example, comparing a security identifier associated with the user, and input to the system (e.g., a PIN, tremor measured by a 3D pointing device, or other security inputs or biometric data) to a pre-stored security data item. If the validation process fails, then the default profile is maintained for controlling the system (e.g., the system of Figures 2, 3A, and/or 3B). Otherwise, if the user's security input is valid, the flow proceeds

VIZIO Ex. 1002, Page 1247 of 3573
VIZIO v. MMT, IPR2024-00722

to step 508 where the new profile is activated. Then, control of the system, and corresponding access to media content, applications, purchasing, etc., is controlled in accordance with the preset parameters for the newly activated profile. At some point in time, when the user turns off the television, at step 510, this operation (and/or the corresponding next time the system is powered on) operates as an implicit request to logoff from the alternative profile. In this way, the user essentially logs out without requiring a separate step to do so, and the default profile will again become the active profile when the television is turned back on.

[0054] Figure 6 illustrates an exemplary profile data flow associated with control systems in accordance with embodiments. Therein, a current profile provides characteristics or parameters 602 which are used by the user interface 604 associated with, e.g., a television, to control accessibility to applications, programs (based e.g., on ratings), purchasing, as well as potentially other types of media content or services that might warrant a profile by profile selective access control.

[0055] Systems and methods for processing data according to exemplary embodiments of the present invention can be performed by one or more processors executing sequences of instructions contained in a memory device. Such instructions may be read into the memory device from other computer-readable mediums such as secondary data storage device(s). Execution of the sequences of instructions contained in the memory device causes the processor to operate, for example, as described above. In alternative embodiments, hard-wire circuitry may be used in place of or in combination with software instructions to implement the present invention.

VIZIO Ex. 1002, Page 1248 of 3573
VIZIO v. MMT, IPR2024-00722

[0056] Numerous variations of the afore-described exemplary embodiments are contemplated. The above-described exemplary embodiments are intended to be illustrative in all respects, rather than restrictive, of the present invention. Thus the present invention is capable of many variations in detailed implementation that can be derived from the description contained herein by a person skilled in the art. All such variations and modifications are considered to be within the scope and spirit of the present invention as defined by the following claims. No element, act, or instruction used in the description of the present application should be construed as critical or essential to the invention unless explicitly described as such. Also, used herein, the article "a" is intended to include one or more items.

WHAT IS CLAIMED IS:

1. A method for controlling access to media content and services via a system comprising:

receiving a first input to turn on the system;

activating a default user profile which permits access to a first set of media content and services via the system without requiring validation of a system user's identity;

receiving a request to switch from the default user profile to another profile;

validating the request; and

activating, if the request is validated, the another profile which permits access to a second set of media content and services via the system that is different from the first set of media content and services.

2. The method of claim 1, further comprising:

receiving a second input to turn off the system;

receiving a third input to turn on the system;

activating the default user profile to control access to the system in response to the third input, wherein the second input operates as an implicit logoff of the another user profile.

3. The method of any of claims 1-2, wherein both the default user profile and the another user profile each include a purchasing parameter that indicates whether the respective profile enables commercial transactions via the system without requiring a PIN entry, the method further comprising:

receiving an input requesting a commercial transaction;

selectively permitting the commercial transaction to be processed via the system

VIZIO Ex. 1002, Page 1250 of 3573
VIZIO v. MMT, IPR2024-00722

based upon the purchasing parameter of the profile which is active at the time that the input requesting the commercial transaction is received.

4. The method of any of claims 1-3, wherein both the default user profile and the another user profile include an application parameter which identifies a subset of applications which are accessible when the system is operating in conjunction with the respective profile, the method further comprising:

displaying icons associated with applications which are accessible based upon the application parameter in a currently active profile.

5. The method of any of claims 1-4, wherein both the default user profile and the another user profile include a ratings parameter which identifies a maximum rating level associated with media content that can be accessed by the currently active profile.

6. The method of any of claims 1-5, wherein the step of validating the request further comprises at least one of: (a) comparing an input PIN with a stored PIN associated with the another profile; and (b) obtaining identifying information associated with a user who is currently using the system and comparing that identifying information with stored identity information associated with the another profile.

7. The method of any of claims 1-6, wherein the system includes a television.

VIZIO Ex. 1002, Page 1251 of 3573
VIZIO v. MMT, IPR2024-00722

8. A controller for controlling access to media content and services through a television, the controller comprising:

at least one interface configured to receive inputs from a user;

a processor configured to receiving a first input associated with turning on the television and, in response to the first input, further configured to activate a default user profile which permits access to a first set of media content and services via the television without requiring validation of a system user's identity;

wherein the at least one interface is further configured to subsequently receive a request to switch from the default user profile to another profile;

wherein the processor is further configured to validate the request and to activate, if the request is validated, the another profile which permits access to a second set of media content and services via the system that is different from the first set of media content and services.

9. The controller of claim 8, wherein the at least one interface is further configured to receive a second input to turn off the system and then to receive a third input to turn on the system, and wherein the processor is further configured to activate the default user profile to control access to the system in response to the third input, wherein the second input operates as an implicit logoff of the another user profile.

10. The controller of any of claims 8-9, wherein both the default user profile and the another user profile each include a purchasing parameter that indicates whether the respective

VIZIO Ex. 1002, Page 1252 of 3573
VIZIO v. MMT, IPR2024-00722

profile enables commercial transactions via the system without requiring a PIN entry and wherein the processor is further configured to selectively permit or deny commercial transactions through the television to be performed based upon the purchasing parameter associated with a currently active one of the default user profile and the another user profile.

11. The controller of any of claims 8-10, wherein both the default user profile and the another user profile include an application parameter which identifies a subset of applications which are accessible when the system is operating in conjunction with the respective profile, wherein the processor is further configured to generate signals for displaying icons on the television associated with applications which are accessible based upon the application parameter in a currently active profile one of the default user profile and the another user profile.

12. The controller any of claims 8-11, wherein both the default user profile and the another user profile include a ratings parameter which identifies a maximum rating level associated with media content that can be accessed by the currently active profile, and wherein the processor is further configured to permit access to media content via the television based on the ratings parameter of a currently active one of the default user profile and the another user profile.

13. The controller of any of claims 8-12, wherein processor is further configured to validate the request by performing at least one: (a) comparing an input PIN with a stored PIN associated with the another profile; and (b) obtaining identifying information associated with

VIZIO Ex. 1002, Page 1253 of 3573
VIZIO v. MMT, IPR2024-00722

a user who is currently using the system and comparing that identifying information with stored identity information associated with the another profile.

14. The controller of any one of claims 8-13, wherein the controller is integrated into the television.

15. The controller of any one of claims 8-13, wherein the controller is disposed in a separate housing from the television and is communicatively connected to the television.

16. A television comprising:

a display configured to display media content and service content which is accessible via a user interface;

a processor configured to generate a user interface, and control access to said media content and service content, in accordance with a currently active user profile;

wherein the processor is further configured to use a default user profile as the currently active user profile upon power on of the television.

17. The television of claim 16, wherein the processor is further configured to use the default user profile as the currently active user profile upon power on of the television automatically without any additional inputs from a user.

18. The television of any of claims 16-17, wherein the processor is further configured to enable switching the currently active user profile from the default user profile to another user

VIZIO Ex. 1002, Page 1254 of 3573
VIZIO v. MMT, IPR2024-00722

profile upon receipt of validated user identity information.

19. The television of any of claims 16-18, wherein the processor is further configured to control the television using the default user profile whenever the television is restarted.

20. The television of claim 16 further comprising the controller of any one of claims 8-15.

VIZIO Ex. 1002, Page 1255 of 3573
VIZIO v. MMT, IPR2024-00722

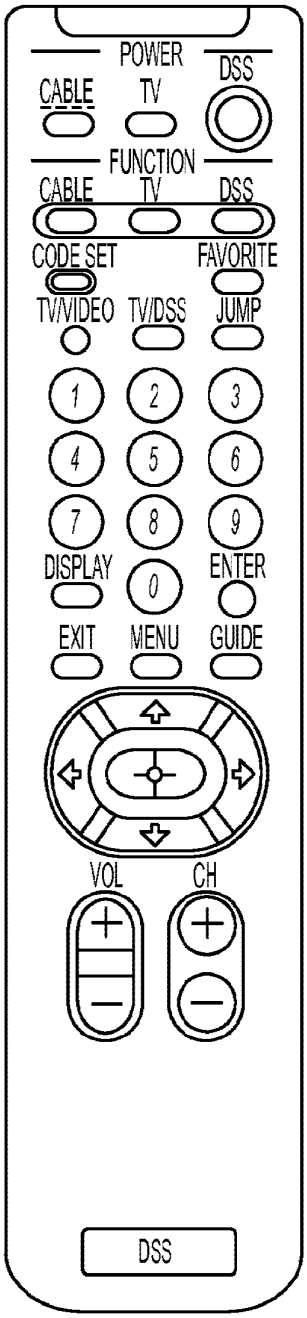


FIG. 1
PRIOR ART

VIZIO Ex. 1002, Page 1256 of 3573
VIZIO v. MMT, IPR2024-00722

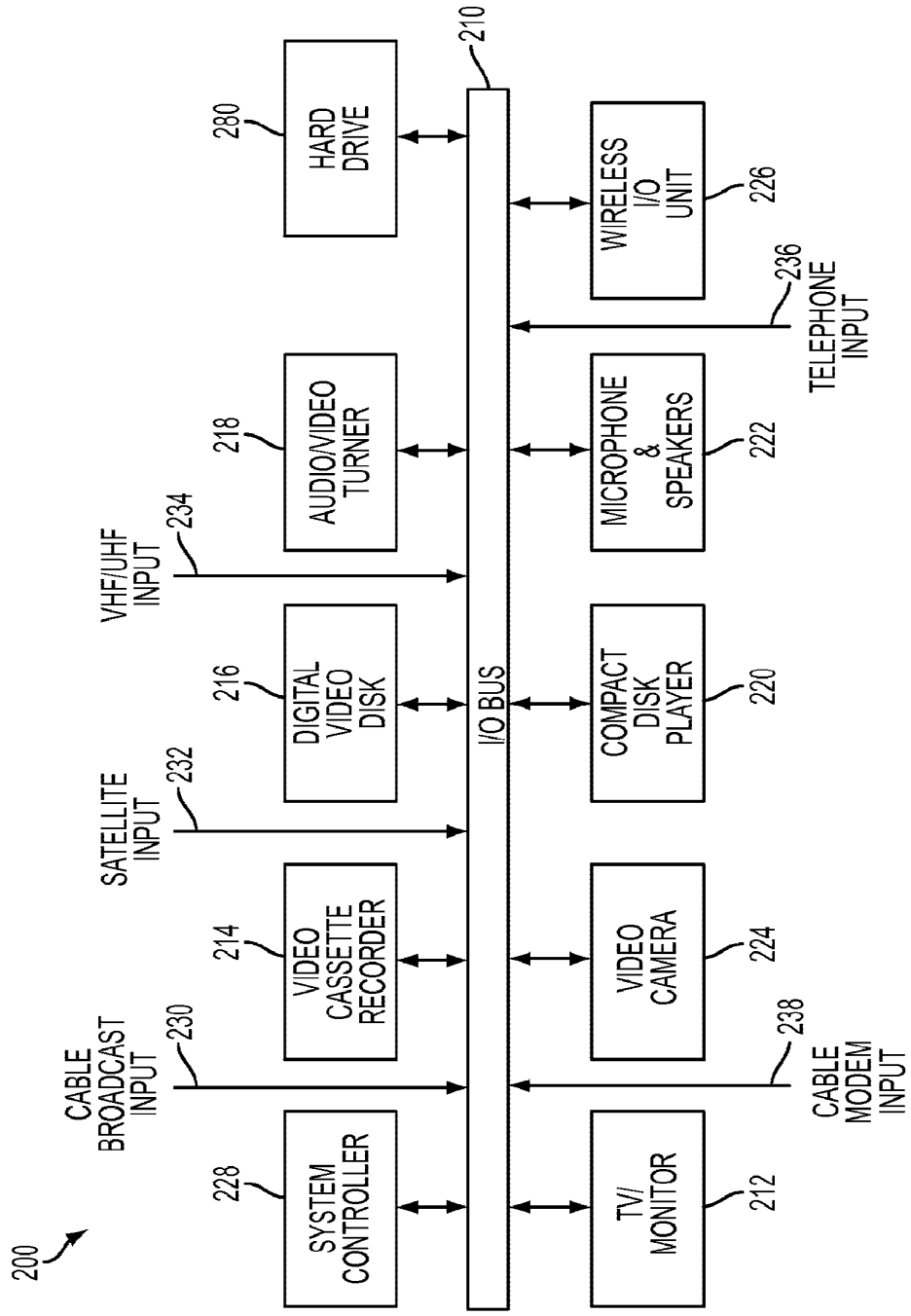


FIG. 2

VIZIO Ex. 1002, Page 1257 of 3573
VIZIO v. MMT, IPR2024-00722

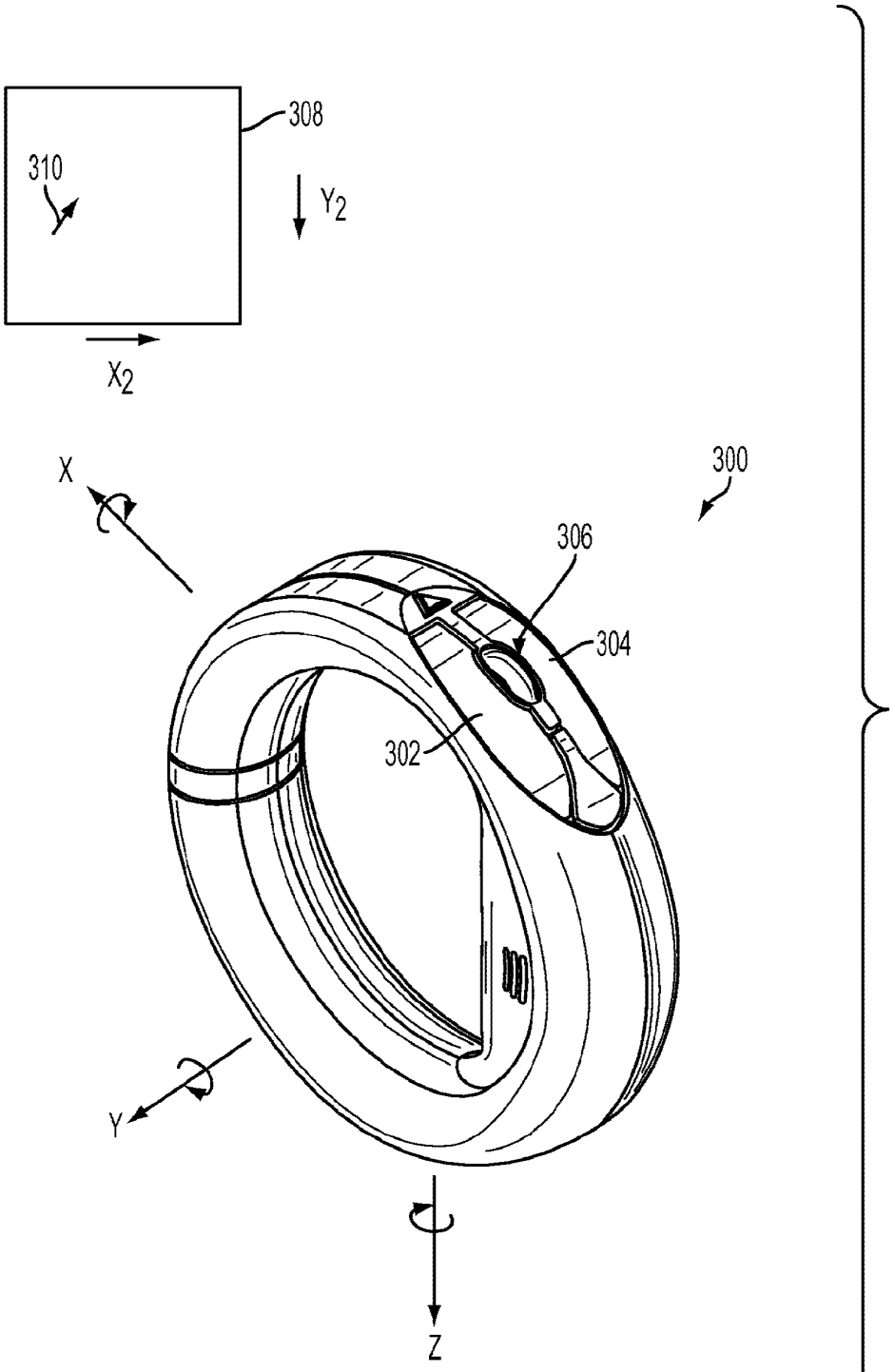


FIG. 3A

VIZIO Ex. 1002, Page 1258 of 3573
VIZIO v. MMT, IPR2024-00722

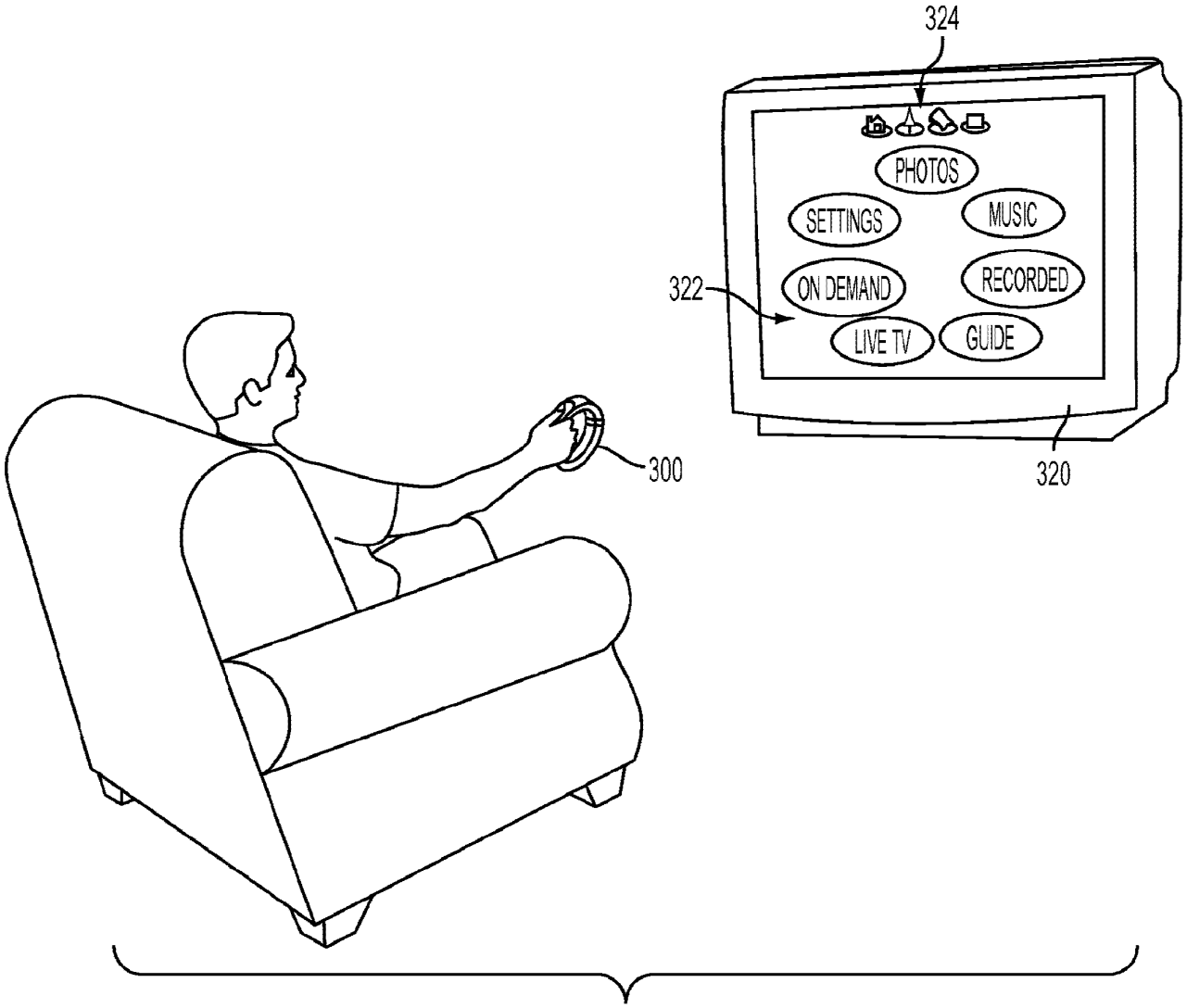


FIG. 3B

VIZIO Ex. 1002, Page 1259 of 3573
VIZIO v. MMT, IPR2024-00722

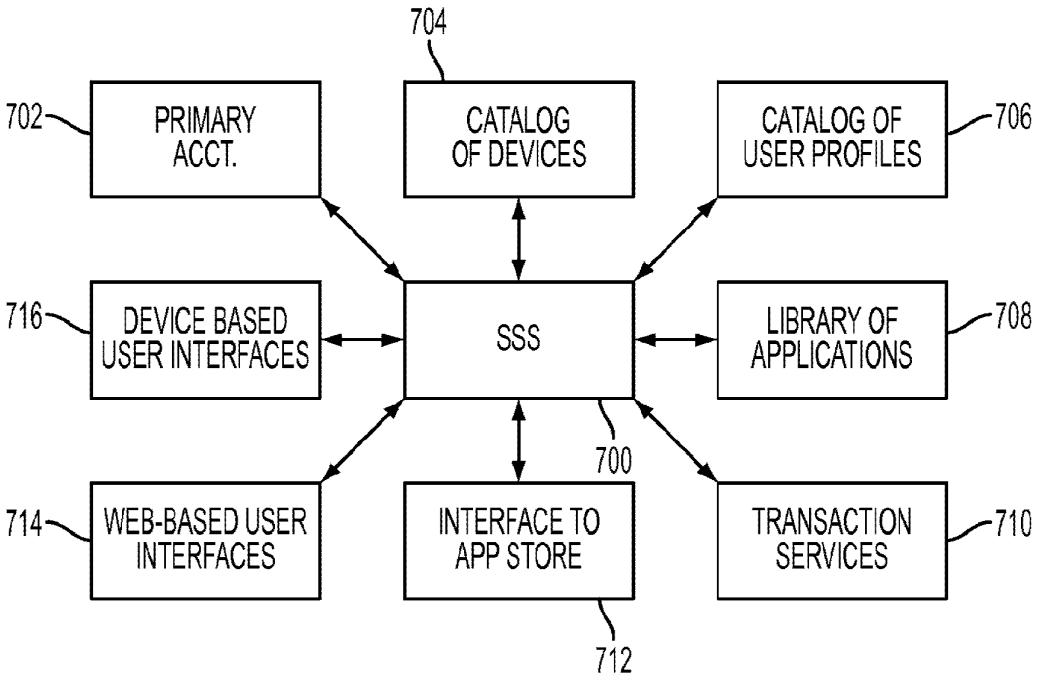


FIG. 4

VIZIO Ex. 1002, Page 1260 of 3573
VIZIO v. MMT, IPR2024-00722

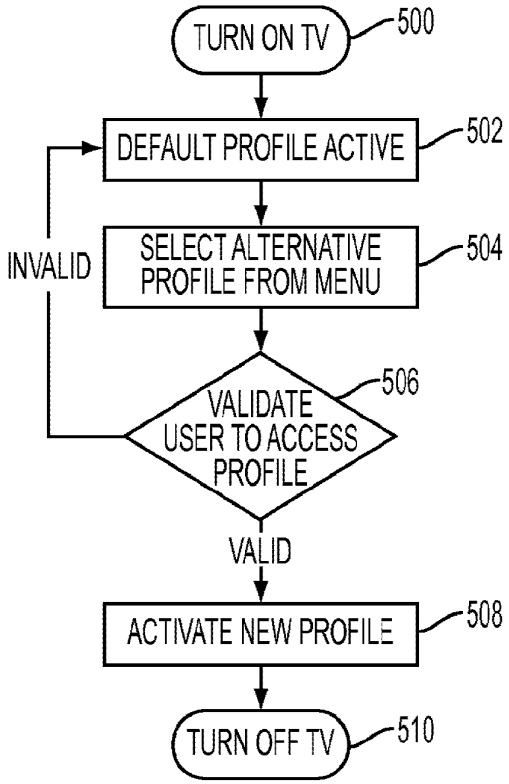


FIG. 5

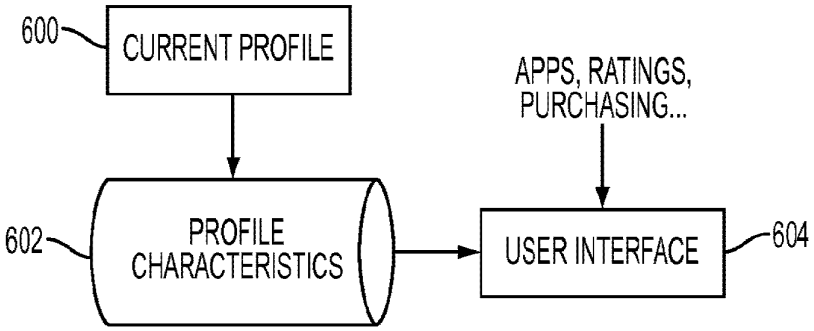


FIG. 6

VIZIO Ex. 1002, Page 1261 of 3573
VIZIO v. MMT, IPR2024-00722

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 March 2012 (08.03.2012)

PCT

(10) International Publication Number
WO 2012/030024 A1

(51) International Patent Classification:
H04N 21/431 (2011.01) *H04N 21/45* (2011.01)

(21) International Application Number:
PCT/KR2010/009046

(22) International Filing Date:
17 December 2010 (17.12.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/379,372 1 September 2010 (01.09.2010) US
61/379,367 1 September 2010 (01.09.2010) US
61/379,363 1 September 2010 (01.09.2010) US
10-2010-0086149
2 September 2010 (02.09.2010) KR
10-2010-0086153
2 September 2010 (02.09.2010) KR
10-2010-0086152
2 September 2010 (02.09.2010) KR

(71) Applicant *(for all designated States except US)*: **LG ELECTRONICS INC.** [KR/KR]; 20 Yeouido-dong, Yeongdeungpo-gu, Seoul 150-721 (KR).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **LEE, Ha Neul** [KR/KR]; 16 Woomyun-dong, Seocho-ku, Seoul 137-724 (KR). **CHOI, Kwang Soo** [KR/KR]; 16 Woomyun-dong, Seocho-ku, Seoul 137-724 (KR). **SUK, Ji He** [KR/KR]; 16 Woomyun-dong, Seocho-ku, Seoul 137-724 (KR). **OH, Hyo Jung** [KR/KR]; 16 Woomyun-dong, Seocho-ku, Seoul 137-724 (KR). **HEO, Ji Min** [KR/KR]; 16 Woomyun-dong, Seocho-ku, Seoul 137-724 (KR). **SUH, Myong Won** [KR/KR]; 16 Woomyun-dong, Seocho-ku, Seoul 137-724 (KR).

(74) Agent: **PARK, Byung Chang**; 2F Dongju Bldg. 824-24, Yeoksam-dong, Kangnam-gu, Seoul 135-080 (KR).

(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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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.

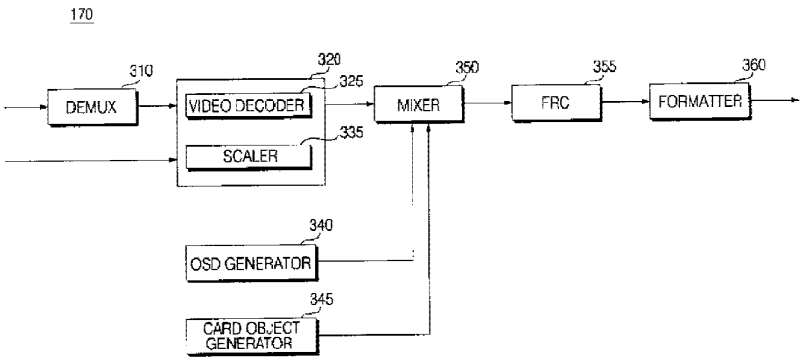
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, 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, ML, MR, NE, SN, TD, TG).

Published:

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

(54) **Title**: IMAGE DISPLAY APPARATUS AND METHOD FOR OPERATING THE SAME

[Fig. 10]



(57) **Abstract**: An image display apparatus for receiving and processing a broadcast signal and a method for operating the same are disclosed. The method includes displaying a home screen including a plurality of card objects, displaying a broadcast image and a favorite channel object representing favorite channels in a broadcast card object representing a broadcast image among the plurality of card objects, and displaying a favorite channel list including favorite channel items on the display, upon selection of the favorite channel object.

WO 2012/030024 A1

Description

Title of Invention: IMAGE DISPLAY APPARATUS AND METHOD FOR OPERATING THE SAME

Technical Field

[1] The present invention relates to an image display apparatus and a method for operating the same, and more particularly, to an image display apparatus and a method for operating the same, which increase user convenience.

Background Art

[2] An image display apparatus has a function of displaying images to a user. The image display apparatus can display a broadcast program selected by the user on a display from among broadcast programs transmitted from broadcasting stations. The recent trend in broadcasting is a worldwide shift from analog broadcasting to digital broadcasting.

[3] As it transmits digital audio and video signals, digital broadcasting offers many advantages over analog broadcasting, such as robustness against noise, less data loss, ease of error correction, and the ability to provide high-definition, clear images. Digital broadcasting also allows interactive viewer services, compared to analog broadcasting.

Disclosure of Invention

Technical Problem

[4] Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide an image display apparatus and a method for operating the same, which can increase user convenience.

[5] It is another object of the present invention to provide an image display apparatus and a method for operating the same, which can provide various user interfaces.

Solution to Problem

[6] In accordance with an aspect of the present invention, the above and other objects can be accomplished by the provision of a method for operating an image display apparatus that receives and processes a broadcast signal, including displaying a home screen including a plurality of card objects, displaying a broadcast image and a favorite channel object representing favorite channels in a broadcast card object representing a broadcast image among the plurality of card objects, and displaying a favorite channel list including favorite channel items on the display, upon selection of the favorite channel object.

[7] In accordance with another aspect of the present invention, there is provided a method for operating an image display apparatus that receives and processes a broadcast signal, including displaying a favorite channel object representing favorite

channels on a display, generating a favorite channel card object using a pre-stored favorite channel list by a card object generator, upon selection of the favorite channel object, and displaying the favorite channel card object on a home screen including a plurality of card objects.

[8] In accordance with a further aspect of the present invention, there is provided an image display apparatus for receiving and processing a broadcast image, including a display for displaying a home screen including a plurality of card objects, a user input interface for receiving an input for selecting a favorite channel object representing favorite channels, displayed on the home screen, and a controller for controlling display of a favorite channel list including favorite channel items on the display, upon selection of the favorite channel object.

Advantageous Effects of Invention

[9] As is apparent from the above description of the embodiments of the present invention, since a favorite channel list is displayed on a home screen, a user can easily identify favorite channels and thus user convenience is increased.

[10] Upon selection of a favorite channel object on the home screen, this favorite channel list is displayed. Therefore, the user can easily access the favorite channel list.

[11] As a broadcast image of a program airing on a channel is displayed by selecting a channel item indicating the channel in a displayed channel list, user convenience is further increased.

[12] When a cursor moves on the channel list or a channel item is selected from the channel list, channel items are sorted differently in the channel list to thereby allow the user for search for a channel.

[13] A favorite channel card object including thumbnail images for favorite channels is displayed on the home screen, which allows the user to easily identify favorite channels. Accordingly, user convenience is increased.

[14] Since channel information and thumbnail images of channels are displayed together, the channel information can be readily identified.

[15] Upon selection of a thumbnail image in the favorite channel card object, a broadcast image of a channel corresponding to the thumbnail image can be displayed fullscreen or displayed in a broadcast card object. Hence, the user can easily watch the broadcast image.

[16] Upon selection of a card object name in the favorite channel card object, a channel list screen including a favorite channel list is displayed so that the user can easily identify favorite channels. Other channel lists such as an all channel list or a recent channel list can also be displayed, thereby increasing user convenience.

[17] The image display apparatus provides a variety of UIs. Therefore, user convenience

is further increased.

Brief Description of Drawings

[18] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[19] FIG. 1 illustrates the overall configuration of a broadcasting system including an image display apparatus according to an embodiment of the present invention;

[20] FIG. 2 illustrates the overall configuration of a broadcasting system including an image display apparatus according to another embodiment of the present invention;

[21] FIG. 3 is a diagram illustrating a signal flow for an operation for attaching to a Service Provider (SP) and receiving channel information from the SP in the image display apparatus illustrated in FIG. 1 or 2 according to an embodiment of the present invention;

[22] FIG. 4 illustrates an example of data used in the operation illustrated in FIG. 3;

[23] FIG. 5 is a detailed block diagram of the image display apparatus illustrated in FIG. 1 or 2 according to an embodiment of the present invention;

[24] FIG. 6 is a detailed block diagram of the image display apparatus illustrated in FIG. 1 or 2 according to another embodiment of the present invention;

[25] FIGS. 7 and 8 are block diagrams illustrating either of the image display apparatuses separately as a set-top box and a display device according to embodiments of the present invention;

[26] FIG. 9 illustrates an operation for communicating with third devices in either of the image display apparatuses according to an embodiment of the present invention;

[27] FIG. 10 is a block diagram of a controller illustrated in FIG. 6;

[28] FIG. 11 illustrates a platform architecture for either of the image display apparatuses according to an embodiment of the present invention;

[29] FIG. 12 illustrates a platform architecture for either of the image display apparatuses according to another embodiment of the present invention;

[30] FIG. 13 illustrates a method for controlling either of the image display apparatuses in a remote controller according to an embodiment of the present invention;

[31] FIG. 14 is a detailed block diagram of the remote controller in either of the image display apparatuses according to an embodiment of the present invention;

[32] FIG. 15 illustrates a UI in either of the image display apparatuses according to an embodiment of the present invention;

[33] FIG. 16 illustrates a UI in either of the image display apparatuses according to another embodiment of the present invention;

[34] FIG. 17 illustrates a UI in either of the image display apparatuses according to

another embodiment of the present invention;

[35] FIG. 18 illustrates a UI in either of the image display apparatuses according to a further embodiment of the present invention;

[36] FIG. 19 is a flowchart illustrating a method for operating an image display apparatus according to an embodiment of the present invention;

[37] FIGS. 20 to 33 are views referred to for describing various examples of the method for operating an image display apparatus, illustrated in FIG. 19;

[38] FIG. 34 is a flowchart illustrating a method for operating an image display apparatus according to another embodiment of the present invention;

[39] FIGS. 35 to 55 are views referred to for describing various examples of the method for operating an image display apparatus, illustrated in FIG. 34;

[40] FIG. 56 is a flowchart illustrating a method for operating an image display apparatus according to a further embodiment of the present invention; and

[41] FIGS. 57 to 69 are views referred to for describing various examples of the method for operating an image display apparatus, illustrated in FIG. 56.

Best Mode for Carrying out the Invention

[42] Embodiments of the present invention will be described below with reference to the attached drawings.

[43] The terms "module" and "unit" used to signify components are used herein to help the understanding of the components and thus they should not be considered as having specific meanings or roles. Accordingly, the terms "module" and "unit" may be used interchangeably.

[44] An image display apparatus as set forth herein is an intelligent image display apparatus equipped with a computer support function in addition to a broadcast reception function, for example. Thus the image display apparatus may have user-friendly interfaces such as a handwriting input device, a touch screen, or a pointing device. Further, because the image display apparatus supports wired or wireless Internet, it is capable of e-mail transmission/reception, Web browsing, banking, gaming, etc. by connecting to the Internet or a computer. To implement these functions, the image display apparatus may operate based on a standard general-purpose Operating System (OS).

[45] Various applications can be freely added to or deleted from, for example, a general-purpose OS kernel in the image display apparatus according to the present invention. Therefore, the image display apparatus may perform a number of user-friendly functions. The image display apparatus may be a network TV, a Hybrid broadcast broadband TV (HbbTV), a smart TV, etc. for example. The image display apparatus is applicable to a smart phone, as needed.

[46] Embodiments of the present invention will be described in detail with reference to the attached drawings, but it should be understood that they are merely illustrative of the present invention and should not be interpreted as limiting the scope of the present invention.

[47] In addition, although the terms used in the present invention are selected from generally known and used terms, some of the terms mentioned in the description of the present invention, the detailed meanings of which are described in relevant parts of the description herein, have been selected by the applicant at his or her discretion. Furthermore, the present invention must be understood, not simply by the actual terms used but by the meanings of each term lying within.

[48] FIG. 1 illustrates the overall configuration of a broadcasting system including an image display apparatus according to an embodiment of the present invention.

[49] Referring to FIG. 1, the broadcasting system may include a Content Provider (CP) 10, a Service Provider (SP) 20, a Network Provider (NP) 30, and a Home Network End Device (HNED) 40. The HNED 40 corresponds to, for example, a client 100 which is an image display apparatus according to an embodiment of the present invention. As stated before, the image display apparatus may be a network TV, a smart TV, an Internet Protocol TV (IPTV), etc.

[50] The CP 10 creates and provides content. The CP 10 may be, for example, a terrestrial broadcaster, a cable System Operator (SO) or Multiple System Operator (MSO), a satellite broadcaster, or an Internet broadcaster, as illustrated in FIG. 1.

[51] Besides broadcast content, the CP 10 may provide various applications, which will be described later in detail.

[52] The SP 20 may provide content received from the CP 10 in a service package. For instance, the SP 20 may package first terrestrial broadcasting, second terrestrial broadcasting, cable broadcasting, satellite broadcasting, Internet broadcasting, and applications and provide the package to users.

[53] The SP 20 may unicast or multicast a service to the client 100. Unicast is a form of transmission in which information is sent from only one transmitter to only one receiver. In other words, unicast transmission is point-to-point, involving two nodes only. In an example of unicast transmission, upon receipt of a request for data from a receiver, a server transmits the data to only one receiver. Multicast is a type of transmission or communication in which a transmitter transmits data to a group of receivers. For example, a server may transmit data to a plurality of pre-registered receivers at one time. For multicast registration, the Internet Group Management Protocol (IGMP) may be used.

[54] The NP 30 may provide a network over which a service is provided to the client 100. The client 100 may construct a home network and receive a service over the home

network.

[55] Content transmitted in the above-described broadcasting system may be protected through conditional access or content protection. CableCard and Downloadable Conditional Access System (DCAS) are examples of conditional access or content protection.

[56] The client 100 may also transmit content over a network. In this case, the client 100 serves as a CP and thus the CP 10 may receive content from the client 100. Therefore, an interactive content service or data service can be provided.

[57] FIG. 2 illustrates the overall configuration of a broadcasting system including an image display apparatus according to another embodiment of the present invention.

[58] Referring to FIG. 2, the image display apparatus 100 according to another embodiment of the present invention is connected to a broadcast network and the Internet. The image display apparatus 100 is, for example, a network TV, a smart TV, an HbbTV, etc.

[59] The image display apparatus 100 includes, for example, a broadcast interface 101, a section filter 102, an Application Information Table (AIT) filter 103, an application data processor 104, a broadcast data processor 111, a media player 106, an IP processor 107, an Internet interface 108, and a runtime module 109.

[60] The image display apparatus 100 receives AIT data, real-time broadcast content, application data, and stream events through the broadcast interface 101. The real-time broadcast content may be referred to as linear Audio/Video (A/V) content.

[61] The section filter 102 performs section filtering on the four types of data received through the broadcast interface 101, and outputs the AIT data to the AIT filter 103, the linear A/V content to the broadcast data processor 111, and the stream events and application data to the application data processor 104.

[62] Meanwhile, the image display apparatus 100 receives non-linear A/V content and application data through the Internet interface 108. The non-linear A/V content may be, for example, a Content On Demand (CoD) application.

[63] The non-linear A/V content and the application data are transmitted to the media player 106 and the runtime module 109, respectively.

[64] The runtime module 109 includes, for example, an application manager and a browser as illustrated in FIG. 2. The application manager controls the life cycle of an interactive application using the AIT data, for example. The browser displays and processes the interactive application.

[65] FIG. 3 is a diagram illustrating a signal flow for an operation for attaching to an SP and receiving channel information from the SP in the image display apparatus illustrated in FIG. 1 or 2. Needless to say, the operation illustrated in FIG. 3 is an embodiment, which should not be interpreted as limiting the scope of the present

invention.

[66] Referring to FIG. 3, an SP performs an SP Discovery operation (S301) and the image display apparatus transmits a Service Provider Attachment Request signal to the SP (S302). Upon completion of attachment to the SP, the image display apparatus receives provisioning information from the SP (S303). Further, the image display apparatus receives Master System Information (SI) Tables, Virtual Channel Map Tables, Virtual Channel Description Tables, and Source Tables from the SP(S304 to S307).

[67] More specifically, SP Discovery is a process by which SPs that provide IPTV services search for Service Discovery (SD) servers having information about the offerings of the SPs.

[68] In order to receive information about the SD servers, an SD server address list can be detected, for example, using three methods, specifically use of an address preset in the image display apparatus or an address manually set by a user, Dynamic Host Configuration Protocol (DHCP)-based SP Discovery, and Domain Name System Service (DNS SRV)-based SP Discovery. The image display apparatus accesses a specific SD server using the SD server address list obtained through one of the above three methods and receives a SP Discovery record from the specific SD server. The Service Provider Discovery record includes information needed to perform Service Discovery on an SP basis. The image display apparatus then starts a Service Discovery operation using the SP Discovery record. These operations can be performed in a push mode or a pull mode.

[69] The image display apparatus accesses an SP attachment server specified by an SP attachment locator included in the SP Discovery record and performs a registration procedure (or a service attachment procedure).

[70] Further, after accessing an authentication service server of an SP specified by an SP authentication locator and performing an authentication procedure, the image display apparatus may perform a service authentication procedure.

[71] After service attachment is successfully performed, a server may transmit data in the form of a provision information table to the image display apparatus.

[72] During service attachment, the image display apparatus may include an Identifier (ID) and location information thereof in data and transmit the data to the service attachment server. Thus the service attachment server may specify a service that the image display apparatus has subscribed to based on the ID and location information. In addition, the service attachment server provides, in the form of a provisioning information table, address information from which the image display apparatus can obtain Service Information (SI). The address information corresponds to access information about a Master SI Table. This method facilitates provision of a customized service to each subscriber.

[73] The SI is divided into a Master SI Table record for managing access information and version information about a Virtual Channel Map, a Virtual Channel Map Table for providing a list of services in the form of a package, a Virtual Channel Description Table that contains details of each channel, and a Source Table that contains access information about actual services.

[74] FIG. 4 illustrates an example of data used in the signal flow illustrated in FIG. 3.

[75] FIG. 4 is a detailed diagram of FIG. 3, illustrating a relationship among data in the SI.

[76] Referring to FIG. 4, a Master SI Table contains information about the location and version of each Virtual Channel MAP.

[77] Each Virtual Channel MAP is identified by its Virtual Channel MAP identifier. VirtualChannelMAPVersion specifies the version number of the Virtual Channel MAP. If any of the tables connected to the Master SI Table in the arrowed direction is modified, the versions of the modified table and overlying tables thereof (up to the Master SI Table) are incremented. Accordingly, a change in any of the SI tables can be readily identified by monitoring the Master SI Table.

[78] For example, when the Source Table is changed, the version of the Source Table is incremented and the version of the Virtual Channel Description Table that references the Source Table is also incremented. In conclusion, a change in any lower table leads to a change in its higher tables and, eventually, a change in the Master SI Table.

[79] One Master SI Table may exist for each SP. However, in the case where service configurations differ for regions or subscribers (or subscriber groups), an SP may have a plurality of Master SI Tables in order to provide a customized service on a region, subscriber or subscriber group basis. Thus it is possible to provide a customized service to a subscriber according to a region in which the subscriber is located and subscriber information regarding the subscriber.

[80] A Virtual Channel Map Table may contain a list of one or more virtual channels. A Virtual Channel Map includes not details of the channels but information about the locations of the details of the channels. In the Virtual Channel Map Table, VirtualChannelDescriptionLocation specifies the location of a Virtual Channel Description Table that provides virtual channel descriptions.

[81] The Virtual Channel Description Table contains the details of the virtual channels. The Virtual Channel Description Table can be accessed using VirtualChannelDescriptionLocation of the Virtual Channel Map Table.

[82] A Source Table provides information necessary to access actual services (e.g. IP addresses, ports, AV Codecs, transmission protocols, etc.) on a service basis.

[83] The above-described Master SI Table, the Virtual Channel Map Table, the Virtual Channel Description Table and the Source Table are delivered in four logically

separate flows, in a push mode or a pull mode. For version management, the Master SI Table may be multicast and thus a version change can be monitored by receiving a multicast stream of the Master SI Table.

[84] FIG. 5 is a detailed block diagram of the image display apparatus illustrated in FIG. 1 or 2 according to an embodiment of the present invention. The structure of the image display apparatus in FIG. 5 is purely exemplary and should not be interpreted as limiting the scope of the present invention.

[85] Referring to FIG. 5, an image display apparatus 700 includes a network interface 701, a Transmission Control Protocol/Internet Protocol (TCP/IP) manager 702, a service delivery manager 703, a Demultiplexer (DEMUX) 705, a Program Specific Information (PSI) & (Program and System Information Protocol (PSIP) and/or SI) decoder 704, a display A/V and On Screen Display (OSD) module 708, a service control manager 709, a service discovery manager 710, a metadata manager 712, an SI & metadata DataBase (DB) 711, a User Interface (UI) manager 714, and a service manager 713.

[86] The network interface 701 transmits packets to and receives packets from a network. Specifically, the network interface 701 receives services and content from an SP over the network.

[87] The TCP/IP manager 702 is involved in packet reception and transmission of the image display apparatus 700, that is, packet delivery from a source to a destination. The TCP/IP manager 702 classifies received packets according to appropriate protocols and outputs the classified packets to the service delivery manager 705, the service discovery manager 710, the service control manager 709, and the metadata manager 712.

[88] The service delivery manager 703 controls received service data. For example, when controlling real-time streaming data, the service delivery manager 703 may use the Real-time Transport Protocol/Real-time Transport Control Protocol (RTP/RTCP). If real-time streaming data is transmitted over RTP/RTCP, the service delivery manager 703 parses the received real-time streaming data using RTP and outputs the parsed real-time streaming data to the DEMUX 705 or stores the parsed real-time streaming data in the SI & metadata DB 711 under the control of the service manager 713. In addition, the service delivery manager 703 feeds back network reception information to a server that provides the real-time streaming data service using RTCP.

[89] The DEMUX 705 demultiplexes a received packet into audio data, video data and PSI data and outputs the audio data, video data and PSI data to the audio decoder 706, the video decoder 707, and the PSI & (PSIP and/or SI) decoder 704, respectively.

[90] The PSI & (PSIP and/or SI) decoder 704 decodes SI such as PSI. More specifically, the PSI & (PSIP and/or SI) decoder 704 decodes PSI sections, PSIP sections or SI

sections received from the DEMUX 705.

[91] The PSI & (PSIP and/or SI) decoder 704 constructs an SI DB by decoding the received sections and stores the SI DB in the SI & metadata DB 711.

[92] The audio decoder 706 and the video decoder 707 decode the audio data and the video data received from the DEMUX 705 and output the decoded audio and video data to a user through the display A/V and OSD module 708.

[93] The UI manager 714 and the service manager 713 manage the overall state of the image display apparatus 700, provide UIs, and manage other managers.

[94] The UI manager 714 provides a Graphical User Interface (GUI) in the form of an OSD and performs a reception operation corresponding to a key input received from the user. For example, upon receipt of a key input signal regarding channel selection from the user, the UI manager 714 transmits the key input signal to the service manager 713.

[95] The service manager 713 controls managers associated with services, such as the service delivery manager 703, the service discovery manager 710, the service control manager 709, and the metadata manager 712.

[96] The service manager 713 also makes a channel map and selects a channel using the channel map according to the key input signal received from the UI manager 714. The service manager 713 sets the audio/video Packet ID (PID) of the selected channel based on SI about the channel received from the PSI & (PSIP and/or SI) decoder 704.

[97] The service discovery manager 710 provides information necessary to select an SP that provides a service. Upon receipt of a channel selection signal from the service manager 713, the service discovery manager 710 detects a service based on the channel selection signal.

[98] The service control manager 709 takes charge of selecting and control services. For example, if a user selects live broadcasting, like a conventional broadcasting service, the service control manager selects and controls the service using Internet Group Management Protocol (IGMP) or Real-Time Streaming Protocol (RTSP). If the user selects Video on Demand (VoD), the service control manager 709 selects and controls the service. RTSP supports trick mode for real-time streaming. Further, the service control manager 709 may initialize and manage a session through an IP Multimedia Control (IMC) gateway using IP Multimedia Subsystem (IMS) and Session Initiation Protocol (SIP). The protocols are given by way of example and thus other protocols are also applicable according to other embodiments.

[99] The metadata manager 712 manages metadata related to services and stores the metadata in the SI & metadata DB 711.

[100] The SI & metadata DB 711 stores the SI decoded by the PSI & (PSIP and/or SI) decoder 704, the metadata managed by the metadata manager 712, and the information

required to select an SP, received from the service discovery manager 710. The SI & metadata DB 711 may store setup data for the system.

[101] The SI & metadata DB 711 may be constructed in a Non-Volatile RAM (NVRAM) or a flash memory.

[102] An IMS gateway 705 is a gateway equipped with functions needed to access IMS-based IPTV services.

[103] FIG. 6 is a detailed block diagram of the image display apparatus illustrated in FIG. 1 or 2 according to another embodiment of the present invention.

[104] Referring to FIG. 6, an image display apparatus 100 according to another embodiment of the present invention includes a broadcasting receiver 105, an external device interface 135, a memory 140, a user input interface 150, a controller 170, a display 180, an audio output unit 185, a power supply 190, and a camera module (not shown). The broadcasting receiver 105 may include a tuner 110, a demodulator 120 and a network interface 130. As needed, the broadcasting receiver 105 may be configured so as to include only the tuner 110 and the demodulator 120 or only the network interface 130.

[105] The tuner 110 selects a Radio Frequency (RF) broadcast signal corresponding to a channel selected by a user from among a plurality of RF broadcast signals received through an antenna and downconverts the selected RF broadcast signal into a digital Intermediate Frequency (IF) signal or an analog baseband A/V signal.

[106] More specifically, if the selected RF broadcast signal is a digital broadcast signal, the tuner 110 downconverts the selected RF broadcast signal into a digital IF signal DIF. On the other hand, if the selected RF broadcast signal is an analog broadcast signal, the tuner 110 downconverts the selected RF broadcast signal into an analog baseband A/V signal, CVBS/SIF. That is, the tuner 110 may be a hybrid tuner capable of processing not only digital broadcast signals but also analog broadcast signals. The analog baseband A/V signal CVBS/SIF may be directly input to the controller 170.

[107] The tuner 110 may be capable of receiving RF broadcast signals from an Advanced Television Systems Committee (ATSC) single-carrier system or from a Digital Video Broadcasting (DVB) multi-carrier system.

[108] The tuner 110 may sequentially select a number of RF broadcast signals corresponding to all broadcast channels previously stored in the image display apparatus 100 by a channel add function from a plurality of RF signals received through the antenna and may downconvert the selected RF broadcast signals into IF signals or baseband A/V signals.

[109] The demodulator 120 receives the digital IF signal DIF from the tuner 110 and demodulates the digital IF signal DIF.

[110] For example, if the digital IF signal DIF is an ATSC signal, the demodulator 120

may perform 8-Vestigal SideBand (VSB) demodulation on the digital IF signal DIF. The demodulator 120 may also perform channel decoding. For channel decoding, the demodulator 120 may include a Trellis decoder (not shown), a de-interleaver (not shown) and a Reed-Solomon decoder (not shown) so as to perform Trellis decoding, de-interleaving and Reed-Solomon decoding.

[111] For example, if the digital IF signal DIF is a DVB signal, the demodulator 120 performs Coded Orthogonal Frequency Division Multiple Access (COFDMA) demodulation upon the digital IF signal DIF. The demodulator 120 may also perform channel decoding. For channel decoding, the demodulator 120 may include a convolution decoder (not shown), a de-interleaver (not shown), and a Reed-Solomon decoder (not shown) so as to perform convolution decoding, de-interleaving, and Reed-Solomon decoding.

[112] The demodulator 120 may perform demodulation and channel decoding on the digital IF signal DIF, thereby obtaining a stream signal TS. The stream signal TS may be a signal in which a video signal, an audio signal and a data signal are multiplexed. For example, the stream signal TS may be an MPEG-2 TS in which an MPEG-2 video signal and a Dolby AC-3 audio signal are multiplexed. An MPEG-2 TS may include a 4-byte header and a 184-byte payload.

[113] In order to properly handle not only ATSC signals but also DVB signals, the demodulator 120 may include an ATSC demodulator and a DVB demodulator.

[114] The stream signal TS may be input to the controller 170 and thus subjected to demultiplexing and A/V signal processing. The processed video and audio signals are output to the display 180 and the audio output unit 185, respectively.

[115] The external device interface 135 may serve as an interface between an external device and the image display apparatus 100. For interfacing, the external device interface 135 may include an A/V Input/Output (I/O) unit (not shown) and/or a wireless communication module (not shown).

[116] The external device interface 135 may be connected to an external device such as a Digital Versatile Disk (DVD) player, a Blu-ray player, a game console, a camera, a camcorder, or a computer (e.g., a laptop computer), wirelessly or by wire. Then, the external device interface 135 externally receives video, audio, and/or data signals from the external device and transmits the received input signals to the controller 170. In addition, the external device interface 135 may output video, audio, and data signals processed by the controller 170 to the external device. In order to receive or transmit audio, video and data signals from or to the external device, the external device interface 135 includes the A/V I/O unit (not shown) and/or the wireless communication module (not shown).

[117] The A/V I/O unit of the external device interface 135 may include a Universal Serial

Bus (USB) port, a Composite Video Banking Sync (CVBS) port, a Component port, a Super-video (S-video) (analog) port, a Digital Visual Interface (DVI) port, a High-Definition Multimedia Interface (HDMI) port, a Red-Green-Blue (RGB) port, and a D-sub port.

[118] The wireless communication module of the external device interface 135 may perform short-range wireless communication with other electronic devices. For short-range wireless communication, the wireless communication module may use Bluetooth, Radio-Frequency IDentification (RFID), Infrared Data Association (IrDA), Ultra WideBand (UWB), ZigBee, and Digital Living Network Alliance (DLNA).

[119] The external device interface 135 may be connected to various set-top boxes through at least one of the above-described ports and may thus receive data from or transmit data to the various set-top boxes.

[120] The external device interface 135 may receive applications or an application list from an adjacent external device and provide the applications or the application list to the controller 170 or the memory 140.

[121] The network interface 130 serves as an interface between the image display apparatus 100 and a wired/wireless network such as the Internet. The network interface 130 may include an Ethernet port for connection to a wired network. The wireless communication module of the external signal I/O unit 128 may wirelessly access the Internet. For connection to wireless networks, the network interface 130 may use Wireless Local Area Network (WLAN) (i.e., Wi-Fi), Wireless Broadband (WiBro), World Interoperability for Microwave Access (WiMax), and High Speed Downlink Packet Access (HSDPA).

[122] The network interface 130 may transmit data to or receive data from another user or electronic device over a connected network or another network linked to the connected network. Especially, the network interface 130 may transmit data stored in the image display apparatus 100 to a user or electronic device selected from among users or electronic devices pre-registered with the image display apparatus 100.

[123] The network interface 130 may access a specific Web page over a connected network or another network linked to the connected network. That is, the network interface 130 may access a specific Web page over a network and transmit or receive data to or from a server. Additionally, the network interface 130 may receive content or data from a CP or an NP. Specifically, the network interface 130 may receive content such as movies, advertisements, games, VoD files, and broadcast signals, and information related to the content from a CP or an NP. Also, the network interface 130 may receive update information about firmware and update files of the firmware from the NP. The network interface 130 may transmit data over the Internet or to the CP or the NP.

[124] The network interface 130 may selectively receive a desired application among open

applications over a network.

[125] In an embodiment of the present invention, when a game application is executed in the image display apparatus 100, the network interface 130 may transmit data to or receive data from a user terminal connected to the image display apparatus 100 through a network. In addition, the network interface 130 may transmit specific data to or receive specific data from a server that records game scores.

[126] The memory 140 may store various programs necessary for the controller 170 to process and control signals, and may also store processed video, audio and data signals.

[127] The memory 140 may temporarily store a video, audio and/or data signal received from the external device interface 135 or the network interface 130. The memory 140 may store information about broadcast channels by the channel-add function.

[128] The memory 140 may store applications or a list of applications received from the external device interface 135 or the network interface 130.

[129] The memory 140 may store a variety of platforms which will be described later.

[130] In an embodiment of the present invention, when the image display apparatus 100 executes a game application, the memory 140 may store user-specific information and game play information about a user terminal used as a game controller.

[131] The memory 140 may include, for example, at least one of a flash memory-type storage medium, a hard disk-type storage medium, a multimedia card micro-type storage medium, a card-type memory (e.g. a Secure Digital (SD) or eXtreme Digital (XD) memory), a Random Access Memory (RAM), or a Read-Only Memory (ROM) such as an Electrically Erasable and Programmable Read Only Memory. The image display apparatus 100 may reproduce content stored in the memory 140 (e.g. video files, still image files, music files, text files, and application files) to the user.

[132] While the memory 140 is shown in FIG. 6 as configured separately from the controller 170, to which the present invention is not limited, the memory 140 may be incorporated into the controller 170, for example.

[133] The user input interface 150 transmits a signal received from the user to the controller 170 or transmits a signal received from the controller 170 to the user.

[134] For example, the user input interface 150 may receive various user input signals such as a power-on/off signal, a channel selection signal, and a screen setting signal from a remote controller 200 or may transmit a signal received from the controller 170 to the remote controller 200, according to various communication schemes, for example, RF communication and IR communication.

[135] For example, the user input interface 150 may provide the controller 170 with user input signals or control signals received from local keys (not shown), such as inputs of a power key, a channel key, and a volume key, and setting values.

[136] Also, the user input interface 150 may transmit a control signal received from a sensor unit (not shown) for sensing a user gesture to the controller 170 or transmit a signal received from the controller 170 to the sensor unit. The sensor unit may include a touch sensor, a voice sensor, a position sensor, a motion sensor, etc.

[137] The controller 170 may demultiplex the stream signal TS received from the tuner 110, the demodulator 120, or the external device interface 135 into a number of signals and process the demultiplexed signals into audio and video data.

[138] The video signal processed by the controller 170 may be displayed as an image on the display 180. The video signal processed by the controller 170 may also be transmitted to an external output device through the external device interface 135.

[139] The audio signal processed by the controller 170 may be output to the audio output unit 185. Also, the audio signal processed by the controller 170 may be transmitted to the external output device through the external device interface 135.

[140] While not shown in FIG. 6, the controller 170 may include a DEMUX and a video processor, which will be described later with reference to FIG. 10.

[141] In addition, the controller 170 may provide overall control to the image display apparatus 100. For example, the controller 170 may control the tuner 110 to select an RF broadcast signal corresponding to a user-selected channel or a pre-stored channel.

[142] The controller 170 may control the image display apparatus 100 according to a user command received through the user input interface 150 or according to an internal program. Especially the controller 170 may access a network and download an application or application list selected by the user to the image display apparatus 100 over the network.

[143] For example, the controller 170 controls the tuner 110 to receive a channel selected according to a specific channel selection command received through the user input interface 150 and processes a video, audio and/or data signal of the selected channel. The controller 170 outputs the processed video or audio signal along with information about the user-selected channel to the display 180 or the audio output unit 185.

[144] In another example, the controller 170 outputs a video or audio signal received from an external device such as a camera or a camcorder through the external device interface 135 to the display 180 or the audio output unit 185 according to an external device video playback command received through the external device interface 150.

[145] The controller 170 may control the display 180 to display images. For instance, the controller 170 may control the display 180 to display a broadcast image received from the tuner 110, an external input image received through the external device interface 135, an image received through the network interface 130, or an image stored in the memory 140. The image displayed on the display 180 may be a Two-Dimensional (2D) or Three-Dimensional (3D) still image or moving picture.

[146] The controller 170 may control content playback. The content may include any content stored in the image display apparatus 100, received broadcast content, and external input content. The content includes at least one of a broadcast image, an external input image, an audio file, a still image, a Web page, or a text file.

[147] Upon receipt of a go-to-home input, the controller 170 may control display of the home screen on the display 180 in an embodiment of the present invention.

[148] The home screen may include a plurality of card objects classified according to content sources. The card objects may include at least one of a card object representing a thumbnail list of broadcast channels, a card object representing a broadcast program guide, a card object representing a program reservation list or a program recording list, or a card object representing a media list of a device connected to the image display apparatus 100. The card objects may further include at least one of a card object representing a list of connected external devices or a card object representing a call-associated list.

[149] The home screen may further include an application menu with at least one application that can be executed.

[150] Upon receipt of a card object move input, the controller 170 may control movement of a card object corresponding to the card object move input on the display 180, or if the card object is not displayed on the display 180, the controller 170 may control display of the card object on the display 180.

[151] When a card object is selected from among the card objects on the home screen, the controller 170 may control display of an image corresponding to the selected card object on the display 180.

[152] The controller 170 may control display of an input broadcast image and an object representing information about the broadcast image in a card object representing broadcast images. The broadcast image may be fixed in size through lock setting.

[153] The controller 170 may control display of a set-up object for at least one of image setting, audio setting, screen setting, reservation setting, setting of a pointer of the remote controller, or network setting on the home screen.

[154] The controller 170 may control display of a log-in object, a help object, or an exit object on a part of the home screen.

[155] The controller 170 may control display of an object representing the total number of available card objects or the number of card objects displayed on the display 180 among all card objects, on a part of the home screen.

[156] If one of the card objects displayed on the display 180 is selected, the controller 170 may fullscreen the selected card object to cover the entirety of the display 180.

[157] Upon receipt of an incoming call at a connected external device or the image display apparatus 100, the controller 170 may control focusing-on or shift of a call-related card

object among the plurality of card objects.

[158] If an application view menu item is selected, the controller 170 may control display of applications or a list of applications that are available in the image display apparatus or downloadable from an external network.

[159] The controller 170 may control installation and execution of an application downloaded from the external network along with various UIs. Also, the controller 170 may control display of an image related to the executed application on the display 180, upon user selection.

[160] In an embodiment of the present invention, when the image display apparatus 100 provides a game application, the controller 170 may control assignment of player IDs to specific user terminals, creation of game play information by executing the game application, transmission of the game play information to the user terminals through the network interface 130, and reception of the game play information at the user terminals.

[161] The controller 170 may control detection of user terminals connected to the image display apparatus 100 over a network through the network interface 130, display of a list of the detected user terminals on the display 180 and reception of a selection signal indicating a user terminal selected for use as a user controller from among the listed user terminals through the user input interface 150.

[162] The controller 170 may control output of a game play screen of the game application, inclusive of player information about each user terminal and game play information, through the display 180.

[163] The controller 170 may determine the specific signal received from a user terminal through the network interface 130 as game play information and thus control the game play information to be reflected in the game application in progress.

[164] The controller 170 may control transmission of the game play information about the game application to a specific server connected to the image display apparatus 100 over a network through the network interface 130.

[165] As another embodiment, upon receipt of information about a change in the game play information from the server through the network interface 130, the controller 170 may control output of a notification message in a predetermined area of the display 180.

[166] The image display apparatus 100 may further include a channel browsing processor (not shown) for generating thumbnail images corresponding to channel signals or external input signals.

[167] The channel browsing processor may extract some of the video frames of each of stream signals TS received from the demodulator 120 or stream signals received from the external device interface 135 and display the extracted video frames on the display 180 as thumbnail images. The thumbnail images may be directly output to the

controller 170 or may be output after being encoded. Also, it is possible to encode the thumbnail images into a stream and output the stream to the controller 170. The controller 170 may display a thumbnail list including a plurality of received thumbnail images on the display 180. The thumbnail images may be updated sequentially or simultaneously in the thumbnail list. Therefore, the user can readily identify the content of broadcast programs received through a plurality of channels.

[168] The display 180 may convert a processed video signal, a processed data signal, and an OSD signal received from the controller 170 or a video signal and a data signal received from the external device interface 135 into RGB signals, thereby generating driving signals.

[169] The display 180 may be various types of displays such as a Plasma Display Panel (PDP), a Liquid Crystal Display (LCD), an Organic Light-Emitting Diode (OLED) display, a flexible display, and a 3D display.

[170] The display 180 may also be a touch screen that can be used not only as an output device but also as an input device.

[171] The audio output unit 185 may receive a processed audio signal (e.g., a stereo signal, a 3.1-channel signal or a 5.1-channel signal) from the controller 170 and output the received audio signal as sound. The audio output unit 185 may employ various speaker configurations.

[172] To sense a user gesture, the image display apparatus 100 may further include the sensor unit (not shown) that has at least one of a touch sensor, a voice sensor, a position sensor, and a motion sensor, as stated before. A signal sensed by the sensor unit may be output to the controller 170 through the user input interface 150.

[173] The image display apparatus 100 may further include the camera unit (not shown) for capturing images of a user. Image information captured by the camera unit may be input to the controller 170.

[174] The controller 170 may sense a user gesture from an image captured by the camera unit or a signal sensed by the sensor unit, or by combining the captured image and the sensed signal.

[175] The power supply 190 supplies power to the image display apparatus 100. Particularly, the power supply 190 may supply power to the controller 170, the display 180, and the audio output unit 185, which may be implemented as a System On Chip (SOC).

[176] For supplying power, the power supply 190 may include a converter (not shown) for converting Alternating Current (AC) into Direct Current (DC). If the display 180 is configured with, for example, a liquid crystal panel having a plurality of backlight lamps, the power supply 190 may further include an inverter (not shown) capable of performing Pulse Width Modulation (PWM) for luminance change or dimming

driving.

[177] The remote controller 200 transmits a user input to the user input interface 150. For transmission of user input, the remote controller 200 may use various communication techniques such as Bluetooth, RF communication, IR communication, UWB and ZigBee.

[178] In addition, the remote controller 200 may receive a video signal, an audio signal or a data signal from the user input interface 150 and output the received signals visually, audibly or as vibrations.

[179] The above-described image display apparatus 100 may be a fixed digital broadcast receiver capable of receiving at least one of ATSC (8-VSB) broadcast programs, DVB-T (COFDM) broadcast programs, and ISDB-T (BST-OFDM) broadcast programs.

[180] The block diagram of the image display apparatus 100 illustrated in FIG. 6 is purely exemplary. Depending upon the specifications of the image display apparatus 100 in actual implementation, the components of the image display apparatus 100 may be combined or omitted or new components may be added. That is, two or more components are incorporated into one component or one component may be configured as separate components, as needed. In addition, the function of each block is described for the purpose of describing the embodiment of the present invention and thus specific operations or devices should not be construed as limiting the scope and spirit of the present invention.

[181] Unlike the configuration illustrated in FIG. 6, the image display apparatus 100 may be configured so as to receive and playback video content through the network interface 130 or the external device interface 135, without the tuner 100 and the de-modulator 120.

[182] The image display apparatus 100 is an example of image signal processing apparatus that processes a stored image or an input image. Other examples of the image signal processing apparatus include a set-top box without the display 180 and the audio output unit 185, a DVD player, a Blu-ray player, a game console, and a computer. The set-top box will be described later with reference to FIGS. 7 and 8.

[183] FIGS. 7 and 8 are block diagrams illustrating either of the image display apparatuses separately as a set-top box and a display device according to embodiments of the present invention.

[184] Referring to FIG. 7, a set-top box 250 and a display device 300 may transmit or receive data wirelessly or by wire.

[185] The set-top box 250 may include a network interface 255, a memory 258, a signal processor 260, a user input interface 263, and an external device interface 265.

[186] The network interface 255 serves as an interface between the set-top box 250 and a wired/wireless network such as the Internet. The network interface 255 may transmit

data to or receive data from another user or another electronic device over a connected network or over another network linked to the connected network.

[187] The memory 258 may store programs necessary for the signal processor 260 to process and control signals and temporarily store a video, audio and/or data signal received from the external device interface 265 or the network interface 255. The memory 258 may also store platforms illustrated in FIGS. 11 and 12, as described later.

[188] The signal processor 260 processes an input signal. For example, the signal processor 260 may demultiplex or decode an input video or audio signal. For signal processing, the signal processor 260 may include a video decoder or an audio decoder. The processed video or audio signal may be transmitted to the display device 300 through the external device interface 265.

[189] The user input interface 263 transmits a signal received from the user to the signal processor 260 or a signal received from the signal processor 260 to the user. For example, the user input interface 263 may receive various control signals such as a power on/off signal, an operation input signal, and a setting input signal through a local key (not shown) or the remote controller 200 and output the control signals to the signal processor 260.

[190] The external device interface 265 serves as an interface between the set-top box 250 and an external device that is connected wirelessly or by wire, particularly the display device 300, for signal transmission or reception. The external device interface 265 may also interface with an external device such as a game console, a camera, a camcorder, and a computer (e.g. a laptop computer), for data transmission or reception.

[191] The set-top box 250 may further include a media input unit for media playback. The media input unit may be a Blu-ray input unit, for example. That is, the set-top box 250 may include a Blu-ray player. After signal processing such as demultiplexing or decoding in the signal processor 260, a media signal from a Blu-ray disk may be transmitted to the display device 300 through the external device interface 265 so as to be displayed on the display device 300.

[192] The display device 300 may include a tuner 270, an external device interface 273, a demodulator 275, a memory 278, a controller 280, a user input interface 283, a display 290, and an audio output unit 295.

[193] The tuner 270, the demodulator 275, the memory 278, the controller 280, the user input interface 283, the display 290, and the audio output unit 295 are identical respectively to the tuner 110, the demodulator 120, the memory 140, the controller 170, the user input interface 150, the display 180, and the audio output unit 185 illustrated in FIG. 6 and thus a description thereof is not provided herein.

[194] The external device interface 273 serves as an interface between the display device

300 and a wireless or wired external device, particularly the set-top box 250, for data transmission or reception.

[195] Hence, a video signal or an audio signal received through the set-top box 250 is output through the display 290 or the audio output unit 295 through the controller 280.

[196] Referring to FIG. 8, the configuration of the set-top box 250 and the display device 300 illustrated in FIG. 8 is similar to that of the set-top box 250 and the display device 300 illustrated in FIG. 7, except that the tuner 270 and the demodulator 275 reside in the set-top box 250, not in the display device 300. Thus the following description is given focusing on such difference.

[197] The signal processor 260 may process a broadcast signal received through the tuner 270 and the demodulator 275. The user input interface 263 may receive a channel selection input, a channel store input, etc.

[198] FIG. 9 illustrates an operation for communicating with third devices in either of the image display apparatuses according to an embodiment of the present invention. The image display apparatus illustrated in FIG. 9 may be one of the afore-described image display apparatuses according to the embodiments of the present invention.

[199] Referring to FIG. 9, the image display apparatus 100 may communicate with a broadcasting station 210, a network server 220, or an external device 230.

[200] The image display apparatus 100 may receive a broadcast signal including a video signal from the broadcasting station 210. The image display apparatus 100 may process the audio and video signals of the broadcast signal or the data signal of the broadcast signal, suitably for transmission from the image display apparatus 100. The image display apparatus 100 may output images or sound based on the processed video or audio signal.

[201] Meanwhile, the image display apparatus 100 may communicate with the network server 220. The network server 200 is capable of transmitting signals to and receiving signals from the image display apparatus 100 over a network. For example, the network server 220 may be a portable terminal that can be connected to the image display apparatus 100 through a wired or wireless base station. In addition, the network server 200 may provide content to the image display apparatus 100 over the Internet. A CP may provide content to the image display apparatus 100 through the network server 220.

[202] The image display apparatus 100 may communicate with the external device 230. The external device 230 can transmit and receive signals directly to and from the image display apparatus 100 wirelessly or by wire. For instance, the external device 230 may be a media memory device or a player. That is, the external device 230 may be any of a camera, a DVD player, a Blu-ray player, a PC, etc.

[203] The broadcasting station 210, the network server 220 or the external device 230 may

transmit a signal including a video signal to the image display apparatus 100. The image display apparatus 100 may display an image based on the video signal included in the received signal. Also, the image display apparatus 100 may transmit a signal received from the broadcasting station 210 or the network server 220 to the external device 230 and may transmit a signal received from the external device 230 to the broadcasting station 210 or the network server 220. That is, the image display apparatus 100 may transmit content included in signals received from the broadcasting station 210, the network server 220, and the external device 230, as well as playback the content immediately.

[204] FIG. 10 is a block diagram of the controller illustrated in FIG. 6.

[205] Referring to FIG. 10, the controller 170 may include a DEMUX 310, a video processor 320, an OSD generator 340, a card object generator 345, a mixer 350, a Frame Rate Converter (FRC) 355, and a formatter 360 according to an embodiment of the present invention. The controller 170 may further include an audio processor (not shown) and a data processor (not shown).

[206] The DEMUX 310 demultiplexes an input stream. For example, the DEMUX 310 may demultiplex an MPEG-2 TS into a video signal, an audio signal, and a data signal. The input stream signal may be received from the tuner 110, the demodulator 120 or the external device interface 135.

[207] The video processor 320 may process the demultiplexed video signal. For video signal processing, the video processor 320 may include a video decoder 325 and a scaler 335.

[208] The video decoder 325 decodes the demultiplexed video signal and the scaler 335 scales the resolution of the decoded video signal so that the video signal can be displayed on the display 180.

[209] The video decoder 325 may be provided with decoders that operate based on various standards.

[210] If the demultiplexed video signal is, for example, an MPEC-2 encoded video signal, the video signal may be decoded by an MPEC-2 decoder.

[211] On the other hand, if the video signal is an H.264-encoded DMB or DVB-handheld (DVB-H) signal, the video signal may be decoded by an H.264 decoder.

[212] The video signal decoded by the video processor 320 is provided to the mixer 350.

[213] The OSD generator 340 generates an OSD signal autonomously or according to user input. For example, the OSD generator 340 may generate signals by which a variety of information is displayed as images or text on the display 180, according to control signals received from the user input interface 150. The OSD signal may include various data such as a UI, a variety of menu screens, widgets, icons, etc.

[214] For example, the OSD generator 340 may generate a signal by which subtitles are

displayed for a broadcast image or Electronic Program Guide (EPG)-based broadcasting information.

[215] The card object generator 345 may generate a plurality of card objects displayed on the home screen according to go-to-home input. The card object generator 345 may be included in the controller 170. While not shown in FIG. 10, the card object generator 345 may be included in the OSD generator 340 of the controller 170 or may be configured as a separate GPU. The plurality of card objects generated from the card object generator may be transmitted to and displayed on the display 180.

[216] The mixer 350 may mix the decoded video signal with the OSD signal and output the mixed signal to the formatter 360. As the decoded broadcast video signal or the external input signal is mixed with the OSD signal, an OSD may be overlaid on the broadcast image or the external input image.

[217] The FRC 355 may change the frame rate of an input image. For example, a frame rate of 60Hz is converted into a frame rate of 120 or 240Hz. When the frame rate is to be changed from 60Hz to 120Hz, a first frame is inserted between the first frame and a second frame, or a predicted third frame is inserted between the first and second frames. If the frame rate is to be changed from 60Hz to 240Hz, three identical frames or three predicted frames are inserted between the first and second frames. It is also possible to maintain the frame rate of the input image without frame rate conversion.

[218] The formatter 360 changes the format of the signal received from the FRC 355 to be suitable for the display 180. For example, the formatter 360 may convert a received signal into an RGB data signal. The RGB signal may be output in the form of a Low Voltage Differential Signal (LVDS) or mini-LVDS.

[219] The audio processor (not shown) of the controller 170 may process the demultiplexed audio signal. For audio signal processing, the audio processor may have a plurality of decoders.

[220] If the demultiplexed audio signal is a coded audio signal, the audio processor of the controller 170 may decode the audio signal. For example, the demultiplexed audio signal may be decoded by an MPEG-2 decoder, an MPEG-4 decoder, an Advanced Audio Coding (AAC) decoder, or an AC-3 decoder.

[221] The audio processor of the controller 170 may also adjust the bass, treble or volume of the audio signal.

[222] The data processor (not shown) of the controller 170 may process the data signal obtained by demultiplexing the input stream signal. For example, if the data signal is an encoded signal such as an EPG which includes broadcasting information specifying the start time, end time, etc. of scheduled broadcast TV or radio programs, the controller 170 may decode the data signal. Examples of an EPG include ATSC-Program and System Information Protocol (PSIP) information and DVB-Service In-

formation (SI).

[223] ATSC-PSIP information or DVB-SI may be included in the header of a TS, i.e., a 4-byte header of an MPEG-2 TS.

[224] The block diagram of the controller 170 illustrated in FIG. 10 is an embodiment of the present invention. Depending upon the specifications of the controller 170, the components of the controller 170 may be combined, or omitted. Or new components are added to the controller 170.

[225] FIG. 11 illustrates a platform architecture for either of the image display apparatuses according to an embodiment of the present invention and FIG. 12 illustrates a platform architecture for either of the image display apparatuses according to another embodiment of the present invention.

[226] A platform for either of the image display apparatuses may have OS-based software to implement the above-described various operations according to an embodiment of the present invention.

[227] Referring to FIG. 11, a platform for either of the image display apparatuses is a separate type according to an embodiment of the present invention. The platform may be designed separately as a legacy system platform 400 and a smart system platform 405. An OS kernel 410 may be shared between the legacy system platform 400 and the smart system platform 405.

[228] The legacy system platform 400 may include a stack of a driver 420, middleware 430, and an application layer 450 on the OS kernel 410.

[229] On the other hand, the smart system platform 405 may include a stack of a library 435, a framework 440, and an application layer 455 on the OS kernel 410.

[230] The OS kernel 410 is the core of an operating system. When the image display apparatus is driven, the OS kernel 410 may be responsible for operation of at least one of hardware drivers, security protection for hardware and processors in the image display apparatus, efficient management of system resources, memory management, hardware interfacing by hardware abstraction, multi-processing, or scheduling associated with the multi-processing. Meanwhile, the OS kernel 410 may further perform power management.

[231] The hardware drivers of the OS kernel 410 may include, for example, at least one of a display driver, a Wi-Fi driver, a Bluetooth driver, a USB driver, an audio driver, a power manager, a binder driver, or a memory driver.

[232] Alternatively or additionally, the hardware drivers of the OS kernel 410 may be drivers for hardware devices within the OS kernel 410. The hardware drivers may include a character device driver, a block device driver, and a network device driver. The block device driver may need a buffer for buffering data on a block basis, because data is transmitted on a block basis. The character device driver may not need a buffer

since data is transmitted on a basic data unit basis, that is, on a character basis.

[233] The OS kernel 410 may be implemented based on any of various OSs such as Unix (Linux), Windows, etc. The OS kernel 410 may be a general-purpose open OS kernel which can be implemented in other electronic devices.

[234] The driver 420 is interposed between the OS kernel 410 and the middleware 430. Along with the middleware 430, the driver 420 drives devices for operations of the application layer 450. For example, the driver 420 may include a driver(s) for a microcomputer, a display module, a Graphic Processing Unit (GPU), the FRC, a General-Purpose Input/Output (GPIO) pin, a High-Definition Multimedia Interface (HDMI), a System Decoder (SDEC) or DEMUX, a Video Decoder (VDEC), an Audio Decoder (ADEC), a Personal Video Recorder (PVR), and/or an Inter-Integrated Circuit (I2C). These drivers operate in conjunction with the hardware drivers of the OS kernel 410.

[235] In addition, the driver 420 may further include a driver for the remote controller 200, especially a pointing device to be described below. The remote controller driver may reside in the OS kernel 410 or the middleware 430, instead of the driver 420.

[236] The middleware 430 resides between the OS kernel 410 and the application layer 450. The middleware 430 may mediate between different hardware devices or different software programs, for data transmission and reception between the hardware devices or the software programs. Therefore, the middleware 430 can provide standard interfaces, support various environments, and enable interaction between tasks conforming to heterogeneous communication protocols.

[237] Examples of the middleware 430 in the legacy system platform 400 may include Multimedia and Hypermedia information coding Experts Group (MHEG) and Advanced Common Application Platform (ACAP) as data broadcasting-related middleware, PSIP or SI middleware as broadcasting information-related middleware, and DLNA middleware as peripheral device communication-related middleware.

[238] The application layer 450 that runs atop the middleware 430 in the legacy system platform 400 may include, for example, UI applications associated with various menus in the image display apparatus. The application layer 450 may allow editing and updating over a network by user selection. With use of the application layer 450, the user may enter a desired menu among various UIs by manipulating the remote controller 210 while viewing a broadcast program.

[239] The application layer 450 may further include at least one of a TV guide application, a Bluetooth application, a reservation application, a Digital Video Recorder (DVR) application, and a hotkey application.

[240] In the smart system platform 405, the library 435 is positioned between the OS kernel 410 and the framework 440, forming the basis of the framework 440. For example, the library 435 may include Secure Socket Layer (SSL) being a security-

related library, WebKit being a Web engine-related library, c library (libc), and Media Framework being a media-related library specifying, for example, a video format and an audio format. The library 435 may be written in C or C++. Also, the library 435 may be exposed to a developer through the framework 440.

[241] The library 435 may include a runtime 437 with a core Java library and a Virtual Machine (VM). The runtime 437 and the library 435 form the basis of the framework 440.

[242] The VM may be a virtual machine that enables concurrent execution of a plurality of instances, that is, multi-tasking. For each application of the application layer 455, a VM may be allocated and executed. For scheduling or interconnection between instances, the binder driver (not shown) of the OS kernel 410 may operate.

[243] The binder driver and the runtime 437 may connect Java applications to C-based libraries.

[244] The library 435 and the runtime 437 may correspond to the middleware 430 of the legacy system platform 400.

[245] In the smart system platform 405, the framework 440 includes programs on which applications of the application layer 455 are based. The framework 440 is compatible with any application and may allow component reuse, movement or exchange. The framework 440 may include supporting programs and programs for interconnecting different software components. For example, the framework 440 may include an activity manager related to activities of applications, a notification manager, and a CP for abstracting common information between applications. This framework 440 may be written in Java.

[246] The application layer 455 on top of the framework 440 includes a variety of programs that are executed and displayed in the image display apparatus. The application layer 455 may include, for example, a core application that is a suit having at least one solution of e-mail, Short Message Service (SMS), calendar, map, or browser. The application layer 455 may be written in Java.

[247] In the application layer 455, applications may be categorized into user-undeletable applications 465 stored in the image display apparatus 100 that cannot be modified and user-installable or user-deletable applications 475 that are downloaded from an external device or a network and stored in the image display apparatus.

[248] With the applications of the application layer 455, a variety of functions such as Internet telephony, VoD, Web album, Social Networking Service (SNS), Location-Based Service (LBS), map service, Web browsing, and application search may be performed through network access. In addition, other functions such as gaming and schedule management may be performed by the applications.

[249] Referring to FIG. 12, a platform for the image display apparatus according to another

embodiment of the present invention is an integrated type. The integrated platform may include an OS kernel 510, a driver 520, middleware 530, a framework 540, and an application layer 550.

[250] Compared to the separate-type platform illustrated in FIG. 11, the integrated-type platform is characterized by the absence of the library 435 and the application layer 550 being an integrated layer. The driver 520 and the framework 540 correspond to the driver 420 and the framework 440 of FIG. 5, respectively.

[251] The library 435 of FIG. 11 may be incorporated into the middleware 530. That is, the middleware 530 may include both the legacy system middleware and the image display system middleware. As described before, the legacy system middleware includes MHEG or ACAP as data broadcasting-related middleware, PSIP or SI middleware as broadcasting information-related middleware, and DLNA middleware as peripheral device communication-related middleware, whereas the image display system middleware includes SSL as a security-related library, WebKit as a Web engine-related library, libc, and Media Framework as a media-related library. The middleware 530 may further include the afore-described runtime.

[252] The application layer 550 may include a menu-related application, a TV guide application, a reservation application, etc. as legacy system applications, and e-mail, SMS, a calendar, a map, and a browser as image display system applications.

[253] In the application layer 550, applications may be categorized into user-undeletable applications 565 that are stored in the image display apparatus and user-installable or user-deletable applications 575 that are downloaded from an external device or a network and stored in the image display apparatus.

[254] Based on the afore-described platforms illustrated in FIGS. 11 and 12, a variety of Application Programming Interfaces (APIs) and Software Development Kits (SDKs) necessary to develop applications may be opened. APIs may be implemented functions that provide connectivity to specific sub-routines, for execution of the functions within a program. Or APIs may be implemented programs.

[255] For example, sources related to hardware drivers of the OS kernel 410, such as a display driver, a WiFi driver, a Bluetooth driver, a USB driver or an audio driver, may be opened. Related sources within the driver 420 such as a driver for a microcomputer, a display module, a GPU, an FRC, an SDEC, a VDEC, an ADEC or a pointing device may be opened. In addition, sources related to PSIP or SI middleware as broadcasting information-related middleware or sources related to DLNA middleware may be opened.

[256] Such various open APIs allow developers to create applications executable in the image display apparatus 100 or applications required to control operations of the image display apparatus 100 based on the platforms illustrated in FIGS. 11 and 12.

[257] The platforms illustrated in FIGS. 11 and 12 may be general-purpose ones that can be implemented in many other electronic devices as well as in image display apparatuses. The platforms may be stored or loaded in the memory 140, the controller 170, or any other processor (not shown). To execute applications, an additional application processor (not shown) may be further provided.

[258] FIG. 13 illustrates a method for controlling either of the image display apparatuses using a remote controller according to an embodiment of the present invention.

[259] FIG. 13(a) illustrates a pointer 205 representing movement of the remote controller 200 displayed on the display 180.

[260] The user may move or rotate the remote controller 200 up and down, side to side (FIG. 13(b)), and back and forth (FIG. 13(c)). Since the pointer 205 moves in accordance with the movement of the remote controller 200, the remote controller 200 may be referred to as a pointing device.

[261] Referring to FIG. 13(b), if the user moves the remote controller 200 to the left, the pointer 205 moves to the left on the display 180. A sensor of the remote controller 200 detects the movement of the remote controller 200 and transmits motion information corresponding to the result of the detection to the image display apparatus. Then, the image display apparatus determines the movement of the remote controller 200 based on the motion information received from the remote controller 200, and calculates the coordinates of a target point to which the pointer 205 should be shifted in accordance with the movement of the remote controller 200 based on the result of the determination. The image display apparatus then displays the pointer 205 at the calculated coordinates.

[262] Referring to FIG. 13(c), while pressing a predetermined button of the remote controller 200, the user moves the remote controller 200 away from the display 180. Then, a selected area corresponding to the pointer 205 may be zoomed in on and enlarged on the display 180. On the contrary, if the user moves the remote controller 200 toward the display 180, the selection area corresponding to the pointer 205 is zoomed out and thus contracted on the display 180. The opposite case is possible. That is, when the remote controller 200 moves away from the display 180, the selection area may be zoomed out and when the remote controller 200 approaches the display 180, the selection area may be zoomed in.

[263] With the predetermined button pressed in the remote controller 200, the up, down, left and right movements of the remote controller 200 may be ignored. That is, when the remote controller 200 moves away from or approaches the display 180, only the back and forth movements of the remote controller 200 are sensed, while the up, down, left and right movements of the remote controller 200 are ignored. Unless the predetermined button is pressed in the remote controller 200, the pointer 205 moves in ac-

cordance with the up, down, left or right movement of the remote controller 200.

[264] The speed and direction of the pointer 205 may correspond to the speed and direction of the remote controller 200.

[265] The pointer 205 is an object displayed on the display 180 in correspondence with the movement of the remote controller 200. Therefore, the pointer 205 may have various shapes other than the arrow illustrated in FIG. 13. For example, the pointer 205 may be a dot, a cursor, a prompt, a thick outline, etc. The pointer 205 may be displayed across a plurality of points, such as a line and a surface, as well as at a single point on horizontal and vertical axes.

[266] FIG. 14 is a detailed block diagram of the remote controller in either of the image display apparatuses according to an embodiment of the present invention.

[267] Referring to FIG. 14, the remote controller 200 may include a wireless communication module 225, a user input unit 235, a sensor unit 240, an output unit 250, a power supply 260, a memory 270, and a controller 280.

[268] The wireless communication module 225 transmits signals to and/or receives signals from either of the afore-described image display apparatuses according to the embodiments of the present invention, herein, the image display apparatus 100.

[269] The wireless communication module 225 may include an RF module 221 for transmitting RF signals to and/or receiving RF signals from the image display apparatus 100 according to an RF communication standard. The wireless communication module 225 may also include an IR module 223 for transmitting IR signals to and/or receiving IR signals from the image display apparatus 100 according to an IR communication standard.

[270] The remote controller 200 transmits motion information representing the movement of the remote controller 200 to the image display apparatus 100 through the RF module 221 in this embodiment. The remote controller 200 may also receive signals from the image display apparatus 100 through the RF module 221. As needed, the remote controller 200 may transmit commands such as a power on/off command, a channel switch command, or a volume change command to the image display apparatus 100 through the IR module 223.

[271] The user input unit 235 may include a keypad, a plurality of buttons, a touchpad and/or a touch screen. The user may enter commands to the image display apparatus 100 by manipulating the user input unit 235. If the user input unit 235 includes a plurality of hard buttons, the user may input various commands to the image display apparatus 100 by pressing the hard buttons. Alternatively or additionally, if the user input unit 235 includes a touch screen displaying a plurality of soft keys, the user may input various commands to the image display apparatus 100 by touching the soft keys. The user input unit 235 may also include various input tools other than those set forth herein,

such as a scroll key and/or a jog wheel, which should not be construed as limiting the present invention.

[272] The sensor unit 240 may include a gyro sensor 241 and/or an acceleration sensor 243. The gyro sensor 241 may sense the movement of the remote controller 200, for example, in X-, Y-, and Z-axis directions, and the acceleration sensor 243 may sense the speed of the remote controller 200. The sensor unit 240 may further include a distance sensor for sensing the distance between the remote controller 200 and the display 180.

[273] The output unit 250 may output a video and/or audio signal corresponding to manipulation of the user input unit 235 or corresponding to a signal received from the image display apparatus 100. The user may easily identify whether the user input unit 235 has been manipulated or whether the image display apparatus 100 has been controlled, based on the video and/or audio signal output by the output unit 250.

[274] The output unit 250 may include a Light Emitting Diode (LED) module 351 which is turned on or off whenever the user input unit 235 is manipulated or whenever a signal is received from or transmitted to the image display apparatus 100 through the wireless communication module 225, a vibration module 253 which generates vibrations, an audio output module 255 which outputs audio data, and/or a display module 257 which outputs video data.

[275] The power supply 260 supplies power to the remote controller 200. If the remote controller 200 is kept stationary for a predetermined time or longer, the power supply 260 may, for example, reduce or shut off supply of power to the spatial remote controller 200 in order to save power. The power supply 260 may resume power supply if a predetermined key on the spatial remote controller 200 is manipulated.

[276] The memory 270 may store various types of programs and application data necessary to control or drive the remote controller 200. The spatial remote controller 200 may wirelessly transmit signals to and/or receive signals from the image display apparatus 100 over a predetermined frequency band with the aid of the RF module 221. The controller 280 of the remote controller 200 may store information regarding the frequency band used for the remote controller 200 to wirelessly transmit signals to and/or wirelessly receive signals from the paired image display apparatus 100 in the memory 270, for later use.

[277] The controller 280 provides overall control to the remote controller 200. The controller 280 may transmit a signal corresponding to a key manipulation detected from the user input unit 235 or a signal corresponding to motion of the spatial remote controller 200, as sensed by the sensor unit 240, to the image display apparatus 100.

[278] FIGS. 15 to 18 illustrate UIs in either of the image display apparatuses according to embodiments of the present invention.

[279] Referring to FIG. 15, an application list available from a network is displayed on the display 180. A user may access a CP or an NP directly, search for various applications, and download the applications from the CP or the NP.

[280] Specifically, FIG. 15(a) illustrates an application list 610 available in a connected server, displayed on the display 180. The application list 610 may include an icon representing each application and a brief description of the application. Because each of the image display apparatuses according to the embodiments of the present invention is capable of full browsing, it may enlarge the icons or descriptions of applications received from the connected server on the display 180. Accordingly, the user can readily identify applications, which will be described later.

[281] FIG. 15(b) illustrates selection of one application 620 from the application list 610 using the pointer 205 of the remote controller 200. Thus, the selected application 620 may be easily downloaded.

[282] FIG. 16 illustrates an application list available in the image display apparatus, displayed on the display 180. Referring to FIG. 16(a), when the user selects an application list view menu by manipulating the remote controller 200, a list of applications 660 stored in the image display apparatus is displayed on the display 180. While only icons representing the applications are shown in FIG. 16, the application list 660 may further include brief descriptions of the applications, like the application list 610 illustrated in FIG. 15. Therefore, the user can readily identify the applications.

[283] FIG. 16(b) illustrates selection of one application 670 from the application list 660 using the pointer 205 of the remote controller 200. Thus, the selected application 670 may be easily executed.

[284] While it is shown in FIGS. 15 and 16 that the user selects a desired application by moving the pointer 205 using the remote controller 200, the application may be selected in many other ways. For example, the user may select a specific application using a cursor displayed on the display 180 by a combined input of a local key and an OK key in the remote controller 200.

[285] In another example, if the remote controller 200 has a touch pad, the pointer 205 moves on the display 180 according to touch input of the touch pad. Thus the user may select a specific menu using the touch-based pointer 205.

[286] FIG. 17 illustrates a Web page displayed on the display 180. Specifically, FIG. 17(a) illustrates a Web page 710 with a search window 720, displayed on the display 180. The user may enter a character into the search window 720 by use of character keys (not shown) of a keypad displayed on a screen, character keys (not shown) provided as local keys, or character keys (not shown) of the remote controller 200.

[287] FIG. 17(b) illustrates a search result page 730 having search results matching a keyword entered into the search window 720. Since the image display apparatuses

according to the embodiments of the present invention are capable of fully browsing a Web page, the user can easily read the Web page.

[288] FIG. 18 illustrates another Web page displayed on the display 180. Specifically, FIG. 18(a) illustrates a mail service page 810 including an ID input window 820 and a password input window 825, displayed on the display 180. The user may enter a specific numeral and/or text into the ID input window 820 and the password input window 825 using a keypad (not shown) displayed on the mail service page 810, character keys (not shown) provided as local keys, or character keys (not shown) of the remote controller 200. Hence, the user can log in to a mail service.

[289] FIG. 18(b) illustrates a mail page 830 displayed on the display 180, after log-in to the mail service. For example, the mail page 830 may contains items "read mail", "write mail", "sent box", "received box", "recycle bin", etc. In the "received box" item, mail may be ordered by sender or by title.

[290] The image display apparatuses according to the embodiments of the present invention are capable of full browsing when displaying a mail service page. Therefore, the user can use the mail service conveniently.

[291] FIG. 19 is a flowchart illustrating a method for operating an image display apparatus according to an embodiment of the present invention and FIGS. 20 to 33 are views referred to for describing various examples of the method for operating an image display apparatus, illustrated in FIG. 19.

[292] Referring to FIG. 19, it is determined whether a go-to-home input has been received (S1910). Upon receipt of a go-to-home input, a home screen including a card object area and an application menu area is displayed (S1915).

[293] Specifically, the controller 170 determines whether a go-to-home input has been received through input of a local key (not shown) or manipulation of the remote controller 200. The go-to-home input may be generated when the image display apparatus is powered on or wakes from standby mode, or when a local key (not shown) or a home key or menu key of the remote controller 200 is manipulated.

[294] Upon receipt of the go-to-home input, the controller 170 may control display of a home screen including a plurality of card objects and an application menu on the display 180. The plurality of card objects and the application menu may be sequentially displayed.

[295] On the home screen, the card object area may include a plurality of card objects classified according to content sources. For example, the card objects may be a card object for displaying a broadcast image, a card object for providing a CP list, and a card object for providing a list of applications. The card objects will be described later with reference to FIGS. 20 to 67.

[296] These card objects may be generated in a card object generator 345 of the image

display apparatus 100. The card object generator 345 may be included in the OSD generator 340 of the controller 170 or may be configured as a separate GPU. The plurality of card objects generated from the card object generator 345 may be transmitted to and displayed on the display 180.

[297] On the home screen, the application menu area includes a plurality of application menu items, particularly mandatory application menu items and optional application menu items set by the user. The application menu is an application compact-view menu, which may include a view more menu item for a fullscreen-view function. The application menu will be described later with reference to FIGS. 20 to 67.

[298] The application menu may be generated in an application menu generator (not shown) of the image display apparatus 100. The application menu generator may be included in the OSD generator 340 of the controller 170 or may be configured as a separate GPU. The application menu generated from the application menu generator may be transmitted to and displayed on the display 180.

[299] A favorite channel object representing favorite channels may be displayed on the home screen. Especially, the favorite channel object may be included in the card object that displays a broadcast image among the plurality of card objects. The favorite channel object will be described later with reference to FIGS. 20 to 67.

[300] As stated before, the display 180 may display the home screen, when the image display apparatus is powered on or a home key is input. The configuration of the home screen allows the user to easily select a desired service, thus increasing user convenience.

[301] It is then determined whether the favorite channel object has been selected (S1920). Upon selection of the favorite channel object, a favorite channel list is displayed on the home screen (S1925).

[302] Specifically, the controller 170 determines whether the favorite channel object has been selected through input of a local key (not shown) or manipulation of the remote controller 200, with the home screen displayed on the display 180. Upon selection of the favorite channel object, the controller 170 may control display of a favorite channel list. For example, the favorite channel list may be displayed in the card object for displaying a broadcast image, and also along with an on-going broadcast image. This operation will be described later with reference to FIGS. 21, 22, 23 and 24.

[303] Subsequently, it is determined whether a specific channel item has been selected from the favorite channel list (S1930). Upon selection of a specific channel item, a broadcast image of a program airing on a channel indicated by the selected channel item is displayed on the display 180 (S1935).

[304] Specifically, with the favorite channel list displayed on the home screen, the controller 170 determines whether a specific channel item has been selected from the

favorite channel list through input of a local key (not shown) or manipulation of the remote controller 200. Upon selection of a specific channel item, the controller 170 controls display of a broadcast image of a program airing on a channel indicated by the selected channel item. For example, the broadcast image may be displayed in the card object for displaying a broadcast image, or may be displayed fullscreen on the display 180, which will be described later with reference to FIGS. 26, 27 and 23.

[305] It is then determined whether a predetermined time has elapsed without input of a local key or manipulation of the remote controller 200 or a move input has been received a plurality of times successively (S1940). If the predetermined time has elapsed without input of the local key or manipulation of the remote controller 200 or the consecutive move inputs have been received, the favorite channel list disappears from the display 180 (S1945).

[306] Specifically, with the home screen displayed on the display 180, the controller 170 determines whether a predetermined time has elapsed without input of a local key (not shown) or manipulation of the remote controller 200 or move inputs have been received successively. If the predetermined time has elapsed without input of the local key or manipulation of the remote controller 200 or the successive move inputs have been received, the controller 170 controls termination of displaying the favorite channel list. This operation will be described later in detail with reference to FIGS. 28 and 29.

[307] As described before, if the image display apparatus 100 is a set-top box without the display 180, the operation method illustrated in FIG. 19 may amount to output of data for displaying an image or a screen on the display 180.

[308] For example, the controller 170 determines whether a go-to-home input has been received in step S1910. Upon receipt of the go-to-home input, the controller 170 may output data needed to display a home screen including a card object area and an application menu area. The display 180, which is separately configured, may display the home screen using the data.

[309] In the same manner, steps S1925, S1935 and S1945 may be performed as the process of outputting data for displaying an image or a screen on the display 180.

[310] FIG. 20 illustrates an exemplary home screen displayed on the display 180.

[311] The home screen configuration illustrated in FIG. 20A may be an example of a default screen configuration for a smart TV. The home screen may be set as an initial screen that is displayed when the image display apparatus is powered on or wakes from standby mode, or as a default screen that is displayed when a local key (not shown) or a home key of the remote controller 200 is manipulated.

[312] Referring to FIG. 20, a card object area and an application menu area may be defined in a home screen 2000.

[313] The card object area may include a plurality of card objects 2010, 2020 and 2030 classified according to content sources.

[314] In the illustrated case of FIG. 20, the card object 2010 is named BROADCAST and displays a broadcast image. The card object 2020 is named NETCAST PREMIUM and provides a CP list. The card object 2030, which is named NETCAST APPS, provides a list of applications.

[315] Other card objects may be arranged in a hidden area 2001 and thus not displayed on the display 180. These card objects may be shifted to show up on the display 180, substituting for card objects displayed on the display 180. The hidden card objects are a CHANNEL BROWSER card object 2040 for providing a list of thumbnail images corresponding to broadcast channels, a TV GUIDE card object 2050 for providing a program list, a FAVORITE CH card object 2060 for providing a favorite channel list, and a RECORDED LIST card object 2070 for providing a list of recorded programs.

[316] While four card objects are hidden in the hidden area 2001, the number of hidden card objects may vary. Card objects other than the card objects illustrated in FIG. 20 may be hidden in the hidden area 2001, such as a MY MEDIA card object for providing a media list available in the image display apparatus or in a device connected to the image display apparatus and a RECOMMENDED card object for providing a list of content recommended by a CP.

[317] The BROADCAST card object 2010 may contain a broadcast image 2015 received through the tuner 110 or the network interface 130, an object 2021 for providing information about the broadcast image 2015, an object 2017 representing an external device, a setup object 2018, and a favorite channel object 2019 for indicating favorite channels.

[318] The broadcast image 2015 is displayed as a card object. Since the broadcast image 2015 may be fixed in size by a lock function, the user may continue viewing the broadcast image 2015 conveniently.

[319] It is also possible to scale the broadcast image 2015 according to user manipulation. For instance, the broadcast image 2015 may be enlarged or contracted by dragging the broadcast image 2015 with the pointer 205 of the remote controller 200. As the broadcast image 2015 is scaled up or down, four or two card objects may be displayed on the display 180, instead of the current three card objects.

[320] When the broadcast image 2015 is selected in the card object 2010, the broadcast image 2015 may be fullscreened on the display 180.

[321] The object 2021 representing information about the broadcast image 2015 may include a channel number (DTV7-1), a channel name (YBC HD), the title of a broadcast program (Oh! Lady), and airing time (8:00-8:50PM) of the broadcast program. Therefore, the user can readily be aware of information about the displayed

broadcast image 2015.

[322] If the user selects the object 2021, related EPG information may be displayed on the display 180.

[323] An object 2002 for notifying a date (03.24), a day (THU), and a current time (8:13PM) may be positioned above the card object 2010 that displays a broadcast image. Thus the user can readily identify time information through the object 2002.

[324] The object 2017 may represent an external device connected to the image display apparatus 100. For example, if the object 2017 is selected, a list of external devices connected to the image display apparatus 100 may be displayed.

[325] The setup object 2018 may be used to set various settings of the image display apparatus 100, such as video settings, audio settings, screen settings, program scheduling settings, setting of the pointer 205 of the remote controller 200, and network settings.

[326] The favorite channel object 2019 may be used to list favorite channels. For example, upon selection of the favorite channel object 2019, the FAVORITE CH card object 2060 may be displayed.

[327] The card object 2020 representing a CP list may contain a card object name 2022 (NETCAST PREMIUM) and a CP list 2025. While Yakoo, Metflix, weather.com, Picason, and My tube are shown as CPs in the CP list 2025 in FIG. 20, it is obvious that many other options are possible.

[328] Upon selection of the card object name 2022, the card object 2020 may be displayed fullscreen on the display 180.

[329] If a specific CP is selected from the CP list 2025, a screen with a list of content provided by the selected CP may be displayed on the display 180.

[330] The card object 2030 representing an application list may include a card object name 2032 (NETCAST APPS) and an application list 2035. Applications may be sorted into predetermined categories in the application list 2035. In the illustrated case of FIG. 20, applications are sorted by popularity (HOT) and by time (NEW), which should not be interpreted as limiting the present invention.

[331] Upon selection of the card object name 2032, the card object 2030 may be displayed fullscreen on the display 180.

[332] Upon selection of an application from the application list 2035, a screen that provides information about the selected application may be displayed on the display 180.

[333] A Login menu item 2027, a Help menu item 2028, and an EXIT menu item 2029 may be displayed above the card objects 2020 and 2030.

[334] The user may log in to an app store or a network connected to the image display apparatus using the Login menu item 2027. The Help menu item 2028 provides guidance on operation of the image display apparatus 100. The EXIT menu item 2029

is used to exit the home screen. When the EXIT menu item 2029 is selected, a received broadcast image may be fullscreened on the display 180.

[335] An object 2037 may be displayed under the card objects 2020 and 2030 to indicate the total number of available card objects. Alternatively or additionally, the object 2037 may indicate the number of card objects being displayed on the display 180 as well.

[336] The card object 2040 representing a thumbnail list of broadcast channels may include a card object name 2042 (CHANNEL BROWSER) and a thumbnail list of broadcast channels 2045. Sequentially received broadcast channels are represented as thumbnail images in FIG. 20, to which the present invention is not limited. Instead, the received broadcast channels may be represented as moving pictures. The thumbnail list 2045 may include information about the channels along with the thumbnail images of the channels, so that the user can readily identify broadcast programs of the channels. The thumbnail images may include a thumbnail image of a broadcast image that the user is viewing or thumbnail images of channels following or previous to the channel of the broadcast image 2015 displayed in the card object 2010. Although eight thumbnail images are displayed in FIG. 20, many other configurations are possible. Thumbnail images may be updated in the thumbnail list 2045.

[337] Upon selection of the card object name 2042, the card object 2040 may be fullscreened on the display 180. That is, information about the thumbnail list 2045 may be displayed on the display 180.

[338] Upon selection of a thumbnail image from the thumbnail list 2045, a broadcast image corresponding to the channel of the selected thumbnail image may be displayed on the display 180.

[339] The card object 2050 for providing a program list may contain a card object name 2052 (TV GUIDE) and a program list 2055. The program list 2055 may list broadcast programs that air after the broadcast program of the broadcast image 2015 or broadcast programs of other channels, to which the present invention is not limited.

[340] Upon selection of the card object name 2052, the card object 2050 may be fullscreened on the display 180.

[341] If a program is selected from the program list 2055, a broadcast image of the selected program or broadcast information about the selected program may be displayed on the display 180.

[342] The card object 2060 representing favorite channels may include a card object name 2062 (FAVORITE CH) and a list of pre-stored favorite channels 2065. While favorite channels are represented as thumbnail images, to which the present invention is not limited, they may be represented as moving pictures. The favorite channel list 2065 may include information about the favorite channels as well as the thumbnail images

of the favorite channels. Hence, the user can readily identify programs that air on the favorite channels. While the FAVORITE CH card object 2060 contains eight favorite channels in FIG. 20, many other configurations are possible. The thumbnail images may be updated in the FAVORITE CH card object 2060.

[343] Upon selection of the card object name 2062, the card object 2060 may be displayed fullscreen on the display 180. Thus, information about the favorite channel list 2065 may be displayed.

[344] Upon selection of a thumbnail image in the favorite channel card list 2065, a broadcast image of a channel corresponding to the thumbnail image may be displayed on the display 180.

[345] The card object 2070 representing a recorded list may include a card object name (RECORDED LIST) 2072 and a scheduled or recorded program list 2075. The scheduled or recorded program list 2075 may include programs scheduled for recording or programs recorded by scheduling. Although a thumbnail image is displayed for each program, this is merely an exemplary application and thus various examples can be considered.

[346] Upon selection of the card object name 2072, the card object 2070 may be fullscreened on the display 180.

[347] Upon selection of a scheduled program or a recorded program from the scheduled or recorded program list 2075, broadcast information about the scheduled or recorded broadcast program or broadcast images of the scheduled or recorded broadcast program may be displayed on the display 180.

[348] The card objects 2020 and 2030 displayed on the display 180 may be exchanged with the hidden card objects 2040 to 2070 according to a card object move input. Specifically, at least one of the card objects 2020 and 2030 being displayed on the display 180 may move to the hidden area 2001 and in turn, at least one of the hidden objects 2040 to 2070 may appear on the display 180.

[349] An application menu 2005 includes a plurality of application menu items, particularly predetermined menu items 2006 to 2009 selected from among all available application menu items on the display 180. Thus the application menu 2005 may be referred to as an application compact-view menu.

[350] The application menu items 2006 to 2009 may be divided into mandatory application menu items 2006, 2007 and 2009 (SEARCH, App Store, and +) and optional application menu items 2008 (Music, Book, MAZON, and SNS) set by the user.

[351] The mandatory application menu items 2006, 2007 and 2009 may be preset as default menu items such that the user is not allowed to edit the same.

[352] The SEARCH application menu item 2006 provides a search function based on an input search keyword. The App Store application menu item 2007 enables the user to

access an app store directly. The + (View More) application menu item 2009 may provide a fullscreen function for displaying application menu items fullscreen.

[353] The user-set application menu items 2008 may be edited to represent applications that the user most frequently uses.

[354] In an embodiment of the present invention, an Internet application menu item (not shown) and a mail application menu item (not shown) may be added to the application menu 2005.

[355] For example, upon selection of the Internet application menu item, a Web page may be displayed fullscreen on the display 180, as illustrated in FIG. 17. Upon selection of the mail application menu item from the application menu 2005, a mail service page may be displayed on the display 180, as illustrated in FIG. 18.

[356] The Internet application menu item and the mail application menu item may be fixed items and, accordingly, the user may not delete, rearrange, change or otherwise edit these items. On the other hand, the Internet application menu item and the mail application menu item may be added as user-set application items 2008 so that the user may delete, rearrange, change or otherwise edit these items.

[357] FIGS. 21, 22, 23 and 21D illustrate an exemplary operation for displaying a channel list.

[358] Referring to FIG. 21, while the home screen 2000 including the card objects 2010, 2020 and 2030 and the application menu 2005 is displayed, the favorite channel object 2019 is selected from the BROADCAST card object 2010 using a remote controller 2100. Thus the user input interface 150 receives a favorite channel object selection input and provides the favorite channel object selection input to the controller 170. The favorite channel object 2019 is used to display a favorite channel list.

[359] Referring to FIG. 22, upon selection of the favorite channel object 2019, a favorite channel list 2110 is displayed. As illustrated in FIG. 22, the favorite channel list 2110 may be displayed in the BROADCAST card object 2010. Specifically, the favorite channel list 2010 may be located within the broadcast image 2015. While the favorite channel list 2110 is shown as overlaid on the broadcast image 2015 in FIG. 22, the favorite channel list 2110 and the broadcast image 2015 may be displayed in separate areas.

[360] The favorite channel list 2110 lists favorite channels pre-stored in the memory 140. In the favorite channel list 2110, each channel item representing a favorite channel includes a channel name such as YBC, LBC or ZBC and a channel number such as 7-1, 8-1, or 9-1. While the channel items take the form of text in FIG. 22, they may be represented as thumbnail images. In this case, channel numbers may be overlaid on the thumbnail images.

[361] While five channel items are contained in the favorite channel list 2110 in FIG. 22,

the number of channel items may be changed. For example, if the favorite channel list 2110 is confined to five channel items but six favorite channels are pre-stored, the favorite channel list 2110 may further include an object 2120 for displaying more channel items additionally as illustrated in FIG. 23.

[362] A channel item corresponding to a channel that the user is currently watching may be included in the favorite channel list 2110. In FIGS. 22 and 23, a channel item indicating channel 7-1 corresponding to the broadcast image 2015 is listed in the favorite channel list 2110. The channel item indicating channel 7-1 that the user is watching may be indicated by a cursor 2105 or highlighted. As illustrated in FIGS. 22 and 23, the channel item indicating channel 7-1 may be positioned at the top of the favorite channel list 2110. Thus, the user can easily identify the channel that he or she is watching.

[363] Referring to FIG. 24, upon selection of the favorite channel object 2019, an image 2087 and a favorite channel list 2092 may be displayed together on the same screen. Here, the image 2087 may correspond to a broadcast image 2015 within the BROADCAST card object 2010 and may be displayed fullscreen on the display 180.

[364] The favorite channel list 2092 may be divided in a plurality of the groups A through D. For example, each group favorite channel list may correspond to the favorite channel list of each user.

[365] Also, the favorite channel list 2092 may include menu item, EDIT for editing channels, SAVE for saving channels, List for viewing the favorite channel list, EXIT for exiting the favorite channel list 2092.

[366] FIGS. 25, 26 and 27 illustrate an exemplary operation for selecting a channel item in the favorite channel list.

[367] Referring to FIG. 25, with the favorite channel list 2110 displayed on the home screen 200 having the card objects 2010, 2020 and 2030 and the application menu 2005, the cursor 2105 is moved through manipulation of the remote controller 2100. For example, upon input of a down directional key of the remote controller, the cursor 2105 moves from the channel item for channel 7-1 to a channel item for channel 9-1.

[368] Then the channel item for channel 9-1 is selected by an OK key of the remote controller 2100. Therefore, the channel of the broadcast image displayed in the BROADCAST card object 2010 is switched to another channel as illustrated in FIG. 26. That is, a broadcast image 2210 of a program airing on the selected channel, channel 9-1 is displayed in the BROADCAST card object 2010. In this manner, the user can easily watch a program on a favorite channel.

[369] Unlike FIG. 26, the broadcast image 2210 of channel 9-1 may be displayed fullscreen. FIG. 30 illustrates exemplary fullscreen display of a broadcast image 2310 corresponding to the selected channel, channel 9-1 on the display 180.

[370] Referring to FIG. 26, the cursor 2105 may be positioned on the channel item indicating channel 9-1 so as to indicate the current channel. Meanwhile, each time the cursor 2105 is moved in response to a move input from the remote controller 2100, a broadcast image corresponding to a channel indicated by the cursor 2105 may be displayed in the BROADCAST card object 2010.

[371] If the selected channel item is not at the top of the favorite channel list 2110, channel items may be re-sorted in the favorite channel list 2110 in order to display additional channels.

[372] For example, the selected channel item indicating channel 9-1 may be moved to the top in the favorite channel list 2110 and thus new channel items indicating channels 15-1 and 16-1 may be added to the favorite channel list 2110. Therefore, the user can check more favorite channels.

[373] FIGS. 28 and 29 illustrate an exemplary operation for ending displaying of the favorite channel list.

[374] For example, if no input has been received from a local key or the remote controller for a predetermined time after the broadcast image 2210 and the favorite channel list 2110 are displayed upon selection of the channel item indicating channel 9-1 as illustrated in FIG. 26, the favorite channel list 2110 may not be displayed any longer within the broadcast image 2210.

[375] Referring to FIG. 28, if no input has been received for a predetermined time, the favorite channel list 2110 disappears and thus only the broadcast image 2210 is displayed on the home screen 2000. At the same time, the cursor 2105 positioned on the favorite channel list 2110 may be moved onto the broadcast image 2210. Therefore, the user can watch the broadcast image 2210 without being bothered.

[376] In the mean time, upon input of an OK key of the remote controller 2100 while the broadcast image 2210 and the favorite channel list 2110 are displayed upon selection of the channel item indicating channel 9-1 as illustrated in FIG. 26, the favorite channel list 2110 may disappear and thus only the broadcast image 2210 may be displayed on the home screen 2000 as illustrated in FIG. 28.

[377] Upon receipt of consecutive move inputs from the remote controller 2100 while the broadcast image 2210 and the favorite channel list 2110 are displayed upon selection of the channel item indicating channel 9-1 as illustrated in FIG. 26, the favorite channel list 2110 may disappear.

[378] Referring to FIG. 29, upon receipt of a down directional key input a predetermined number of times or more times successively from the remote controller 2100 while the cursor 2105 is positioned on the channel item indicating channel 7-1 in the favorite channel list 2110, the favorite channel list 2110 disappears and the cursor 2105 is moved onto the favorite channel object 2019. Thus the user can easily view the

broadcast image 2210 without being bothered.

[379] While a channel item is selected by moving the cursor 2105 through input of a directional key, an OK key, etc. of the remote controller 2100 in FIGS. 21 to 29, this is purely exemplary and many other configurations are possible. For example, a pointer may be displayed on the display 180 in correspondence with movement of the remote controller. Now a description will be given of a method for displaying a favorite channel list using a pointer with reference to FIGS. 31, 32 and 33.

[380] Referring to FIG. 31, the favorite channel object 2019 is selected by pointing at the favorite channel object 2019 with the pointer 205 in correspondence with movement of the remote controller 200 on the home screen 2000. To select the favorite channel object 2019, the OK key of the remote controller 200 may be used.

[381] Hence, the favorite channel list 2110 is displayed on the home screen 2000 as illustrated in FIG. 32. The channel item indicating channel 7-1 that the user is watching may be highlighted, as indicated by reference numeral 2410.

[382] Referring to FIG. 33, as the pointer 205 is positioned on the channel item indicating channel 9-1 in correspondence with movement of the remote controller 200, with the favorite channel list 2110 displayed on the home screen 2000, channel 9-1 is selected. To select channel 9-1, the OK key of the remote controller 200 may be used.

[383] Since channel 7-1 is switched to another channel, channel 9-1, the broadcast image 2015 of channel 7-1 is replaced with a broadcast image 2420 of the selected channel, channel 9-1. Herein, the channel item indicating the selected channel, channel 9-1 may be highlighted as indicated by reference numeral 2415.

[384] FIG. 34 is a flowchart illustrating a method for operating an image display apparatus according to another embodiment of the present invention and FIGS. 35 to 55 are views referred to for describing various examples of the method for operating an image display apparatus, illustrated in FIG. 34.

[385] Referring to FIG. 34, it is determined whether a go-to-home input has been received (S2510). Upon receipt of a go-to-home input, a home screen including a card object area and an application menu area is displayed (S2515) and a favorite channel object is displayed on the home screen (S2520).

[386] Specifically, the controller 170 determines whether a go-to-home input has been received, through input of a local key (not shown) or manipulation of the remote controller 200. The go-to-home input may be generated when the image display apparatus is powered on or wakes from standby mode, or when a local key (not shown) or a home key or menu key of the remote controller 200 is manipulated.

[387] Upon receipt of the go-to-home input, the controller 170 may control display of a home screen including a plurality of card objects and an application menu on the display 180

[388] On the home screen, the card object area may include a plurality of card objects classified according to content sources. For example, the card objects may be a card object for displaying a broadcast image, a card object for providing a CP list, and a card object for providing a list of applications. On the home screen, the application menu area includes a plurality of application menu items, particularly mandatory application menu items and optional application menu items set by the user. The application menu is an application compact-view menu, which may include a view more menu item for a fullscreen-view function.

[389] A favorite channel object for indicating favorite channels may be displayed on the home screen. Especially, the favorite channel object may be included in the card object that displays a broadcast image among the plurality of card objects.

[390] As stated before, the display 180 may display the home screen when the image display apparatus is powered on or a home key is input. The configuration of the home screen allows the user to easily select a desired service, thus increasing user convenience.

[391] It is then determined whether the favorite channel object has been selected (S2525). Upon selection of the favorite channel object, a FAVORITE CH card object is displayed on the home screen (S2530).

[392] Specifically, the controller 170 determines whether the favorite channel object has been selected through input of a local key (not shown) or manipulation of the remote controller 200, with the home screen displayed on the display 180. Upon selection of the favorite channel object, the controller 170 may control display of the FAVORITE CH card object. For example, upon selection of the favorite channel object, a FAVORITE CH card object hidden from the display 180 in a hidden area may show up on the display 180. This operation will be described later with reference to FIGS. 35, 36 and 37.

[393] As described before, the card object generator 345 may generate the FAVORITE CH card object using a list of favorite channels pre-stored in the memory 140. A channel that the user is watching may be included in the FAVORITE CH card object.

[394] Then the displayed favorite channel object is toggled to a channel browser object (S2535).

[395] Because upon selection of the favorite channel object, the FAVORITE CH card object is displayed on the home screen of the display 180, there is no need for further displaying the favorite channel object in the card object that provides a broadcast image.

[396] Therefore, the channel browser object may be provided to facilitate access to a thumbnail list through a channel browser, as the favorite channel object facilitates access to a favorite channel list. That is, when the favorite channel object is selected

once, the favorite channel object is toggled to the channel browser object. Similarly, when the channel browser object is selected, the channel browser object is toggled to the favorite channel object. Therefore, user convenience is increased.

[397] With the channel browser object displayed on the home screen, it is determined whether the channel browser object has been selected (S2540). Upon selection of the channel browser object, a CHANNEL BROWSER card object is displayed (S2545).

[398] Specifically, with the home screen displayed on the display 180, the controller 170 determines whether the channel browser object has been selected on the home screen through input of a local key (not shown) or manipulation of the remote controller 200. Upon selection of the channel browser object, the controller 170 controls display of the CHANNEL BROWSER card object. For example, the CHANNEL BROWSER card object is hidden in the hidden area and upon selection of the channel browser object, the CHANNEL BROWSER card object appears on the display 180. This operation will be described later with reference to FIGS. 38 to 41.

[399] As described before, if the image display apparatus 100 is a set-top box without the display 180, the operation method illustrated in FIG. 19 may amount to output of data for displaying an image or a screen on the display 180.

[400] For example, the controller 170 determines whether a go-to-home input has been received in step S2510. Upon receipt of the go-to-home input, the controller 170 may output data needed to display a home screen including a card object area and an application menu area. The display 180, which is separately configured, may display the home screen using the data.

[401] In the same manner, steps S2520, S2530, S2535 and S2545 may be performed as the process of outputting data for displaying an image or a screen on the display 180.

[402] FIG. 35 illustrates an exemplary home screen displayed on the display 180. The home screen illustrated in FIG. 35 is identical to the home screen illustrated in FIG. 20 and thus a description of the home screen is not provided herein.

[403] FIGS. 35, 36 and 37 illustrate an exemplary operation for displaying the FAVORITE CH card object.

[404] Referring to FIG. 35, with the home screen 2000 having the card objects 2010, 2020 and 2030 and the application menu 2005 displayed on the display 180, the cursor 2105 is moved to the favorite channel object 2019 on the home screen 2000 through manipulation of the remote controller 2100. Upon selection of the favorite channel object 2019 through input of the OK key of the remote controller 2100, the FAVORITE CH card object 2060 is moved from the hidden area 2001.

[405] Referring to FIG. 36, the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 are moved from the hidden area. Specifically, the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 initially appear at

the right side of the display 180 and finally reach in the vicinity of the BROADCAST card object 2010. Thus the user can easily notice the movement of the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070.

[406] Therefore, the BROADCAST card object 2010, the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 are arranged side by side on the home screen 2000 as illustrated in FIG. 37. Therefore, the user can easily view the contents of the FAVORITE CH card object 2060.

[407] As described above, the FAVORITE CH card object 2060 may include a list of thumbnail images for broadcast images of pre-stored favorite channels. The thumbnail images may contain channel information such as channel numbers.

[408] A thumbnail image of channel 7-1 may be displayed in the FAVORITE CH card object 2060, in relation to the broadcast image 2015 of channel 7-1 displayed in the BROADCAST card object 2010. The thumbnail image of channel 7-1 that the user is watching may be indicated by the cursor 2105 or highlighted. As illustrated in FIG. 37, the thumbnail image of channel 7-1 may be positioned at the top of the favorite channel list 2065. Thus the user can readily identify the channel that he or she is watching.

[409] While eight thumbnail images representing channels are listed in the favorite channel list 2065 in FIG. 37, this is purely exemplary. Thus various numbers of thumbnail images can be set. For example, if the favorite channel list 2065 is confined to eight thumbnail images for channels but nine or more favorite channels are pre-stored, the favorite channel list 2065 may further include an object (not shown) for displaying more thumbnail images additionally.

[410] Upon selection of a specific thumbnail image in the favorite channel list 2065, a broadcast image of a channel corresponding to the selected thumbnail image may be displayed in the BROADCAST card object 2010 or may be fullscreened on the display 180. In this manner, the user can conveniently view a program airing on a favorite channel.

[411] While it is shown in FIGS. 35 and 36 that the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 reside in the hidden area 2001 and appear on the display 180 according to a card object move input, alternatively, the card object generator 345 may generate the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 upon receipt of the card object move input and then display the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 on the display 180. The FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 may be generated in real time or stored in advance.

[412] FIGS. 38 to 41 illustrate an exemplary operation for toggling between the favorite

channel object 2019 and the channel browser object 2019 in the BROACAST card object 2010.

[413] Upon selection of the favorite channel object 2019 in the BROADCAST card object 2010 in 38, the favorite channel object 2019 is toggled to the channel browser object 2019 in FIG. 39. In this manner, various objects can simply be represented.

[414] In addition, the NETCAST PREMIUM card object 2020 and the NETCAST APPS card object 2030 are replaced with the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 on the home screen 2000. Accordingly, the user can easily view the favorite channel list 2065 in the FAVORITE CH card object 2060.

[415] Upon selection of the displayed channel browser object 2019 using the cursor 2105 of the remote controller 2100 in FIG. 39, the channel browser object 2019 is toggled to the favorite channel object 2019 in FIG. 40.

[416] In addition, the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 are replaced with the CHANNEL BROWSER card object 2040 and the TV GUIDE card object 2050 on the home screen 2000. Accordingly, the user can easily view the thumbnail list 2045 in the CHANNEL BROWSER card object 2040 irrespective of favorite channels.

[417] Alternatively or additionally, the FAVORITE CH card object 2060 may be toggled to the CHANNEL BROWSER card object 2040, rather than the CHANNEL BROWSER card object 2040 & the TV GUIDE card object 2050 are moved, substituting for the FAVORITE CH card object 2060 & the RECORDED LIST card object 2070.

[418] Referring to FIG. 41, upon selection of the channel browser object 2019 using the cursor 2105 of the remote controller 2100 in FIG. 39, the channel browser object 2019 is toggled to the favorite channel object 2019 and the FAVORITE CH card object 2060 is also toggled to the CHANNEL BROWSER card object 2040. As a consequence, the TV GUIDE card object 2050 is positioned beside the CHANNEL BROWSER card object 2040, compared to FIG. 40 in which the RECOMMENDED LIST card object 2070 is positioned beside the CHANNEL BROWSER card object 2040.

[419] FIGS. 42, 43 and 44 illustrate an exemplary operation for moving card objects using a pointer that moves in correspondence with movement of the remote controller.

[420] Referring to FIG. 42, while the BROADCAST card object 2010, the NETCAST PREMIUM card object 2020, and the NETCAST APPS card object 2030 are displayed on the home screen 2000, a card object, particularly the NETCAST PREMIUM card object 2020 is flicked to the left by the pointer 205 of the remote controller 200, by way of example.

[421] Referring to FIG. 43, the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 are moved.

[422] Therefore, the BROADCAST card object 2010, the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 are displayed side by side on the home screen 2000, as illustrated in FIG. 44. Accordingly, the user can readily identify the contents of the FAVORITE CH card object 2060. Herein, the pointer 205 of the remote controller 200 may automatically point at the thumbnail image of channel 7-1 that the user is watching.

[423] While card objects are moved in twos by moving another card object in FIG. 43, they may be moved one by one. The number of moved card objects may depend on the strength and/or speed with which another card object is flicked.

[424] FIGS. 45 and 46 illustrate an exemplary operation for moving card objects through input of a directional key of the remote controller, similarly to FIGS. 42, 43 and 44.

[425] To move a card object through input of a directional key of the remote controller, a home screen may be configured so that a left movement object and a right movement object are further displayed at the left side of the NETCAST PREMIUM card object 2020 and at the right side of the NETCAST APPS card object 2030, respectively.

[426] Referring to FIG. 45, with the BROADCAST card object 2010, the NETCAST PREMIUM card object 2020 and the NETCAST APPS card object 2030 displayed on the home screen 2000, the left movement object may be selected by means of a left directional key or an OK key of the remote controller 2100. Herein, the left movement object is selected using the cursor 2105 of the remote controller 2100, by way of example.

[427] Referring to FIG. 46, the FAVORITE CH card object 2060, and the RECORDED LIST card object 2070 are moved.

[428] Therefore, the BROADCAST card object 2010, the FAVORITE CH card object 2060, and the RECORDED LIST card object 2070 are displayed side by side on the home screen 2000, as illustrated in FIG. 47. Accordingly, the user can readily identify the contents of the FAVORITE CH card object 2060. Herein, the cursor 2105 of the remote controller 2100 may automatically be positioned on the thumbnail image of channel 7-1 that the user is watching.

[429] While card objects are moved in twos in FIG. 46, they may be moved one by one. The number of moved card objects may depend on the number of times the left movement object is selected.

[430] FIGS. 48 and 49 illustrate exemplary addition of a card object.

[431] Referring to FIG. 48, the hidden area 2001 further includes a card object 2080 for providing a media list available in the image display apparatus or in an external device connected to the image display apparatus, at the right side of the RECORDED LIST card object 2070, compared to FIG. 35.

[432] The card object 2080 representing a media list may include a card object name 2082

(MY MEDIA) and a media list 2085. The media list 2085 may a list of media available in the image display apparatus 100 or a device connected to the image display apparatus 100. While the media are shown as moving pictures, still images, and audio in FIG. 48, many other media such as text, e-books, etc. may be added to the media list.

[433] Upon selection of the card object name 2082, the card object 2080 may be fullscreened on the display 180.

[434] Upon selection of a file from the media list 2085, the selected file may be opened and a screen corresponding to the selected file may be displayed on the display 180.

[435] Meanwhile, upon selection of the favorite channel object 2019 using the remote controller 2100, the FAVORITE CH card object 2060 hidden in the hidden area 2001 appears on the display 180, as illustrated in FIG. 49. While not shown, the favorite channel object 2019 may be toggled to the channel browser object 2019.

[436] FIGS. 50 and 51 illustrate an exemplary new card object 2090 in which the FAVORITE CH card object and the CHANNEL BROWSER card object are integrated.

[437] The FAVORITE CH/CHANNEL BROWSER card object 2090 disposed in the hidden area 2001 may include both thumbnail images corresponding to favorite channels of a favorite channel list and thumbnail images corresponding to received channels. The thumbnail images of the favorite channels may contain information indicating favorite channels as well as channel information so that the user can identify the favorite channels.

[438] Upon selection of the favorite channel object 2019 using the remote controller 2100, the FAVORITE CH/CHANNEL BROWSER card object 2090 hidden in the hidden area 2001 is displayed on the home screen 2000, as illustrated in FIG. 51. While not shown, the favorite channel object 2019 may be toggled to the channel browser object 2019.

[439] FIGS. 52 to 55 illustrate examples of displaying the FAVORITE CH card object, while a specific image is displayed fullscreen on the display 180.

[440] Referring to FIG. 52, an image 3210 is displayed fullscreen on the display 180. Upon input of a local key (not shown) or a favorite channel key (not shown) of the remote controller, the FAVORITE CH card object 2060 may be displayed on the display 180 as illustrated in FIG. 53. The FAVORITE CH card object 2060 may be displayed together with the image 3210 on the same screen. Therefore, the user can instantly be aware of the FAVORITE CH card object 2060 including the favorite channel list 2065.

[441] Referring to FIG. 54, an image 3310 is displayed fullscreen on the display 180. Upon input of a local key (not shown) or a favorite channel key (not shown) of the remote controller, the home screen 2000 may be displayed as illustrated in FIG. 55. The home

screen 2000 may include the FAVORITE CH card object 2060. Particularly, the FAVORITE CH card object 2060 may be highlighted. Therefore, the user can readily view the FAVORITE CH card object 2060 including the favorite channel list 2065.

[442] FIG. 56 is a flowchart illustrating a method for operating an image display apparatus according to a further embodiment of the present invention, and FIGS. 57 to 69 are views referred to for describing various examples of the method for operating an image display apparatus, illustrated in FIG. 56.

[443] Referring to FIG. 56, steps S3410 to S3430 are identical to steps S2510 to S2530 illustrated in FIG. 34 and thus a description of steps S3410 to S3430 is not provided herein to avoid redundancy.

[444] It is determined whether a thumbnail image has been selected from the FAVORITE CH card object (S3435). Upon selection of the thumbnail image from the FAVORITE CH card object, a broadcast image of a channel corresponding to the selected thumbnail image is displayed (S3440).

[445] Specifically, with the FAVORITE CH card object displayed on the home screen, the controller 170 determines whether a thumbnail image has been selected from the FAVORITE CH card object through input of a local key (not shown) or manipulation of the remote controller 200. Upon selection of a thumbnail image from the FAVORITE CH card object, the controller 170 controls reception of a channel corresponding to the selected thumbnail image and controls fullscreen display of a broadcast image of the channel or display of a broadcast image of the channel in the BROADCAST card object. This operation will be described later with reference to FIGS. 61, 62 and 63.

[446] Meanwhile, with the FAVORITE CH card object displayed on the home screen, it is determined whether the card object name has been selected in the FAVORITE CH card object (S3445). Upon selection of the card object name in the FAVORITE CH card object, a channel list screen is displayed (S3450).

[447] Specifically, with the FAVORITE CH card object displayed on the home screen, the controller 170 determines whether the card object name has been selected in the FAVORITE CH card object through input of a local key (not shown) or manipulation of the remote controller. Upon selection of the card object name in the FAVORITE CH card object, the controller 170 controls display of a channel list screen including a recent channel list, etc. on the display 180. This operation will be described later with reference to FIGS. 64 to 67.

[448] As described before, if the image display apparatus 100 is a set-top box without the display 180, the operation method illustrated in FIG. 56 may amount to output of data for displaying an image or a screen on the display 180.

[449] For example, the controller 170 determines whether a go-to-home input has been

received in step S3410. Upon receipt of the go-to-home input, the controller 170 may output data needed to display a home screen including a card object area and an application menu area. The display 180, which is separately configured, may display the home screen using the data.

[450] In the same manner, steps S3415, S3420, S3430 and S3440 may be performed as the process of outputting data for displaying an image or a screen on the display 180.

[451] FIG. 57 illustrates an exemplary home screen displayed on the display 180. This home screen is identical to the home screen illustrated in FIG. 20 and thus will not be described herein.

[452] Referring to FIG. 57, the favorite channel object 2019 is selected using the cursor 2105 of the remote controller 2100, while the BROADCAST card object 2010, the NETCAST PREMIUM card object 2020, and the NETCAST APPS card object 2030 are displayed on the home screen 2000. Thus the FAVORITE CH card object 2060 moves out of the hidden area 2001.

[453] Referring to FIG. 58, the FAVOIRTE CH card object 2060 and the RECORDED LIST card object 2070 are moved according to the selection of the favorite channel object 2019. As a consequence, the BROADCAST card object 2010, the FAVORITE CH card object 2060, and the RECORDED LIST card object 2070 are arranged side by side on the home screen 2000 as illustrated in FIG. 59. Therefore, the user can easily identify thumbnail images in the FAVORITE CH card object 2060.

[454] FIG. 60 is an enlarged view of the FAVORITE CH card object 2060 illustrated in FIG. 57. Referring to FIG. 60, the FAVORITE CH card object 2060 representing thumbnail images may include the card object name (FAVORITE CH) 2062 and the list of pre-stored favorite channels 2065.

[455] The favorite channel list 2065 may include thumbnail images for favorite channels. While favorite channel items are represented as thumbnail images in the favorite channel list 2065 in FIG. 60, they may be represented as moving pictures.

[456] A thumbnail image of channel 7-1 may be displayed in the favorite channel list 2065 of the FAVORITE CH card object 2060, in relation to the broadcast image 2015 of channel 7-1 displayed in the BROADCAST card object 2010. The thumbnail image of channel 7-1 that the user is watching may be indicated by the cursor 2105 or highlighted. As illustrated in FIG. 60, the thumbnail image of channel 7-1 may be positioned at the top of the favorite channel list 2065. Thus the user can readily identify the channel that he or she is watching.

[457] While eight thumbnail images representing channels are listed in the favorite channel list 2065 in FIG. 60, this is purely exemplary. Thus a variable number of thumbnail images can be included in the favorite channel list 2065. For example, if the favorite channel list 2065 is confined to eight thumbnail images for channels but nine or more

favorite channels are pre-stored, the favorite channel list 2065 may further include an object (not shown) for displaying more thumbnail images additionally.

[458] The thumbnail images may be updated in the favorite channel list 2065. For example, if a predetermined number of or more thumbnail images are updated, the FAVORITE CH card object 2060 hidden in the hidden area as illustrated in FIG. 57 may automatically move into the home screen 2000 even though a card object move input has not been received, as illustrated in FIG. 59.

[459] The favorite channel list 2065 may provide channel information. Channel information about a favorite channel may include at least one of the channel number of the favorite channel, or the airing time, rating or viewed rank of a program airing on the favorite channel. While only channel numbers are shown as channel information in FIG. 60, many other options are available.

[460] The channel information may be overlaid on the thumbnail images as illustrated in FIG. 60. Thus the user can readily identify channel information (DTV 7-1) about a thumbnail image 2115.

[461] Upon selection of the card object name 2062, a channel list screen may be displayed in full screen on the display 180, which will be described later with reference to FIGS. 64 to 67.

[462] Upon selection of a thumbnail image in the favorite channel list 2065, a broadcast image of a channel corresponding to the selected thumbnail image may be displayed on the display 180. Display of a broadcast image of a channel corresponding to the selected thumbnail image will be described with reference to FIGS. 61, 62 and 63.

[463] FIGS. 61, 62 and 63 illustrate exemplary selection of a thumbnail image in the FAVORITE CH card object 2060.

[464] Referring to FIG. 61, with the BROADCAST card object 2010, the FAVORITE CH card object 2060, and the RECORDED LIST card object 2070 displayed on the home screen 2000, a thumbnail image of a specific channel, channel DTV9-1 is selected from the favorite channel list 2065 using the cursor 2105 of the remote controller 2100. Meanwhile, the broadcast image 2015 of a channel that the user is watching, channel DTV 7-1 is displayed in the BROADCAST card object 2010.

[465] Referring to FIG. 62, upon selection of the thumbnail image of channel DTV 9-1 in the favorite channel list 2065 in FIG. 61, a broadcast image 2105 of channel DTV 9-1 is displayed in the BROADCAST card object 2010. In this manner, the user can easily watch a program airing on a favorite channel.

[466] Referring to FIG. 63, alternatively or additionally, upon selection of the thumbnail image of channel DTV 9-1 in the favorite channel list 2065, the broadcast image 2015 of channel DTV 9-1 may be displayed as a fullscreen image 2210 on the display 180. In this manner, the user can easily watch a program airing on a favorite channel.

[467] FIGS. 64 to 67 illustrate an exemplary operation for selecting the card object name in the FAVORITE CH card object 2060.

[468] Referring to FIG. 64, while the BROADCAST card object 2010, the FAVORITE CH card object 2060 and the RECORDED LIST card object 2070 are displayed on the home screen 2000, the card object name 2062 is selected from the FAVORITE CH card object 2060 using the cursor 2105 of the remote controller 2100.

[469] Referring to FIG. 65, upon selection of the card object name 2062 in FIG. 64, a channel list screen including a favorite channel list is displayed fullscreen.

[470] The channel list screen may include at least one of a favorite channel list, an all channel list or a recent channel list.

[471] In FIG. 65, a menu area 2320 includes tabbed menus including ALL CHANNEL (an all channel list), FAVORITE CHANNEL (a favorite channel list) and RECENT CHANNEL (a recent channel list).

[472] Since the channel list screen is displayed upon selection of the card object name 2062 in the FAVORITE CH card object 2060, the FAVOIRTE CHANNEL tabbed menu may be selected by default. The selected FAVOIRTE CHANNEL tabbed menu may be focused on or highlighted, as illustrated in FIG. 65.

[473] Accordingly, the favorite channel list is displayed in a channel list area 2310. Thumbnail images are shown for eight channels in FIG. 65. The thumbnail images may be sequentially updated. Thus the user may readily identify up-to-date information about favorite channels.

[474] The number of thumbnail images in the FAVORITE CH card object 2060 may be different from the number of thumbnail images on the channel list screen. Since the channel list screen is displayed in full screen, it preferably contains more thumbnail images than the FAVORITE CH card object 2060. While 15 thumbnail images are shown by default in FIG. 65, many other options are available.

[475] The channel list screen may further include a channel setup menu 2330. For example, the channel setup menu 2330 may include menu items, EDIT for editing channels, ZOOM for changing the number of displayed thumbnail images, GROUP VIEW for viewing thumbnail images by group, COMPACT VIEW for displaying a broadcast image in a part and a channel list in another part, and EXIT.

[476] FIG. 66 illustrates an exemplary operation for selecting the ALL CHANNEL tabbed menu in the menu area 2320 to display the all channel list.

[477] Referring to FIG. 66, the selected ALL CHANNEL tabbed menu may be focused on or highlighted. All available channels are listed in the channel list area 2310. In FIG. 66, 15 thumbnail images are displayed. The channels may be received through the afore-described channel browser function. The thumbnail images for these channels may be sequentially updated. Thus the user can instantly identify information about all

channels.

[478] FIG. 67 illustrates an exemplary operation for selecting the RECENT CHANNEL tabbed menu in the menu area 2320 to display the recent channel list.

[479] Referring to FIG. 67, the selected RECENT CHANNEL tabbed menu may be focused on or highlighted. Recently viewed channels are listed in the channel list area 2310. In FIG. 67, two thumbnail images are displayed, with the remaining space capable of accommodating 13 thumbnail images left empty. Thus the user can instantly identify information about the recent channels.

[480] FIGS. 68 to 69 illustrate an exemplary operation for selecting a favorite channel object in BROADCAST card object 2010.

[481] Referring to Fig. 68, while the home screen 2000 including the card objects 2010, 2020 and 2030 and the application menu 2005 is displayed, the favorite channel object 2019 is selected from the BROADCAST card object 2010 using a remote controller 2100. The favorite channel object 2019 is used to display a favorite channel list.

[482] Referring to FIG. 69, upon selection of the favorite channel object 2019, a favorite channel list screen including a favorite channel list is displayed fullscreen.

[483] The favorite channel list screen may include a plurality of groups A through D.

[484] In FIG. 69, a group area 3920 includes tabbed menus including th plurality of groups, for example, A group, B group, C group, and D group. Each group favorite channel list may correspond to the favorite channel list of each user.

[485] Since the channel list screen is displayed upon selection of the favorite channel object 2019 in the BROADCAST card object 2010 by a B user, the B group tabbed menu may be selected by default. The selected B group tabbed menu may be focused on or highlighted, as illustrated in FIG. 69.

[486] Accordingly, the favorite channel list of B group is displayed in a channel list area 3910. Thumbnail images are shown for 15 channels in FIG. 69. The thumbnail images may be sequentially updated. Thus the user may readily identify up-to-date information about favorite channels.

[487] The favorite channel list screen may further include a channel setup menu 3930. For example, the channel setup menu 3930 may include menu items, EDIT for editing channels, ZOOM for changing the number of displayed thumbnail images, GROUP VIEW for viewing thumbnail images by group, COMPACT VIEW for displaying a broadcast image in a part and a channel list in another part, and EXIT.

[488] The image display apparatus and the method for operating the same according to the foregoing exemplary embodiments are not restricted to the embodiments set forth herein. Therefore, variations and combinations of the embodiments set forth herein may fall within the scope of the present invention.

[489] The method for operating an image display apparatus according to the foregoing em-

bodiments may be implemented as code that can be written on a computer-readable recording medium and thus read by a processor. The computer-readable recording medium may be any type of recording device in which data is stored in a computer-readable manner. Examples of the computer-readable recording medium include a ROM, a RAM, a CD-ROM, a magnetic tape, a floppy disc, an optical data storage, and a carrier wave (e.g., data transmission over the Internet). The computer-readable recording medium can be distributed over a plurality of computer systems connected to a network so that computer-readable code is written thereto and executed therefrom in a decentralized manner. Programs, code and code segments to realize the embodiments herein can easily be realized by one of ordinary skill in the art.

[490] While the present invention has been particularly shown and described with reference to embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

Claims

[Claim 1] A method for operating an image display apparatus that receives and processes a broadcast image, the method comprising:
displaying a home screen including a plurality of card objects;
displaying a broadcast image and a favorite channel object representing favorite channels in a broadcast card object representing a broadcast image among the plurality of card objects; and
displaying a favorite channel list including favorite channel items on the display, upon selection of the favorite channel object.

[Claim 2] The method according to claim 1, wherein the displaying comprises displaying the favorite channel list within the broadcast card object.

[Claim 3] The method according to claim 1, wherein the favorite channel list further includes an object for displaying an additional item.

[Claim 4] The method according to claim 1, further comprising displaying a broadcast image of a channel corresponding to a channel item, upon selection of the channel item in the favorite channel list.

[Claim 5] The method according to claim 4, further comprising re-sorting channel items in the favorite channel list, after the selection of the channel item.

[Claim 6] The method according to claim 1, further comprising ending displaying of the favorite channel list, when a predetermine time has elapsed or a move input has been received consecutively a predetermined number of or more times for a cursor displayed on the favorite channel list, after the favorite channel list is displayed.

[Claim 7] A method for operating an image display apparatus that receives and processes a broadcast image, the method comprising:
displaying a favorite channel object representing favorite channels on a display;
generating a favorite channel card object using a pre-stored favorite channel list by a card object generator, upon selection of the favorite channel object; and
displaying the favorite channel card object on a home screen including a plurality of card objects.

[Claim 8] The method according to claim 7, wherein the displaying of the favorite channel object comprises simultaneously displaying the favorite channel object and the plurality of card objects on the home screen.

[Claim 9] The method according to claim 8, further comprising:
displaying a channel browser object by toggling the favorite channel

object to the channel browser object; and

displaying a channel browser card object representing a thumbnail list for received channels, upon selection of the channel browser object.

[Claim 10] The method according to claim 7, further comprising displaying a channel browser card object representing a thumbnail list for received channels by toggling the favorite channel card object.

[Claim 11] The method according to claim 7, further comprising displaying a broadcast image of a channel, upon selection of a thumbnail image corresponding to the channel in the favorite channel card object.

[Claim 12] The method according to claim 7, wherein the favorite channel card object includes a thumbnail image corresponding to a broadcast image of a favorite channel.

[Claim 13] The method according to claim 12, wherein the favorite channel card object further includes channel information about the broadcast image of the favorite channel, the channel information including at least one of a channel number of the favorite channel, an airing time of a program corresponding to the broadcast image, a title of the program, a rating of the program, or a viewed rank of the program.

[Claim 14] The method according to claim 7, wherein the favorite channel card object further includes a thumbnail image corresponding to a broadcast image of a channel that is currently being watched.

[Claim 15] The method according to claim 7, wherein the displaying of the favorite channel card object comprises simultaneously displaying a thumbnail image corresponding to a broadcast image of a channel that is currently being watched and a thumbnail image corresponding to a broadcast image of a favorite channel.

[Claim 16] An image display apparatus for receiving and processing a broadcast image, comprising:

a display for displaying a home screen including a plurality of card objects;

a user input interface for receiving an input for selecting a favorite channel object representing favorite channels, displayed on the home screen; and

a controller for controlling display of a favorite channel list including favorite channel items on the display, upon selection of the favorite channel object.

[Claim 17] The image display apparatus according to claim 17, wherein the favorite channel list is displayed together with a broadcast image within

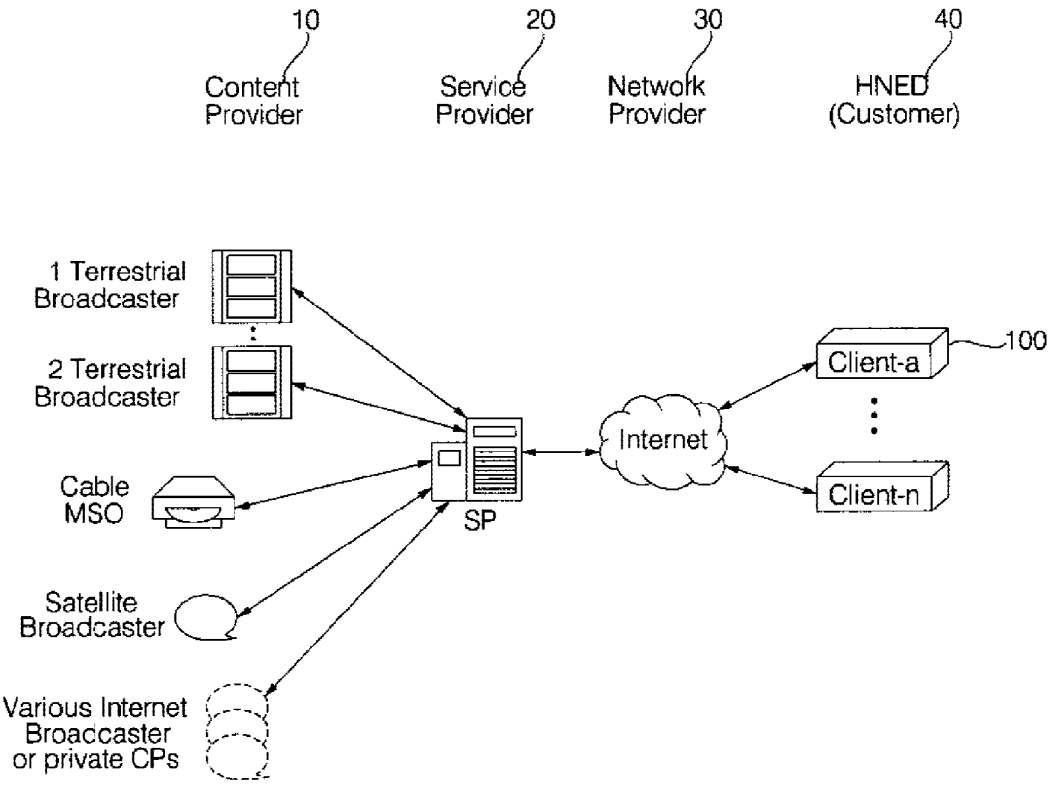
a broadcast card object representing a broadcast image among the plurality of card objects.

[Claim 18] The image display apparatus according to claim 16, wherein the favorite channel list is displayed within a favorite channel card object on the home screen.

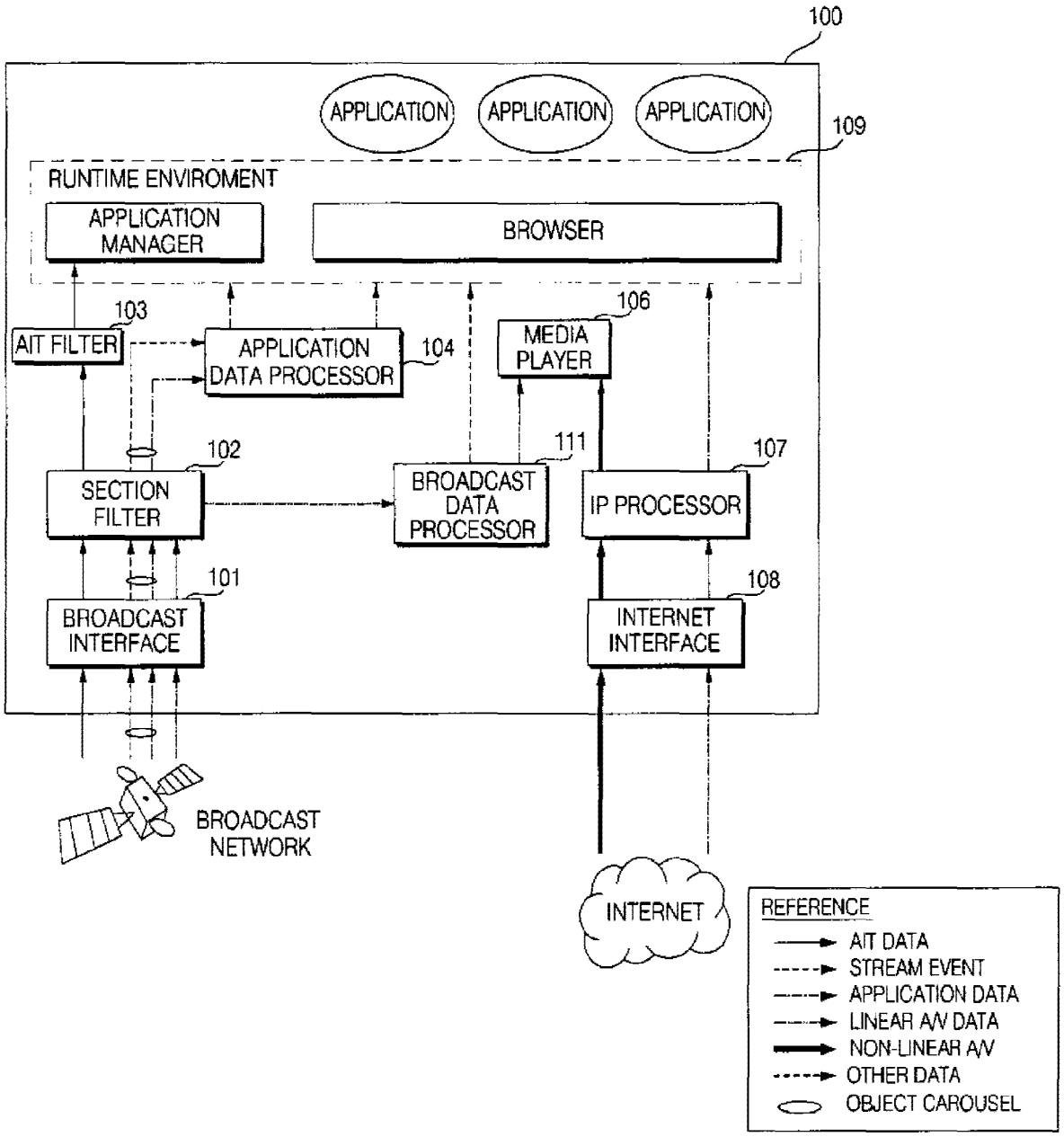
[Claim 19] The image display apparatus according to claim 16, further comprising:
a remote controller for transmitting a control signal;
a network interface for transmitting data to and receiving data from a network; and
a platform for controlling transmission or reception of data through the network according to the control signal received from the remote controller,
wherein the platform includes an Operating System (OS) kernel and an application layer operating on the OS kernel, the application layer including an application that can be downloaded from the network and installed or deleted.

[Claim 20] A recording medium readable by a processor and having a program recorded to execute the method for operating an image display apparatus claimed in any of claims 1 to 15 in the processor.

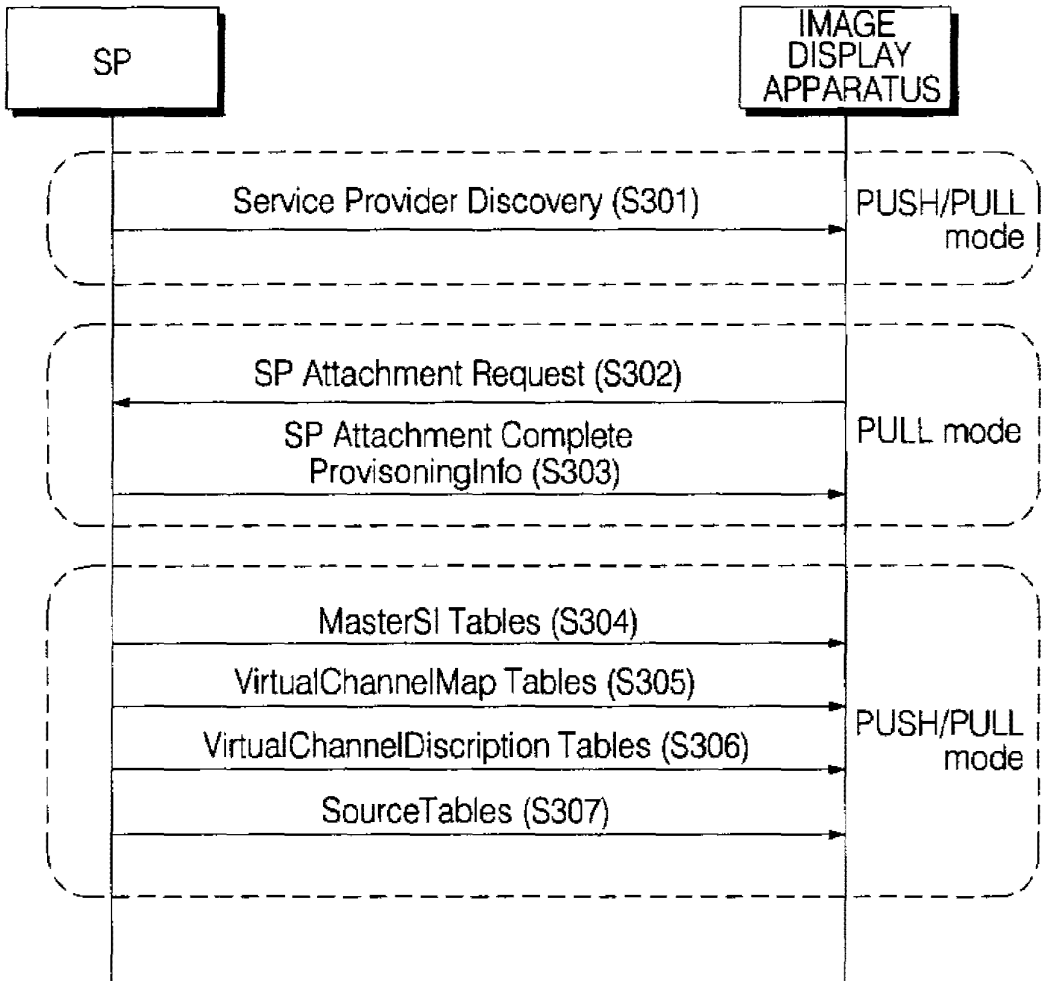
[Fig. 1]


10
20
30
40
Content Provider
Service Provider
Network Provider
HNED (Customer)
1 Terrestrial Broadcaster
2 Terrestrial Broadcaster
Cable MSO
Satellite Broadcaster
Various Internet Broaccaster or private CPs
SP
Internet
Client-a
Client-n
100

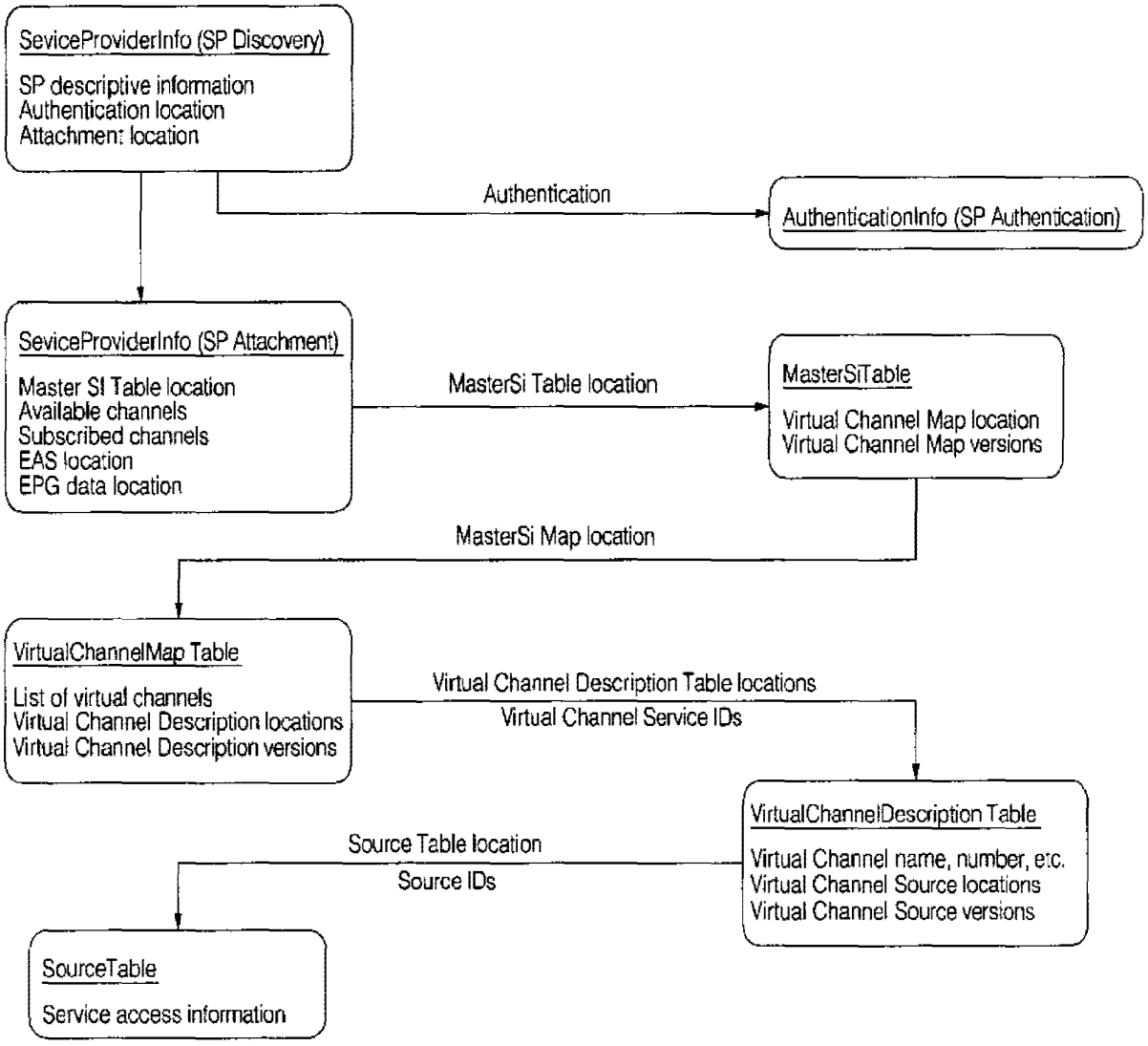
[Fig. 2]


100
APPLICATION
APPLICATION
APPLICATION
109
RUNTIME ENVIROMENT
APPLICATION MANAGER
BROWSER
103
AIT FILTER
APPLICATION DATA PROCESSOR
104
106
MEDIA PLAYER
102
SECTION FILTER
111
BROADCAST DATA PROCESSOR
107
IP PROCESSOR
101
BROADCAST INTERFACE
108
INTERNET INTERFACE
BROADCAST NETWORK
INTERNET
REFERENCE
AIT DATA
STREAM EVENT
APPLICATION DATA
LINEAR A/V DATA
NON-LINEAR A/V
OTHER DATA
OBJECT CAROUSEL

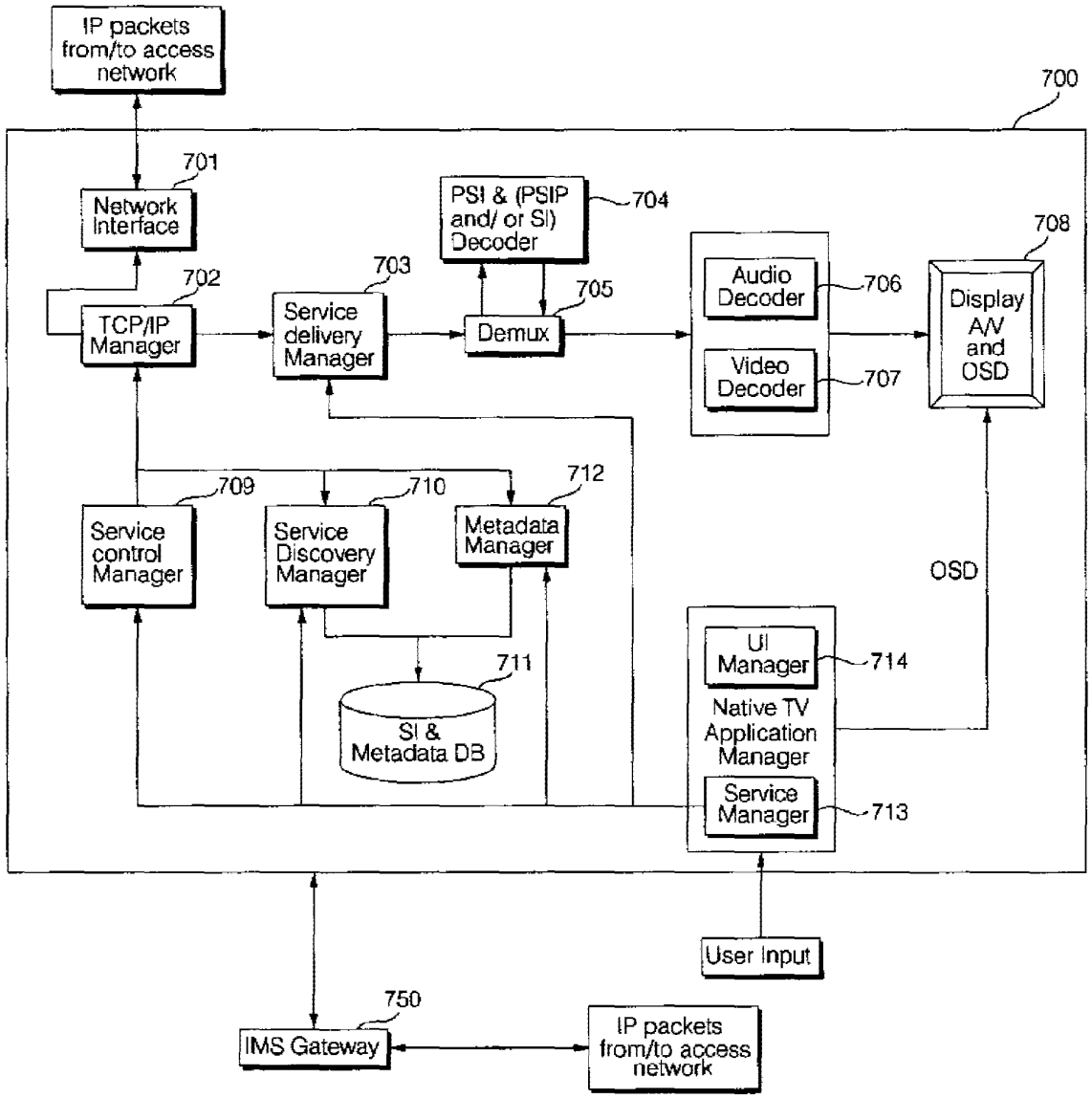
[Fig. 3]


SP
IMAGE DISPLAY APPARATUS
Service Provider Discovery (S301)
PUSH/PULL mode
SP Attachment Request (S302)
SP Attachment Complete ProvisoningInfo (S303)
PULL mode
MasterSI Tables (S304)
VirtualChannelMap Tables (S305)
VirtualChannelDiscription Tables (S306)
SourceTables (S307)
PUSH/PULL mode

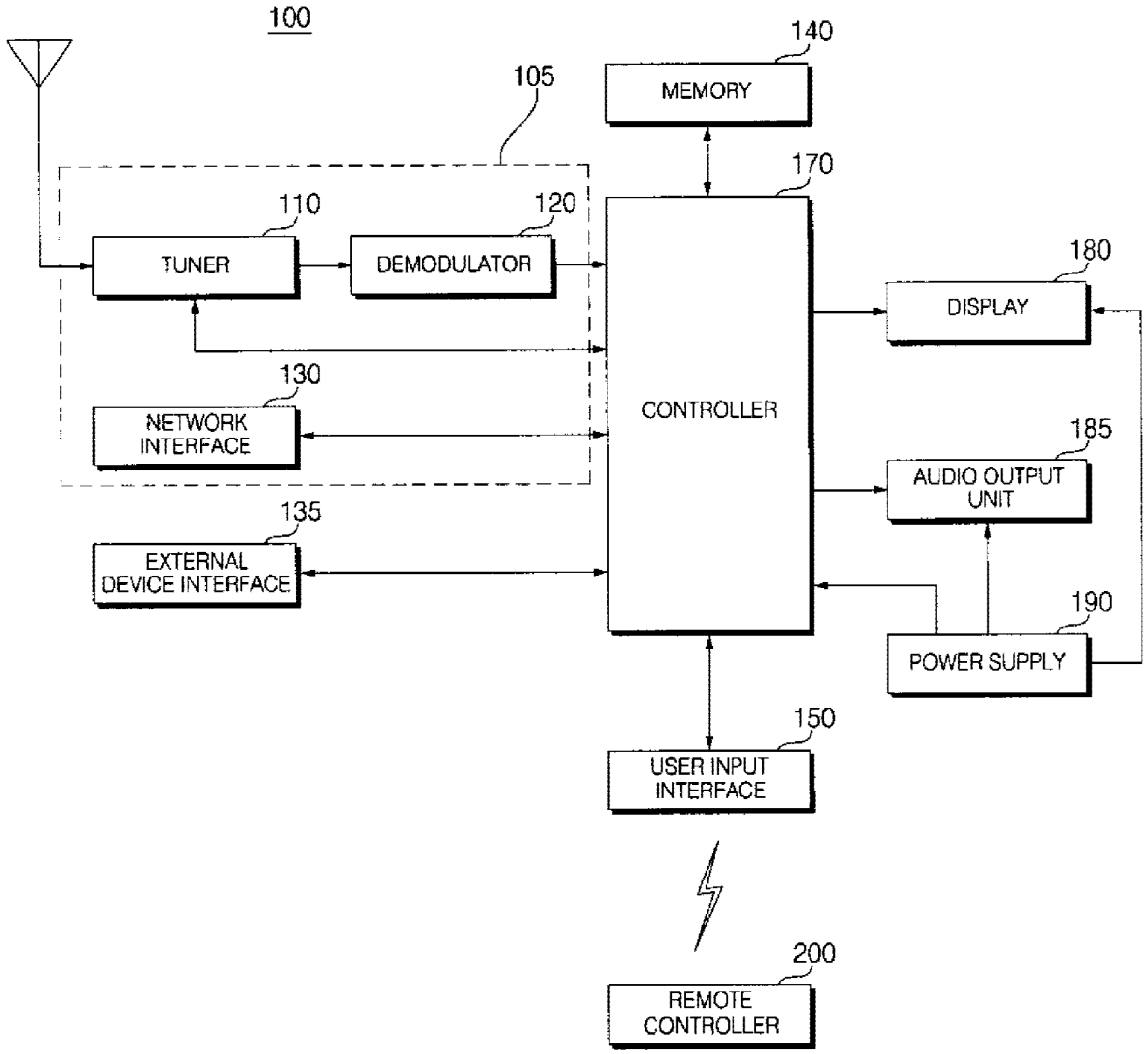
[Fig. 4]


SeviceProviderInfo (SP Discovery)
SP descriptive information
Authentication location
Attachment location
Authentication
AuthenticationInfo (SP Authentication)
SeviceProviderInfo (SP Attachment)
Master SI Table location
Available channels
Subscribed channels
EAS location
EPG data location
MasterSi Table location
MasterSiTable
Virtual Channel Map location
Virtual Channel Map versions
MasterSi Map location
VirtualChannelMap Table
List of virtual channels
Virtual Channel Description locations
Virtual Channel Description versions
Virtual Channel Description Table locations
Virtual Channel Service IDs
VirtualChannelDescription Table
Virtual Channel name, number, etc.
Virtual Channel Source locations
Virtual Channel Source versions
Source Table location
Source IDs
SourceTable
Service access information

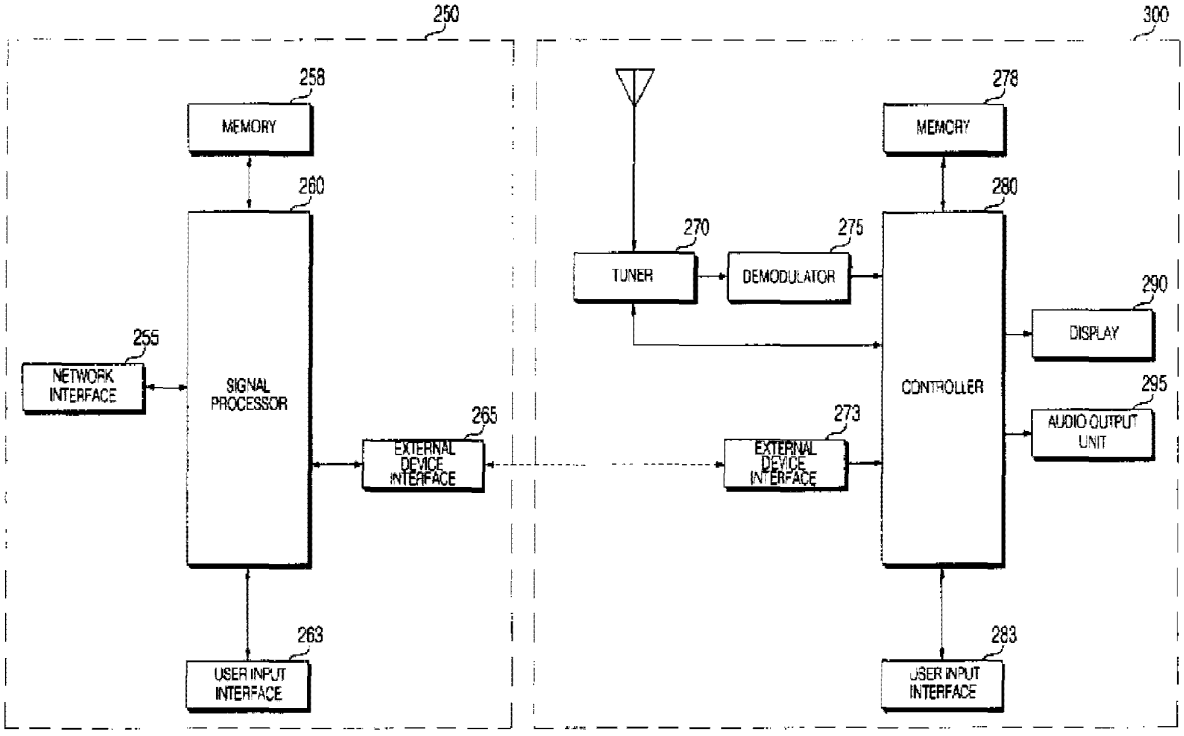
[Fig. 5]


IP packets from/to access network
700
701
Network Interface
702
TCP/IP Manager
703
Service delivery Manager
704
PSI & (PSIP and/ or SI) Decoder
705
Demux
706
Audio Decoder
707
Video Decoder
708
Display A/V and OSD
709
Service control Manager
710
Service Discovery Manager
712
Metadata Manager
711
SI & Metadata DB
OSD
UI Manager
714
Native TV Application Manager
Service Manager
713
User Input
750
IMS Gateway
IP packets from/to access network

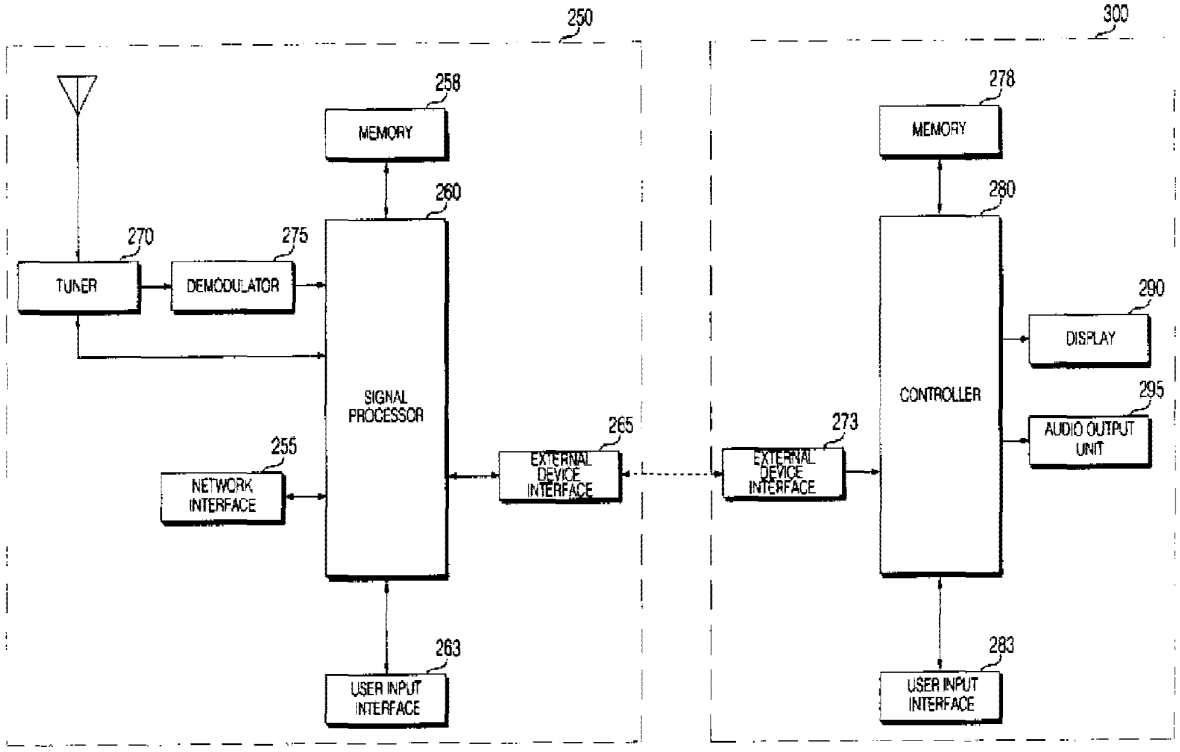
[Fig. 6]


100
105
140
MEMORY
170
110
120
TUNER
DEMODULATOR
180
DISPLAY
130
NETWORK INTERFACE
CONTROLLER
185
AUDIO OUTPUT UNIT
135
EXTERNAL DEVICE INTERFACE
190
POWER SUPPLY
150
USER INPUT INTERFACE
200
REMOTE CONTROLLER

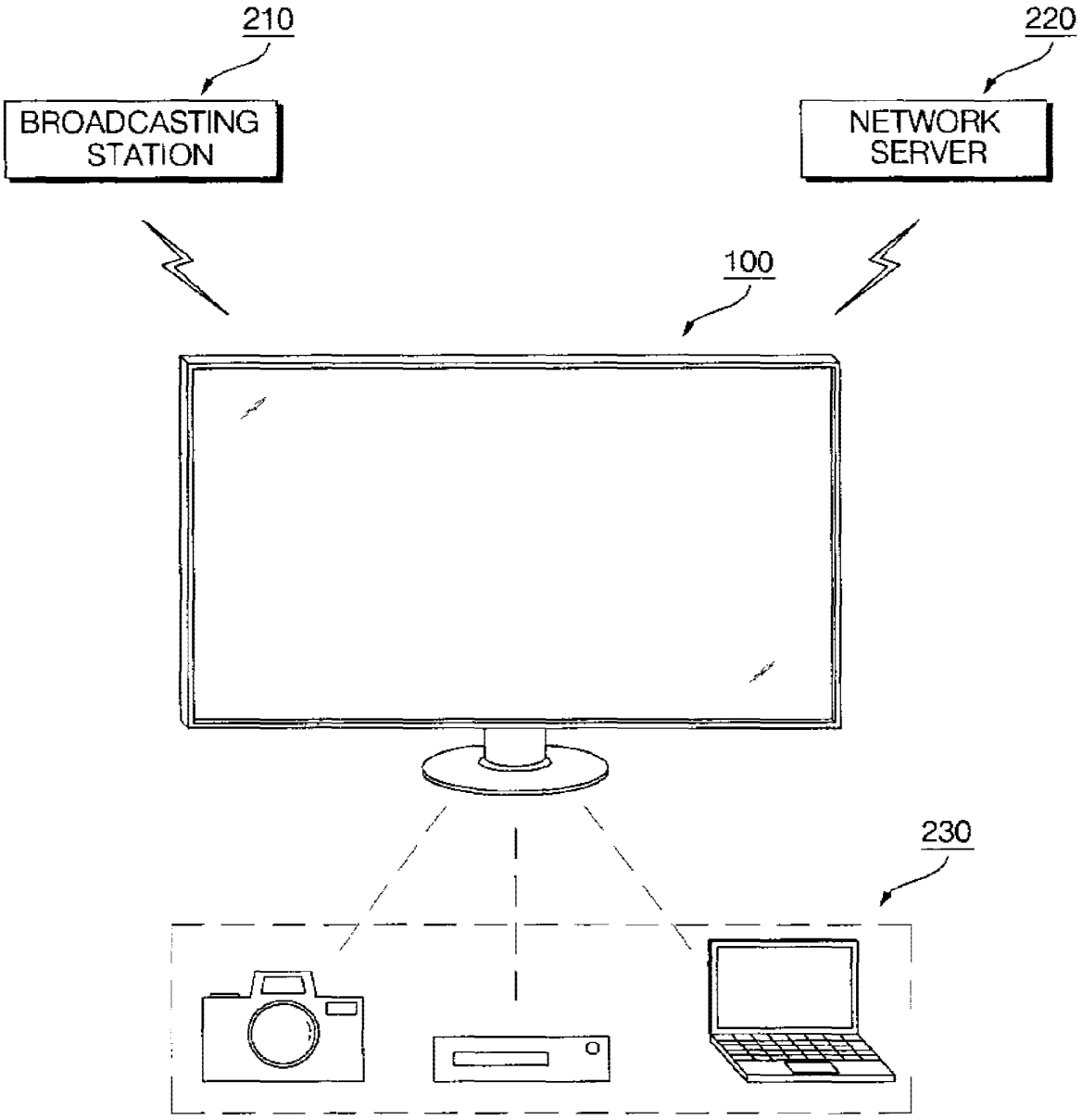
[Fig. 7]


250
300
258
MEMORY
260
SIGNAL PROCESSOR
255
NETWORK INTERFACE
265
EXTERNAL DEVICE INTERFACE
263
USER INPUT INTERFACE
278
MEMORY
280
CONTROLLER
270
TUNER
275
DEMODULATOR
290
DISPLAY
295
AUDIO OUTPUT UNIT
273
EXTERNAL DEVICE INTERFACE
283
USER INPUT INTERFACE

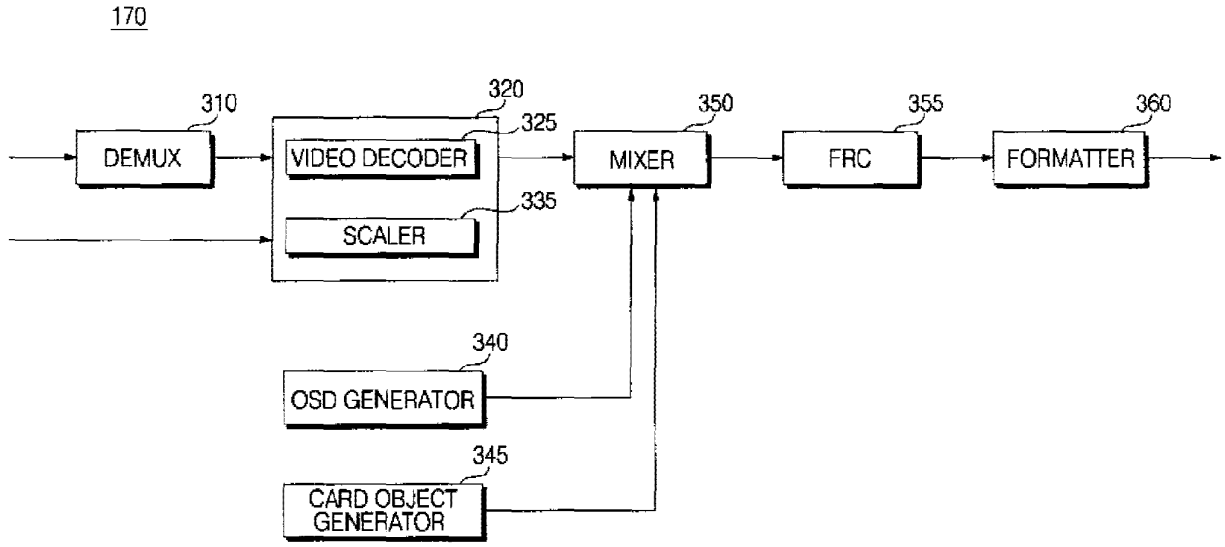
[Fig. 8]


250
300
258
MEMORY
260
SIGNAL PROCESSOR
270
TUNER
275
DEMODULATOR
255
NETWORK INTERFACE
265
EXTERNAL DEVICE INTERFACE
263
USER INPUT INTERFACE
278
MEMORY
280
CONTROLLER
290
DISPLAY
295
AUDIO OUTPUT UNIT
273
EXTERNAL DEVICE INTERFACE
283
USER INPUT INTERFACE

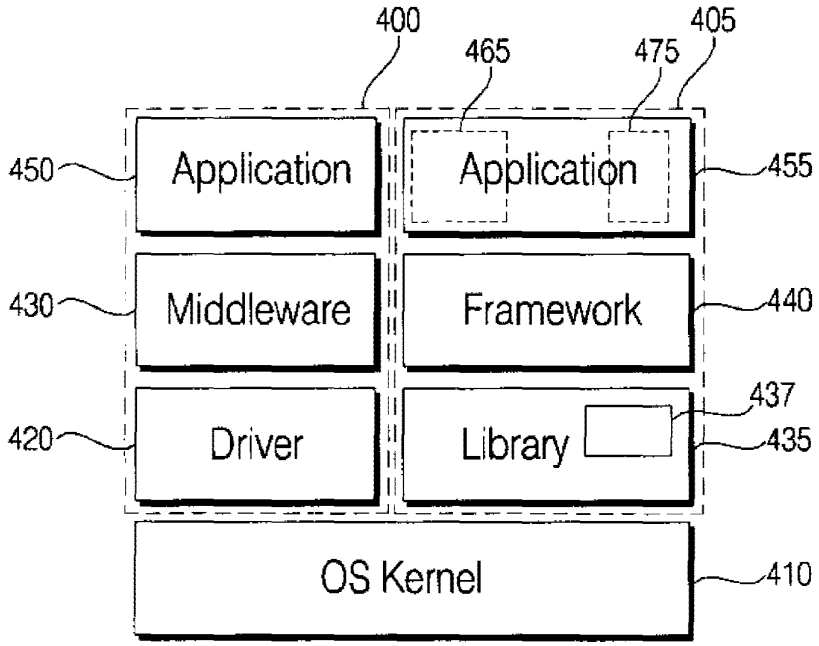
[Fig. 9]



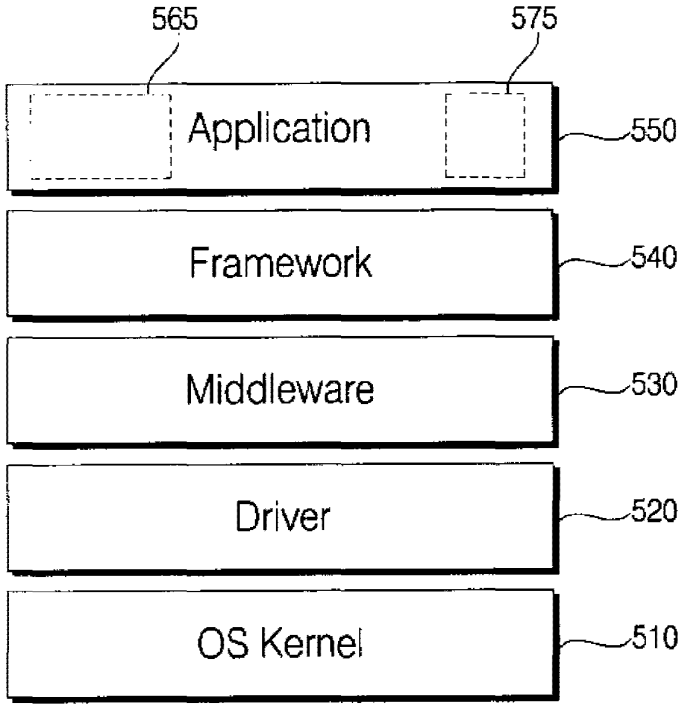
[Fig. 10]


170
310
320
325
350
355
360
DEMUX
VIDEO DECODER
MIXER
FRC
FORMATTER
335
SCALER
340
OSD GENERATOR
345
CARD OBJECT GENERATOR

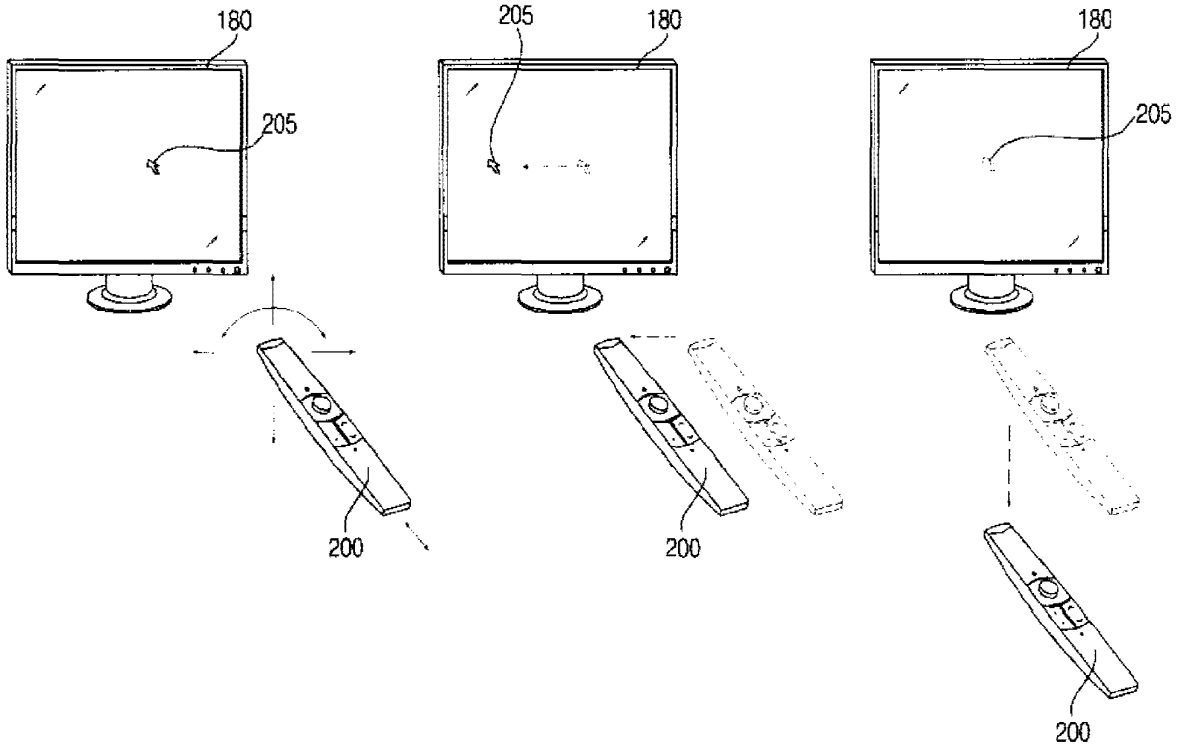
[Fig. 11]


400
465
475
405
450
Application
Application
455
430
Middleware
Framework
440
437
420
Driver
Library
435
OS Kernel
410

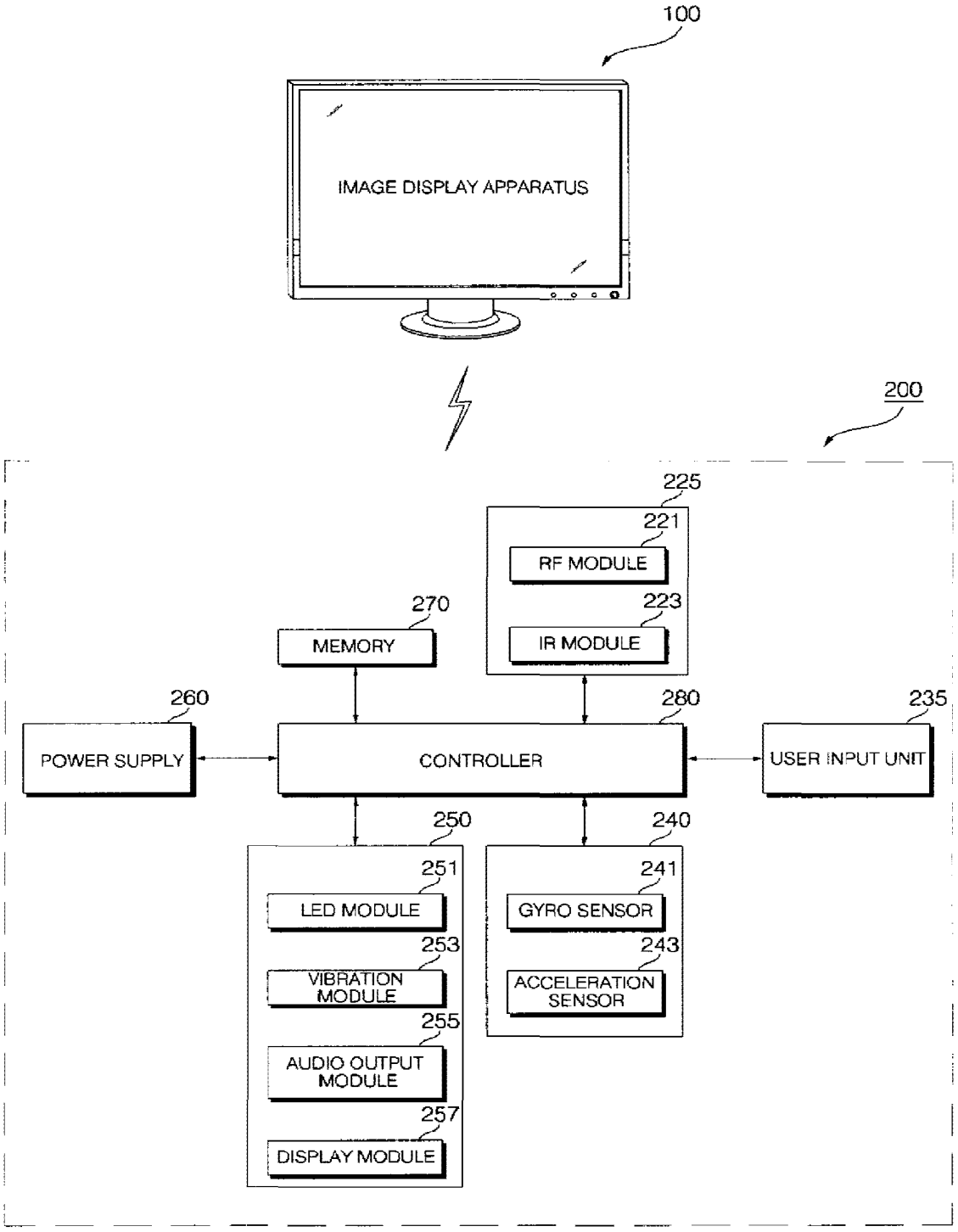
[Fig. 12]


565
575
Application
550
Framework
540
Middleware
530
Driver
520
OS Kernel
510

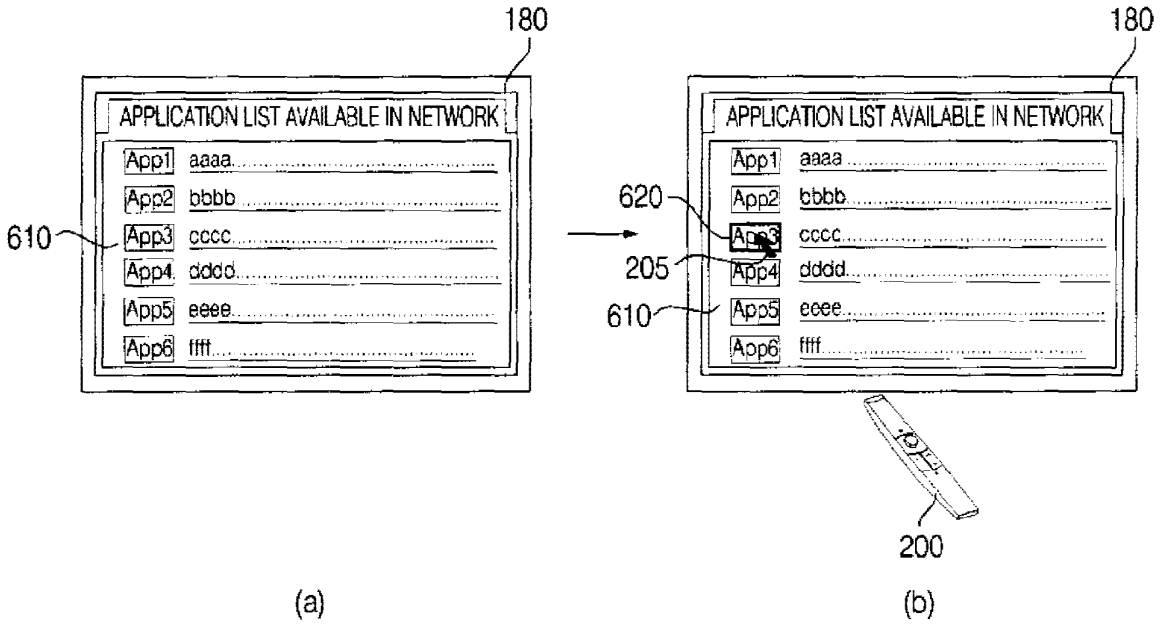
[Fig. 13]


180
205
200
205
180
200
180
205
200

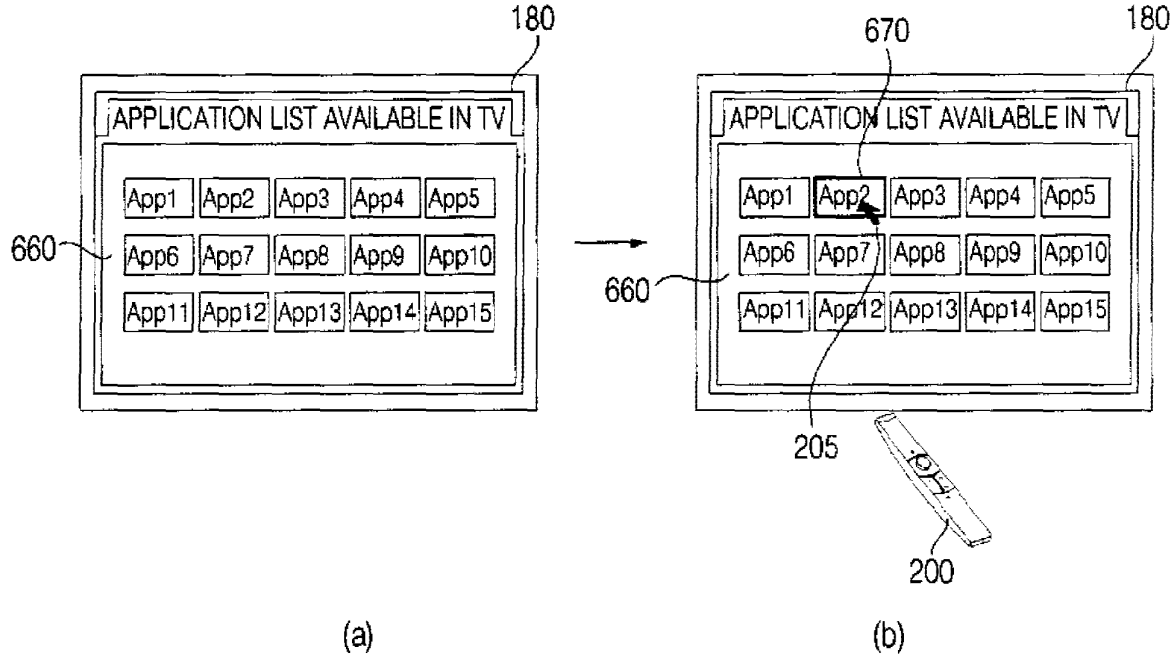
[Fig. 14]


100
IMAGE DISPLAY APPARATUS
200
225
221
RF MODULE
223
IR MODULE
270
MEMORY
260
POWER SUPPLY
280
CONTROLLER
235
USER INPUT UNIT
250
251
LED MODULE
253
VIBRATION MODULE
255
AUDIO OUTPUT MODULE
257
DISPLAY MODULE
240
241
GYRO SENSOR
243
ACCELERATION SENSOR

[Fig. 15]

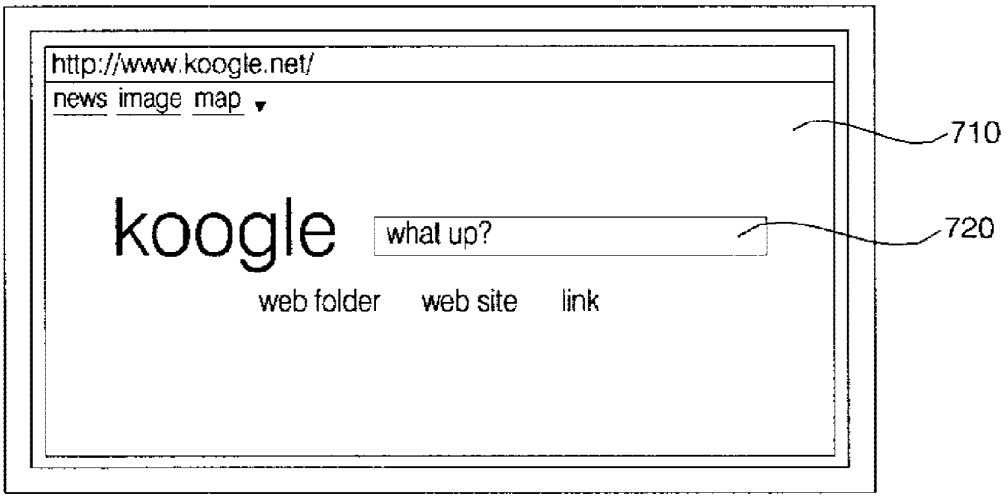

180
APPLICATION LIST AVAILABLE IN NETWORK
App1 aaaa
App2 bbbb
App3 cccc
App4 dddd
App5 eeee
App6 ffff
610
620
205
610
180
200
(a)
(b)

[Fig. 16]

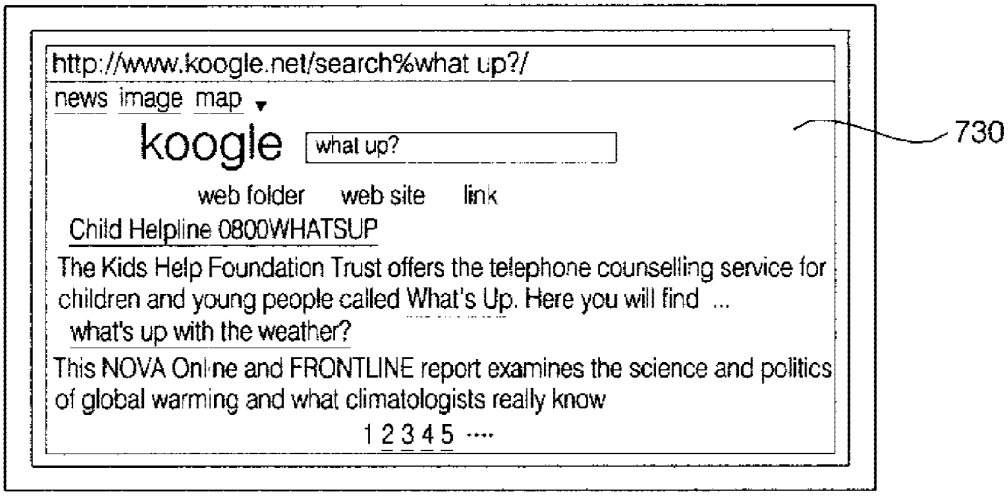

180
APPLICATION LIST AVAILABLE IN TV
App1 App2 App3 App4 App5
App6 App7 App8 App9 App10
App11 App12 App13 App14 App15
660
670
205
200
(a)
(b)

[Fig. 17]

(a)

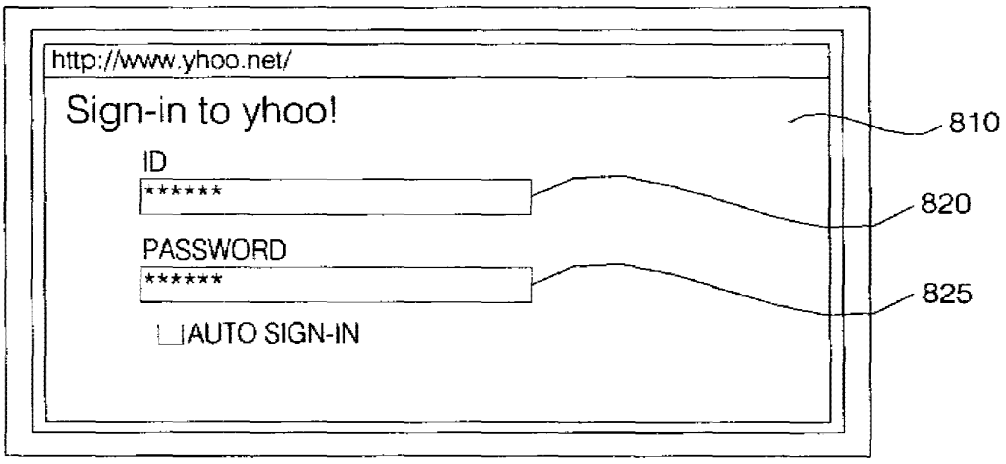

http://www.koogle.net/
news image map
koogle
what up?
web folder web site link
710
720

(b)

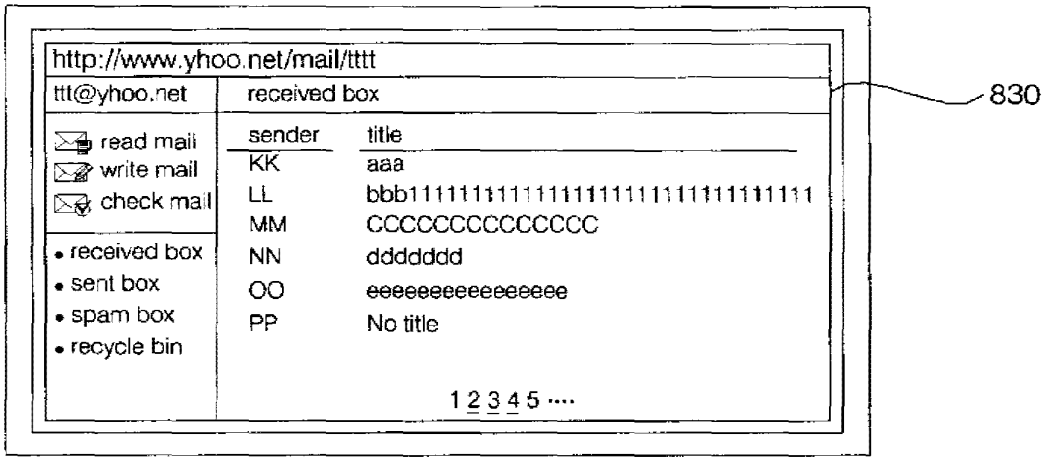

http://www.koogle.net/search%what up?/
news image map
koogle
what up?
web folder web site link
Child Helpline 0800WHATSUP
The Kids Help Foundation Trust offers the telephone counselling service for children and young people called What's Up. Here you will find ...
what's up with the weather?
This NOVA Online and FRONTLINE report examines the science and politics of global warming and what climatologists really know
1 2 3 4 5 ····
730

[Fig. 18]

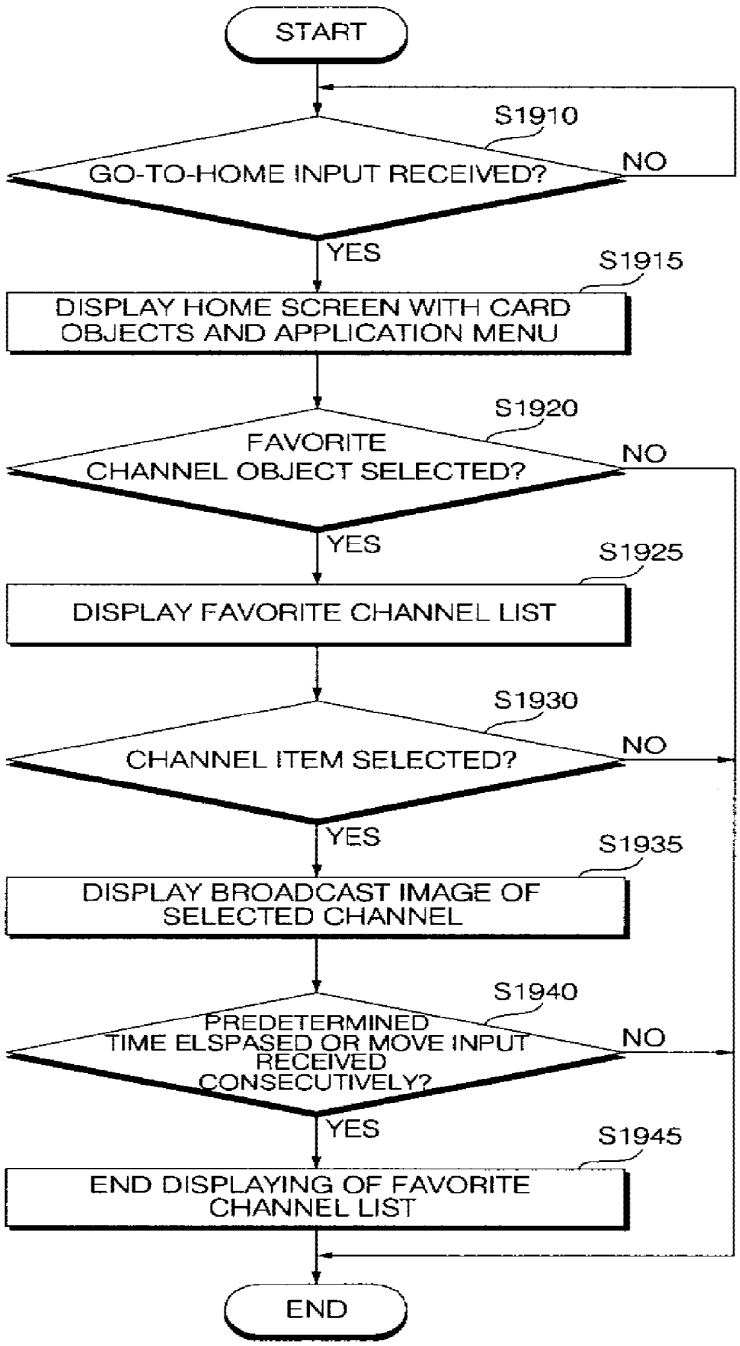
(a)


http://www.yhoo.net/
Sign-in to yhoo!
ID
******
PASSWORD
******
AUTO SIGN-IN
810
820
825

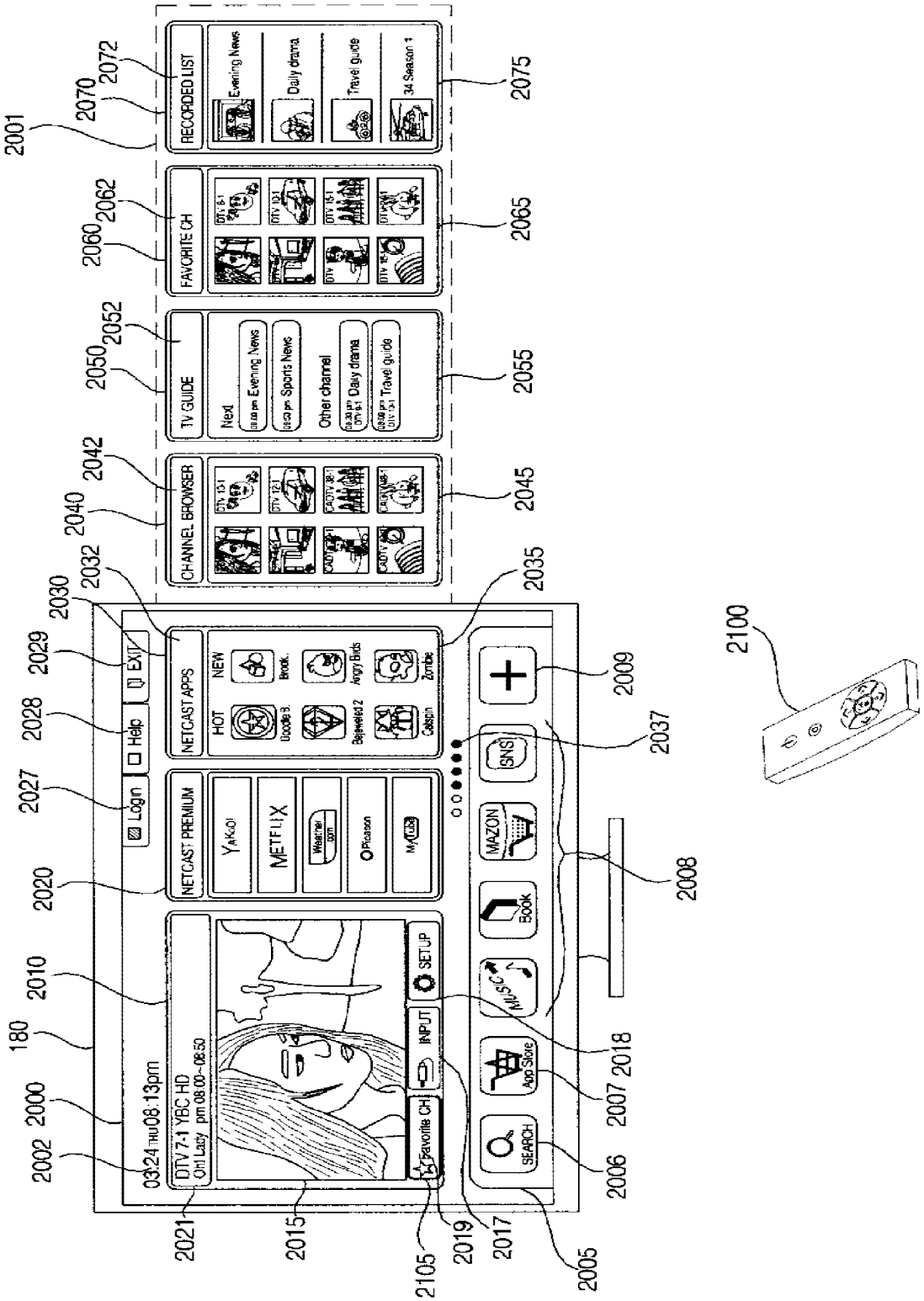
(b)


http://www.yhoo.net/mail/tttt
ttt@yhoo.net
received box
read mail
write mail
check mail
• received box
• sent box
• spam box
• recycle bin
sender
title
KK
aaa
LL
bbb1111111111111111111111111111111
MM
CCCCCCCCCCCCC
NN
ddddddd
OO
eeeeeeeeeeeeeee
PP
No title
1 2 3 4 5 ····
830

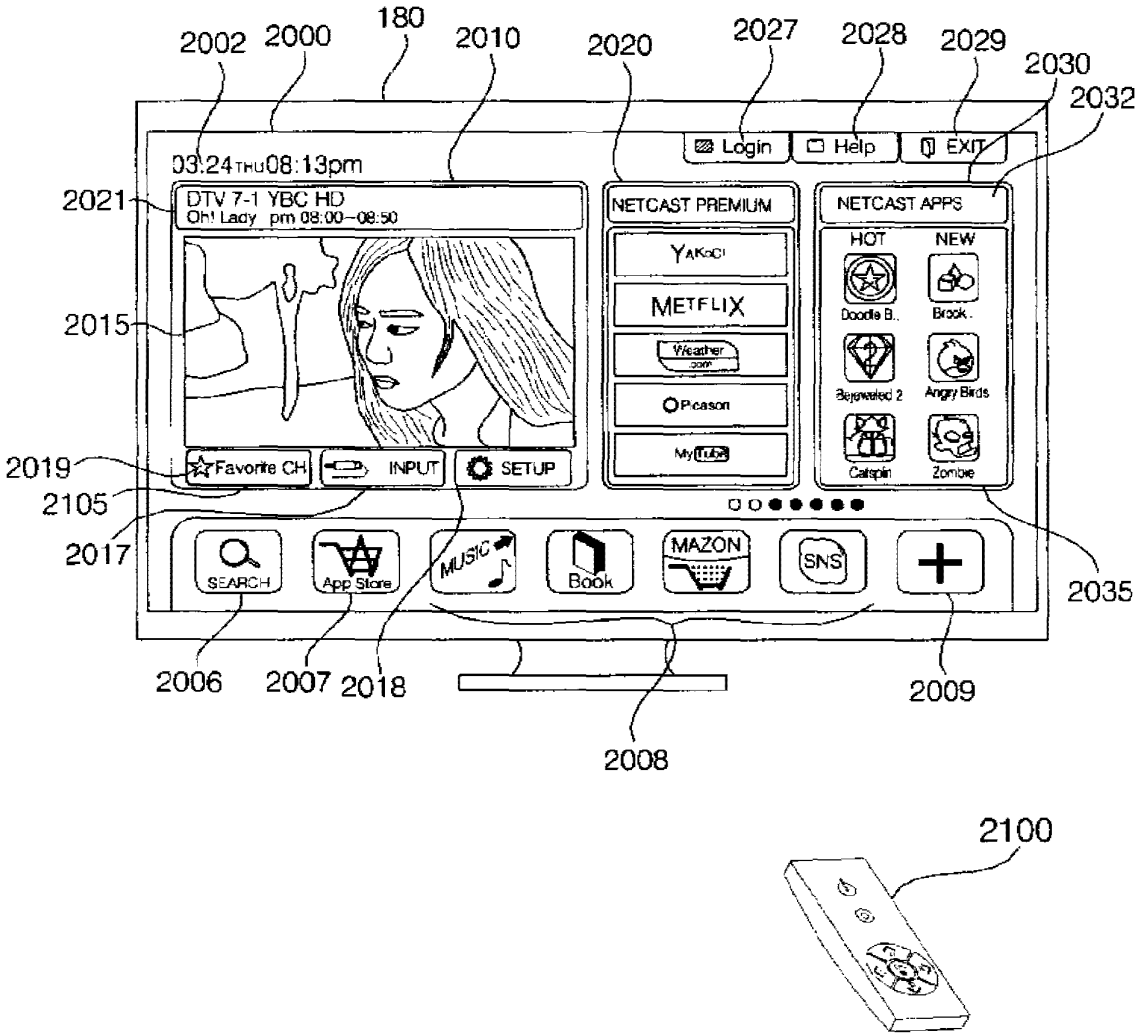
[Fig. 19]


START
S1910
GO-TO-HOME INPUT RECEIVED?
NO
YES
S1915
DISPLAY HOME SCREEN WITH CARD OBJECTS AND APPLICATION MENU
S1920
FAVORITE CHANNEL OBJECT SELECTED?
NO
YES
S1925
DISPLAY FAVORITE CHANNEL LIST
S1930
CHANNEL ITEM SELECTED?
NO
YES
S1935
DISPLAY BROADCAST IMAGE OF SELECTED CHANNEL
S1940
PREDETERMINED TIME ELSPASED OR MOVE INPUT RECEIVED CONSECUTIVELY?
NO
YES
S1945
END DISPLAYING OF FAVORITE CHANNEL LIST
END

[Fig. 20]

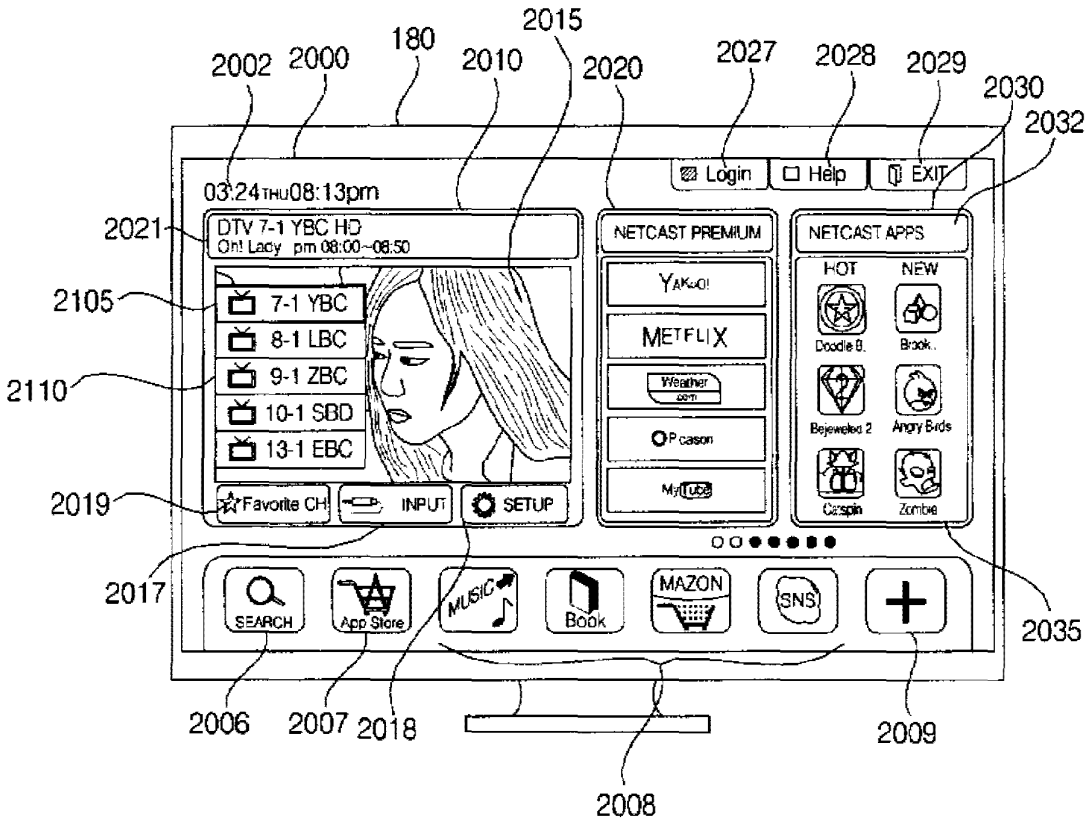

2001
2070
2072
RECORDED LIST
Evening News
Daily drama
Travel Guide
34 Season 1
2075
2060
2062
FAVORITE CH
2065
2050
2052
TV GUIDE
Next
Evening News
Sports News
Other channel
Daily drama
Travel guide
2055
2040
2042
CHANNEL BROWSER
2045
2030
2032
2035
2029
EXIT
2028
Help
2027
Login
2020
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2009
2037
2010
180
2000
2002
03:24 THU 08:13pm
DTV 7-1 YBC HD
Oh! Lazy pm 08:00~08:50
SETUP
INPUT
Favorite CH
SEARCH
App Store
MUSIC
BOOK
AMAZON
SNS
2008
2018
2007
2006
2021
2015
2105
2019
2017
2005
2100

[Fig. 21]

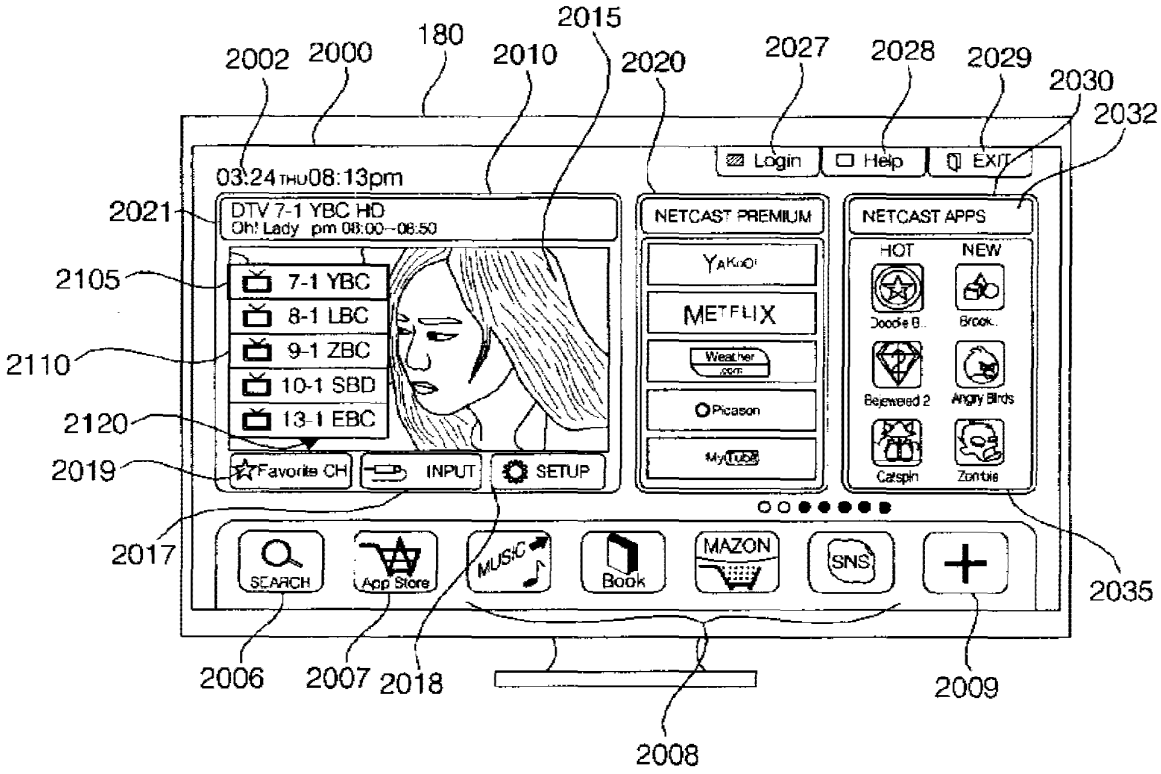

180
2002
2000
2010
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03.24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2015
METFLIX
Weather
Picasa
Doodle B..
Brook..
Bejeweled 2
Angry Birds
Catspin
Zombie
2019
Favorite CH
INPUT
SETUP
2105
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

2100

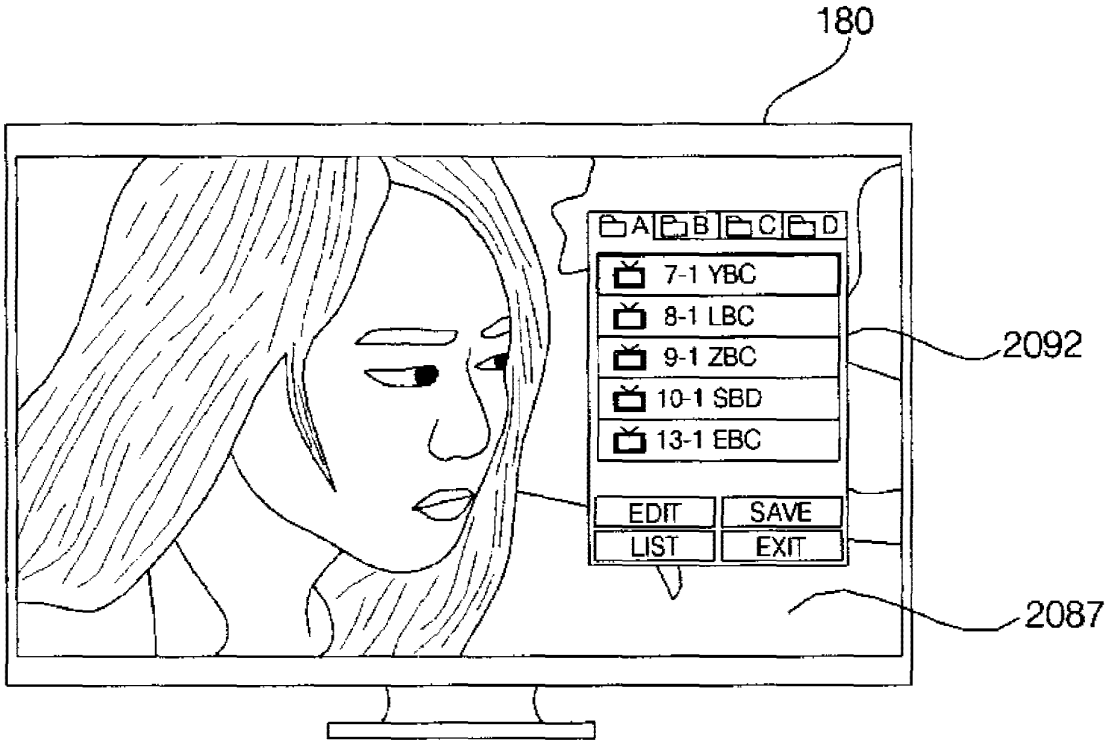
[Fig. 22]


2002
2000
180
2010
2015
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2105
7-1 YBC
8-1 LBC
9-1 ZBC
10-1 SBD
13-1 EBC
2110
YAHOO!
METFLIX
Weather .com
Picasa
MyTube
Doodle B.
Brook.
Bejeweled 2
Angry Birds
Catspin
Zombie
2019
Favorite CH
INPUT
SETUP
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

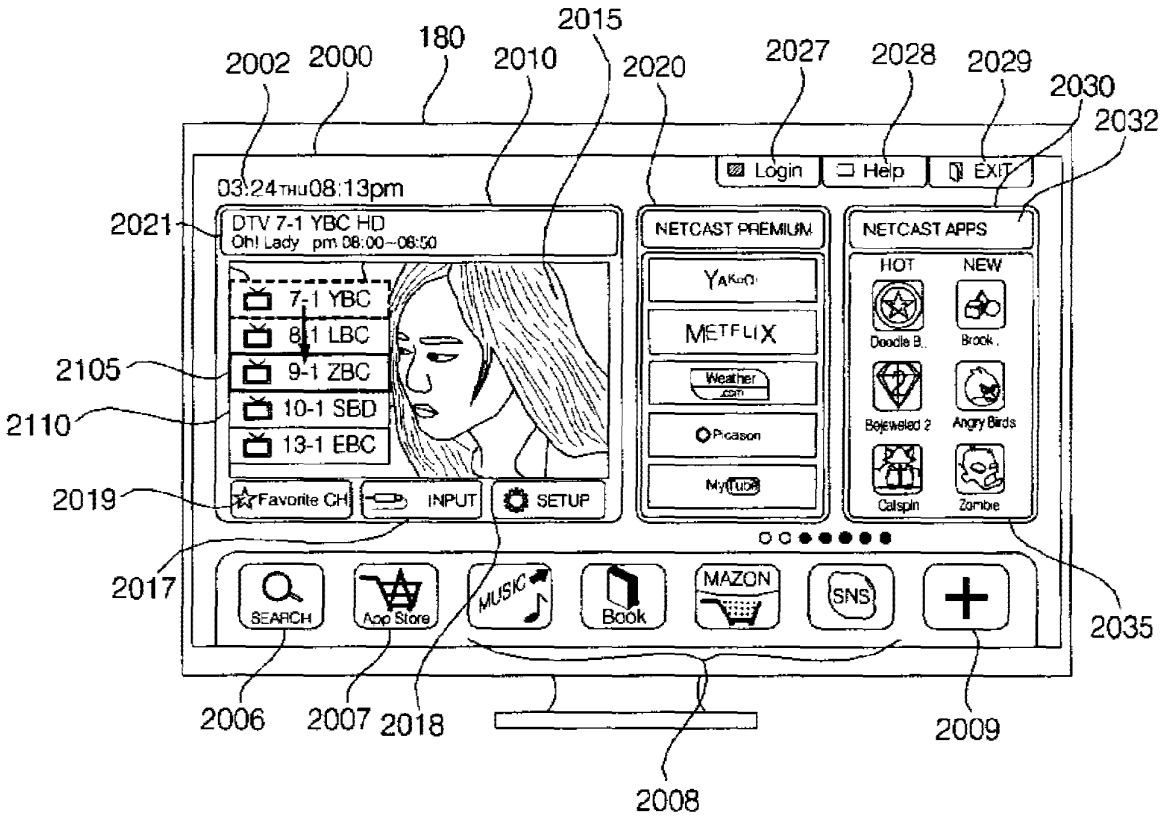
[Fig. 23]

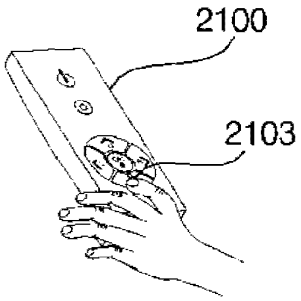

2002
2000
180
2010
2015
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2105
7-1 YBC
8-1 LBC
9-1 ZBC
10-1 SBD
13-1 EBC
2110
YAHOO!
METFLIX
Weather .com
Picasa
MyTube
Doodle B.
Brook.
Bejeweled 2
Angry Birds
Catspin
Zombie
2120
2019
Favorite CH
INPUT
SETUP
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

[Fig. 24]

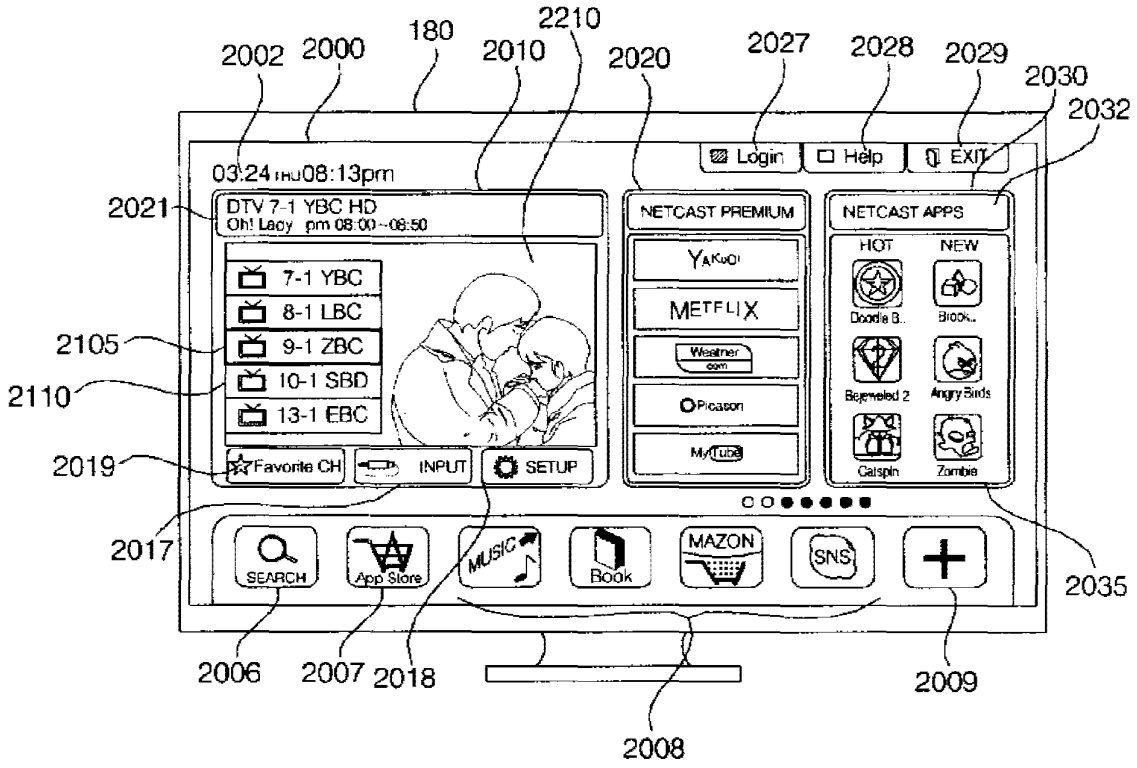

180
A
B
C
D
7-1 YBC
8-1 LBC
9-1 ZBC
10-1 SBD
13-1 EBC
2092
EDIT
SAVE
LIST
EXIT
2087

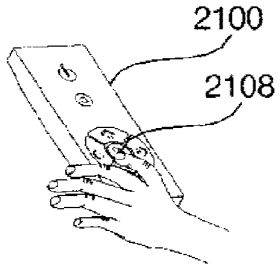
[Fig. 25]


2002
2000
180
2010
2015
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
7-1 YBC
8-1 LBC
9-1 ZBC
10-1 SBD
13-1 EBC
2105
2110
2019
Favorite CH
INPUT
SETUP
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

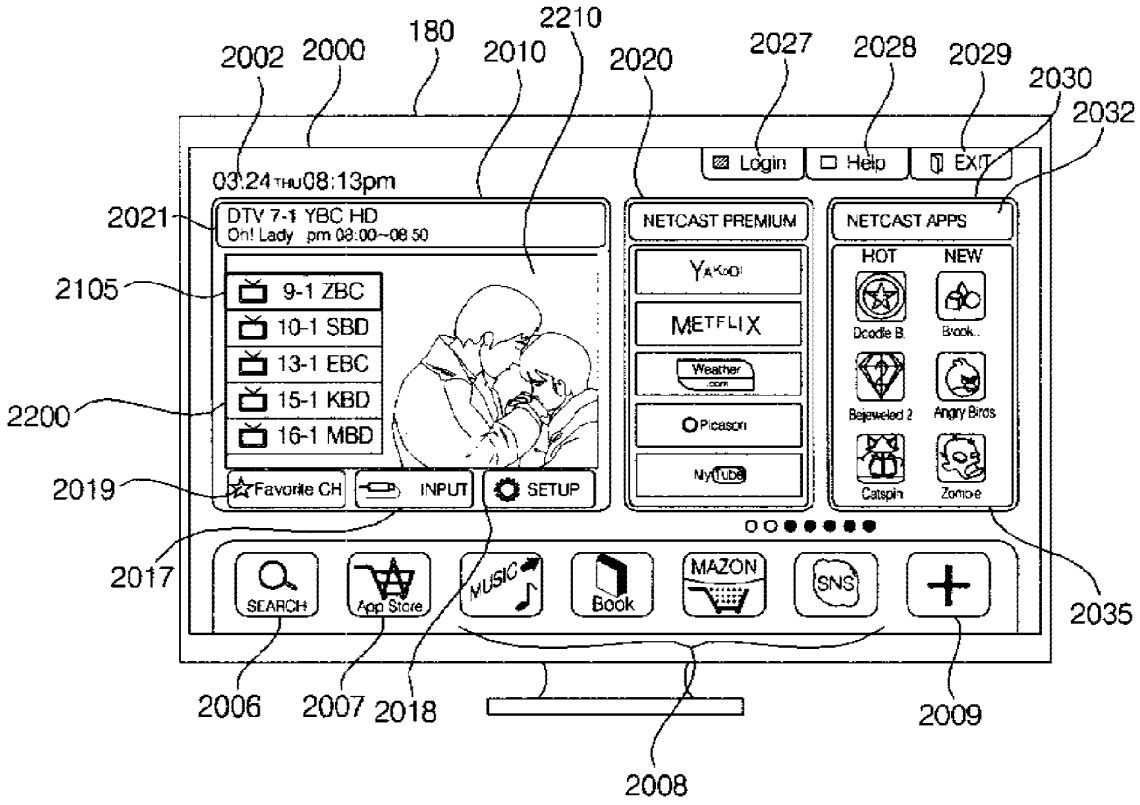

2100
2103

[Fig. 26]

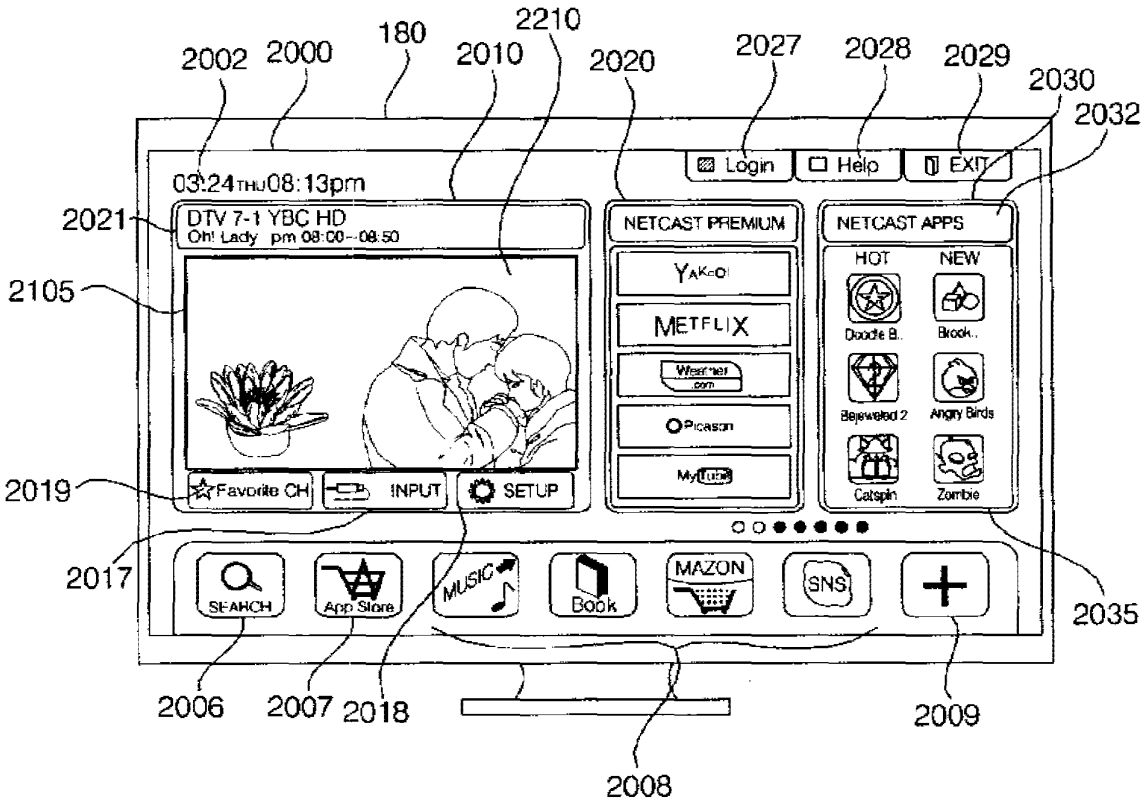

2002
2000
180
2010
2210
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 Thu 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lacy pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
7-1 YBC
8-1 LBC
9-1 ZBC
10-1 SBD
13-1 EBC
2105
2110
2019
Favorite CH
INPUT
SETUP
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

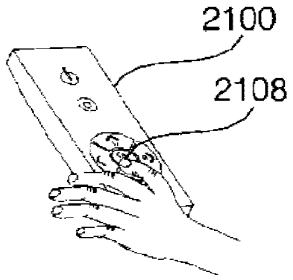

2100
2108

[Fig. 27]

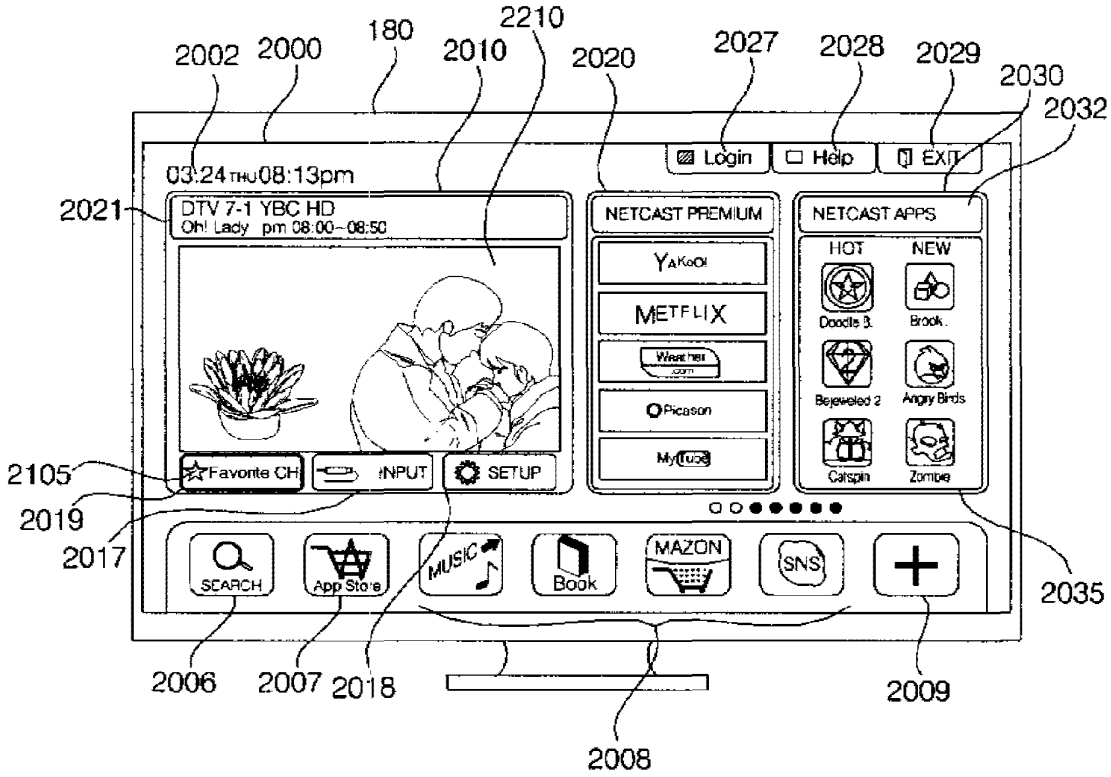

2002
2000
180
2010
2210
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
On! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2105
9-1 ZBC
10-1 SBD
13-1 EBC
15-1 KBD
16-1 MBD
YAHOO!
NETFLIX
Weather
Picasa
Doodle B
Bejeweled 2
Angry Birds
Catspin
Zombie
2200
2019
Favorite CH
INPUT
SETUP
2017
SEARCH
App Store
MUSIC
Book
AMAZON
SNS
2035
2006
2007
2018
2009
2008

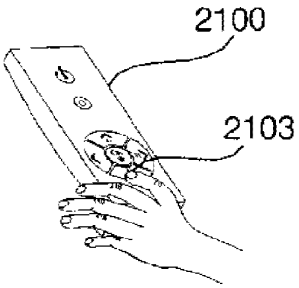
[Fig. 28]


2002
2000
180
2010
2210
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2105
YAHOO!
NETFLIX
Picasa
Doodle B..
Brook..
Bejeweled 2
Angry Birds
Catspin
Zombie
2019
Favorite CH
INPUT
SETUP
2017
SEARCH
App Store
MUSIC
Book
AMAZON
SNS
2035
2006
2007
2018
2009
2008

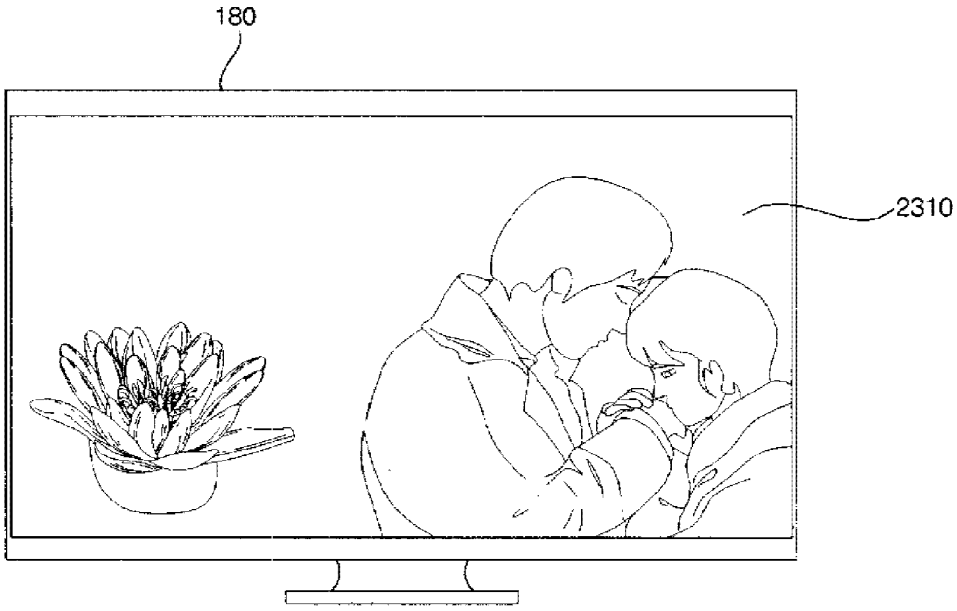

2100
2108

[Fig. 29]

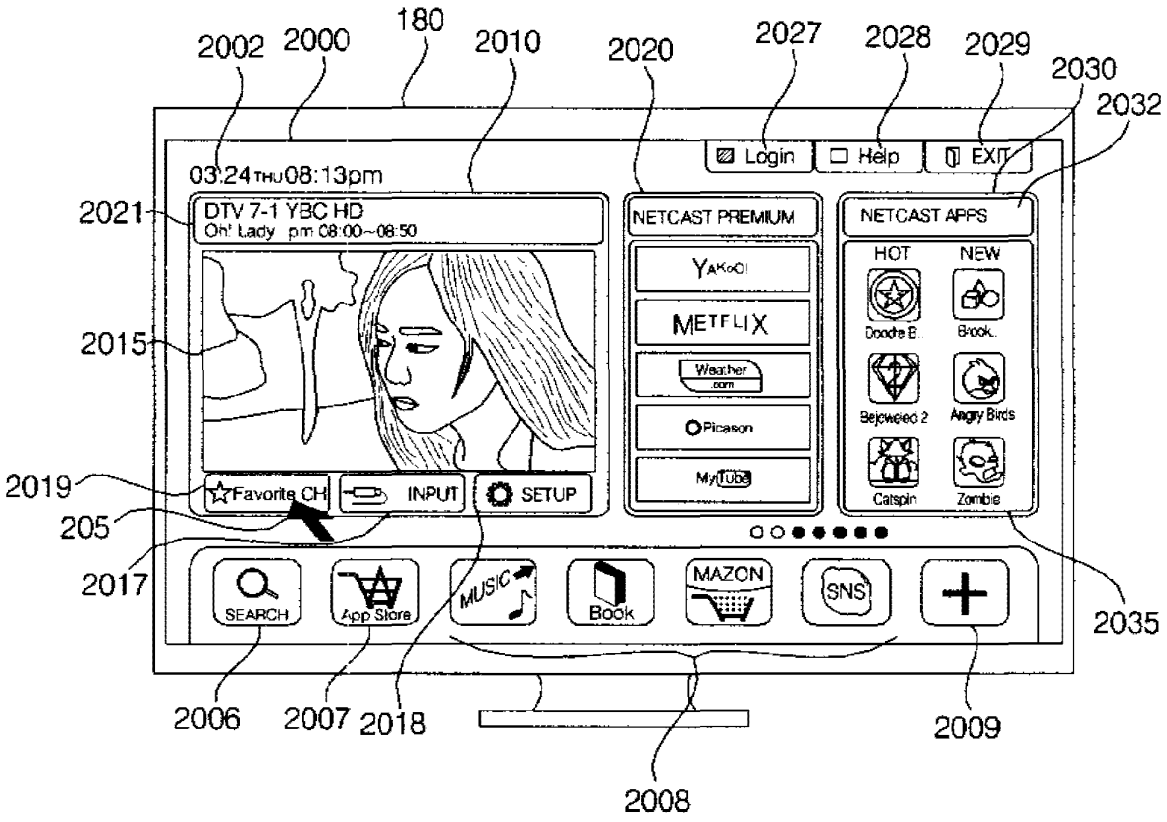

2002
2000
180
2010
2210
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
YAKOO!
NETFLIX
Picasa
Doodle B.
Brick.
Bejeweled 2
Angry Birds
Catspin
Zombie
2105
2019
2017
Favorite CH
INPUT
SETUP
SEARCH
App Store
MUSIC
Book
AMAZON
SNS
2035
2006
2007
2018
2009
2008

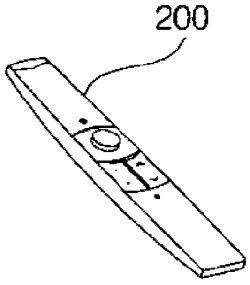

2100
2103

[Fig. 30]

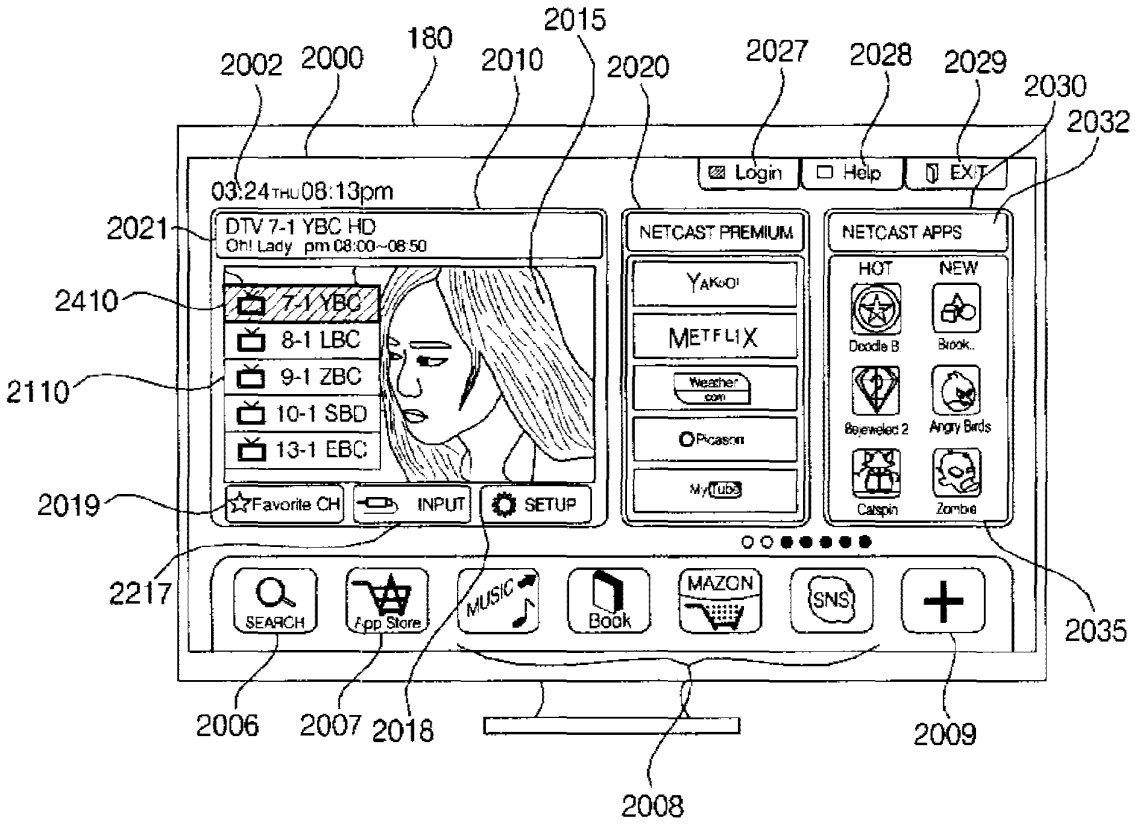


[Fig. 31]

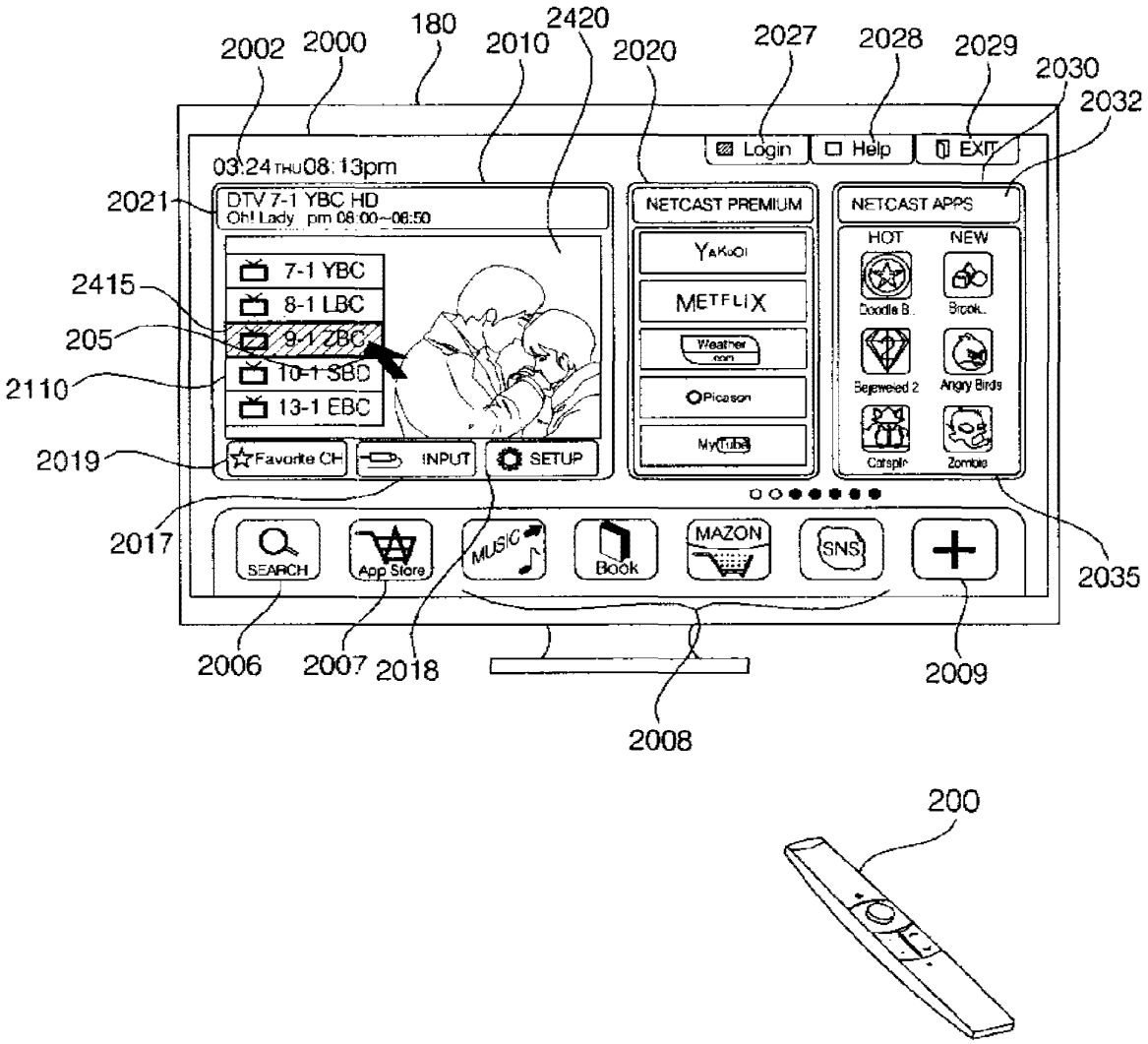

180
2002
2000
2010
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2015
YAHOO!
METFLIX
Weather.com
Picasa
MyTube
Doodle B
Brook..
Bejeweled 2
Angry Birds
Catspin
Zombie
2019
Favorite CH
INPUT
SETUP
205
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008


200

[Fig. 32]

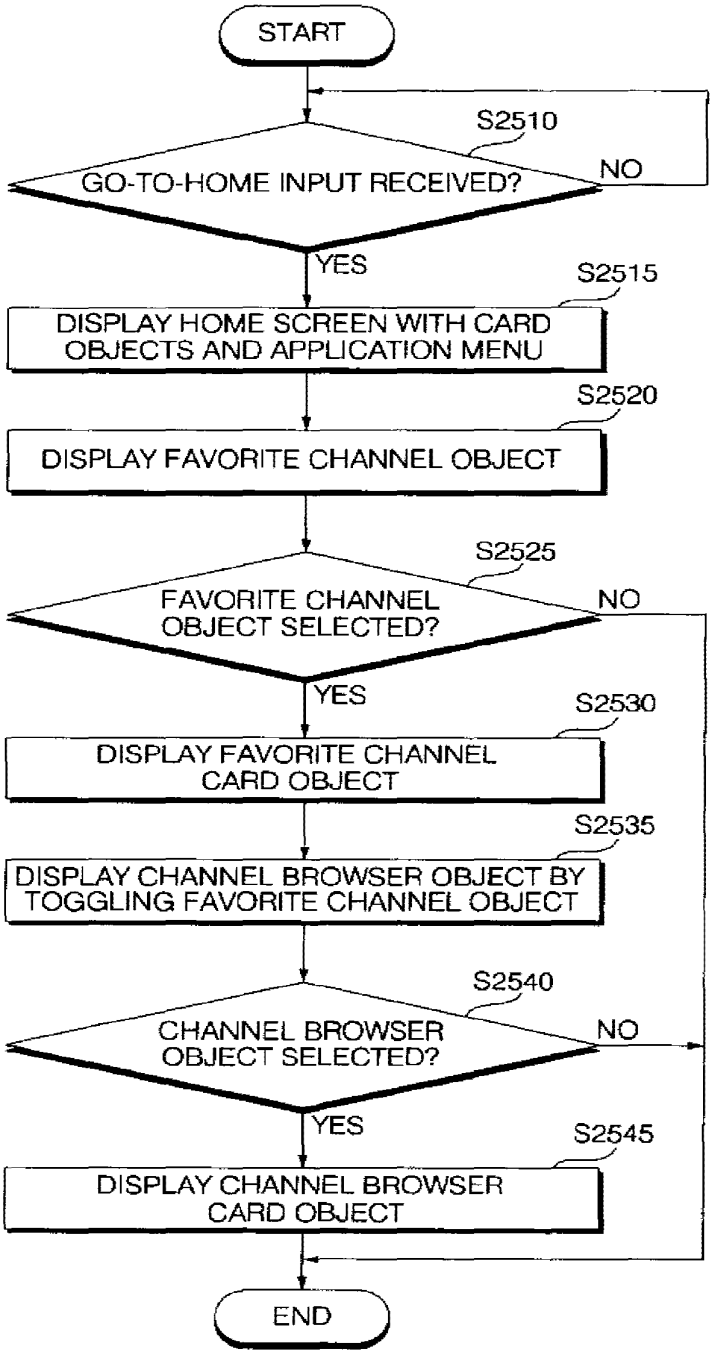

2002
2000
180
2010
2015
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2410
7-1 YBC
8-1 LBC
9-1 ZBC
10-1 SBD
13-1 EBC
2110
METFLIX
Picasa
Doodle B
Book..
Bejeweled 2
Angry Birds
Catspin
Zombie
2019
Favorite CH
INPUT
SETUP
2217
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

[Fig. 33]

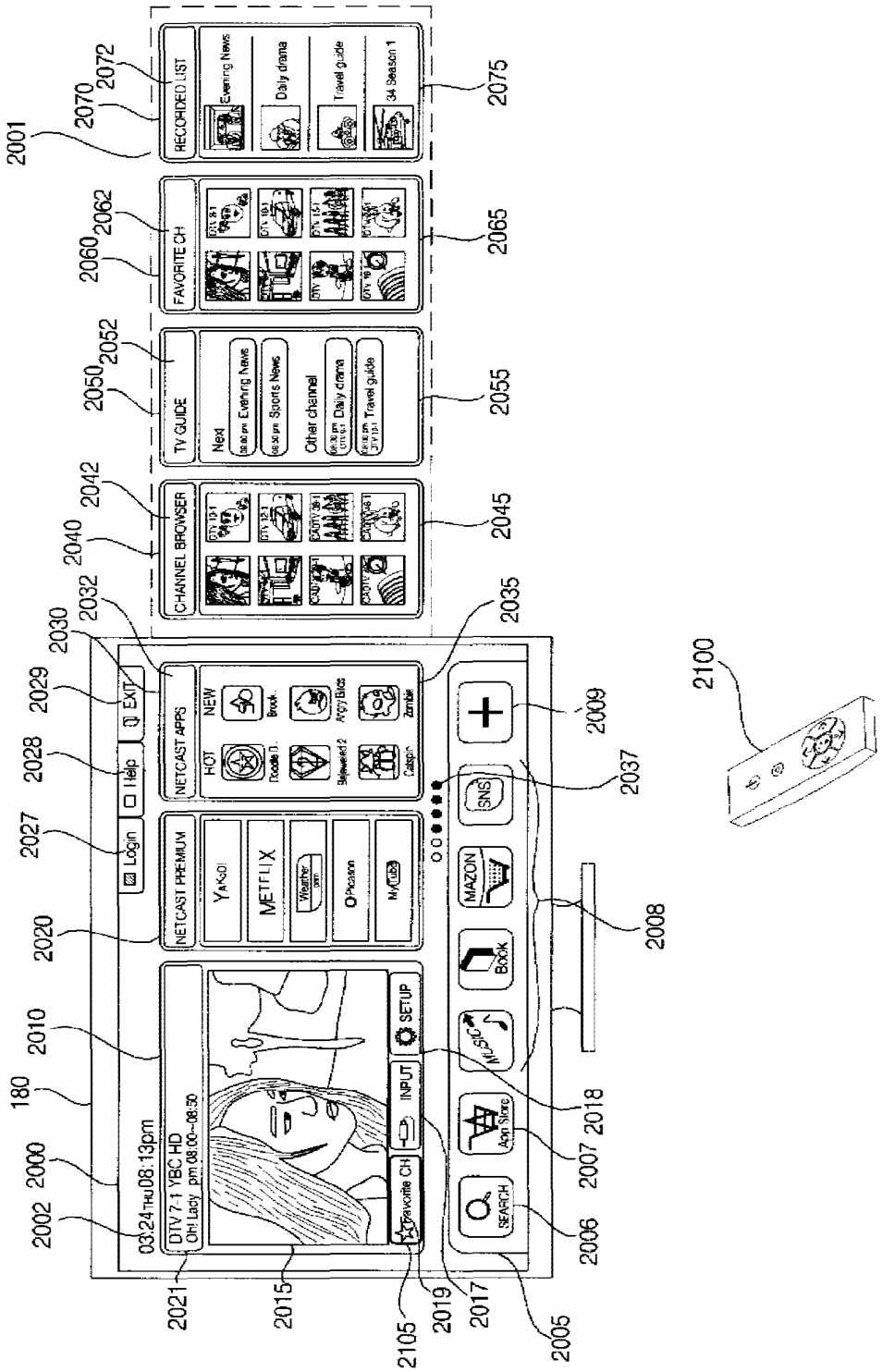

2002
2000
180
2010
2420
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2415
7-1 YBC
8-1 LBC
9-1 ZBC
10-1 SBC
13-1 EBC
205
2110
2019
Favorite CH
INPUT
SETUP
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

200

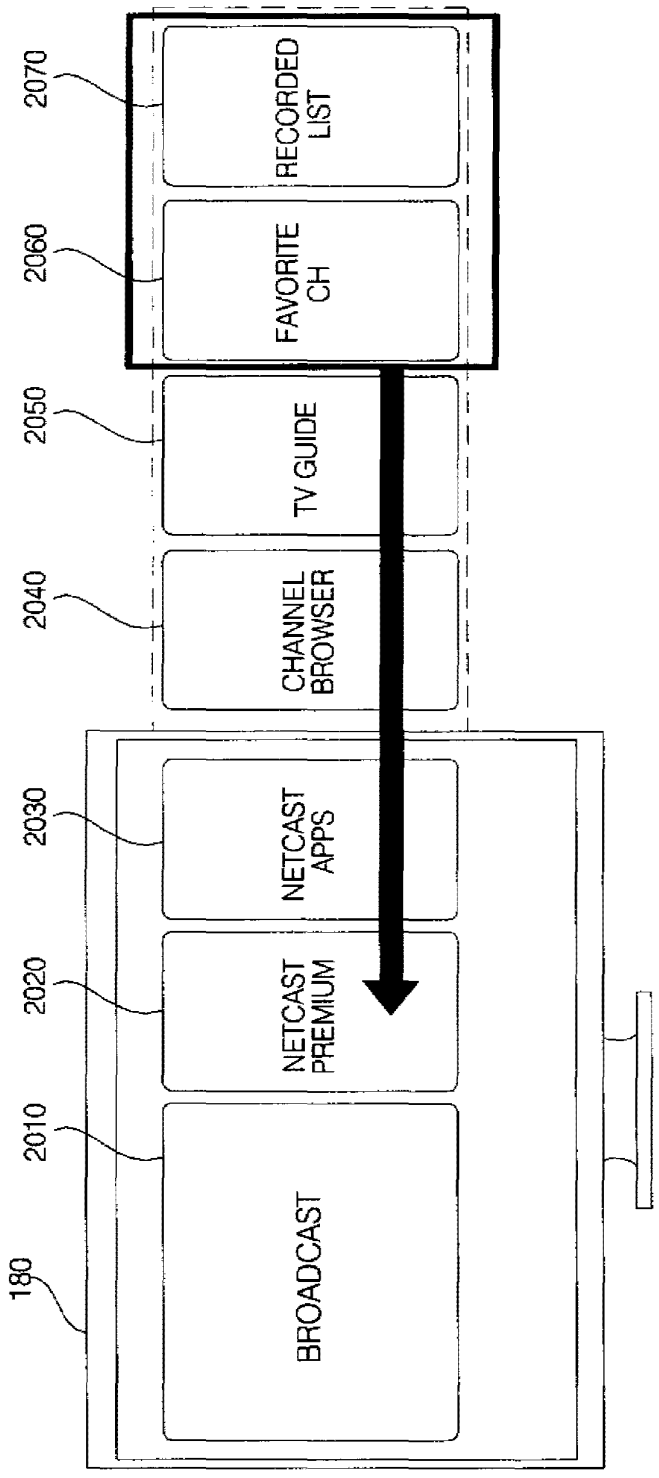
[Fig. 34]


START
S2510
GO-TO-HOME INPUT RECEIVED?
NO
YES
S2515
DISPLAY HOME SCREEN WITH CARD OBJECTS AND APPLICATION MENU
S2520
DISPLAY FAVORITE CHANNEL OBJECT
S2525
FAVORITE CHANNEL OBJECT SELECTED?
NO
YES
S2530
DISPLAY FAVORITE CHANNEL CARD OBJECT
S2535
DISPLAY CHANNEL BROWSER OBJECT BY TOGGLING FAVORITE CHANNEL OBJECT
S2540
CHANNEL BROWSER OBJECT SELECTED?
NO
YES
S2545
DISPLAY CHANNEL BROWSER CARD OBJECT
END

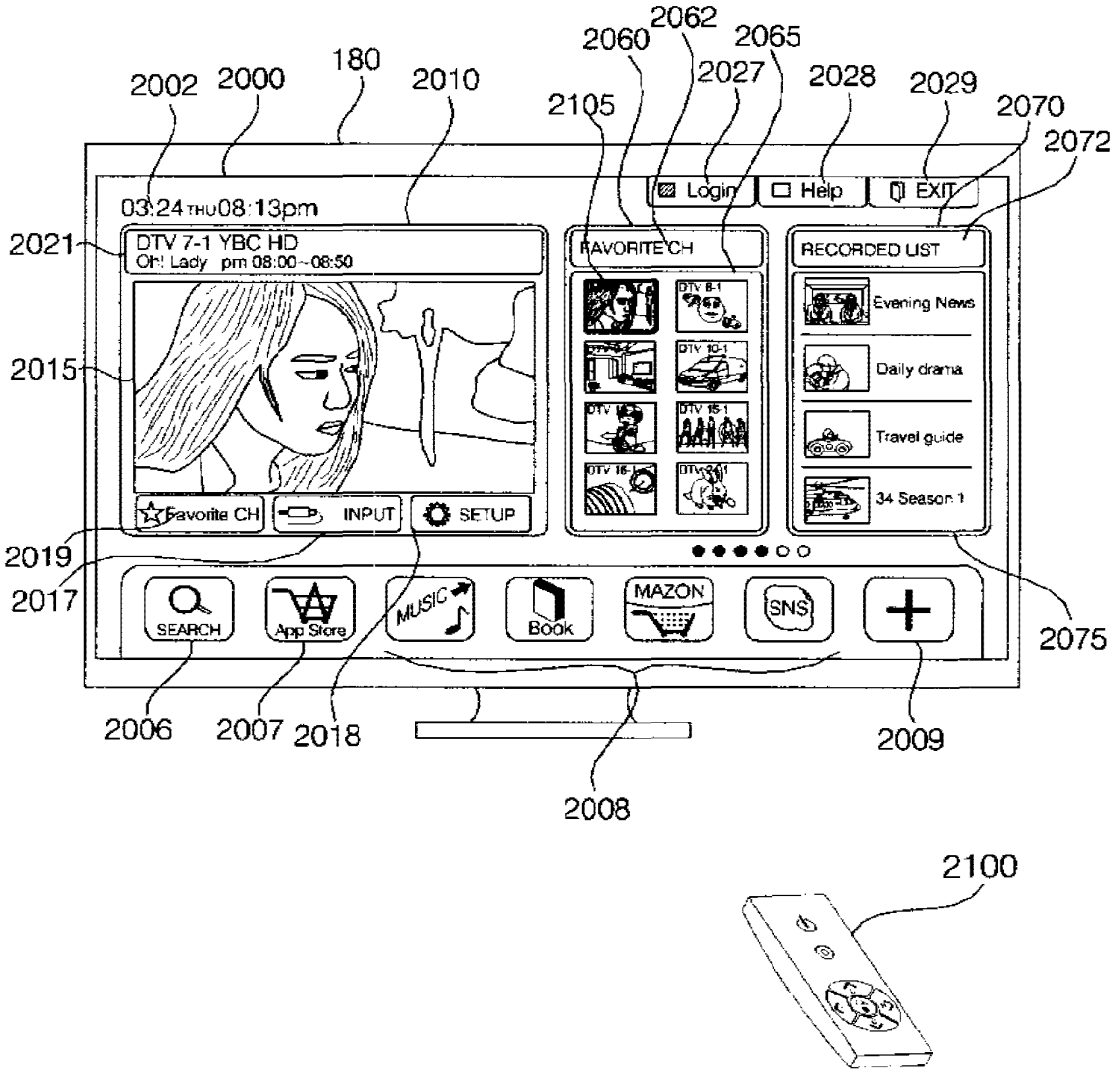
[Fig. 35]


RECORDED LIST
Evening News
Daily drama
Travel guide
34 Season 1
FAVORITE CH
TV GUIDE
Next
Other channel
CHANNEL BROWSER
NETCAST APPS
NETCAST PREMIUM
Login
Help
EXIT
SETUP
INPUT
Favorite CH
SEARCH
App Store
Music
Book
AMAZON
SNS
03:24 THU 08:13pm
DTV 7-1 YBC HD
CH Lady pm 08:00~08:30
2001
2002
2005
2006
2007
2008
2009
2010
2015
2017
2018
2019
2020
2021
2027
2028
2029
2030
2032
2035
2037
2040
2042
2045
2050
2052
2055
2060
2062
2065
2070
2072
2075
180
2100
2105

[Fig. 36]

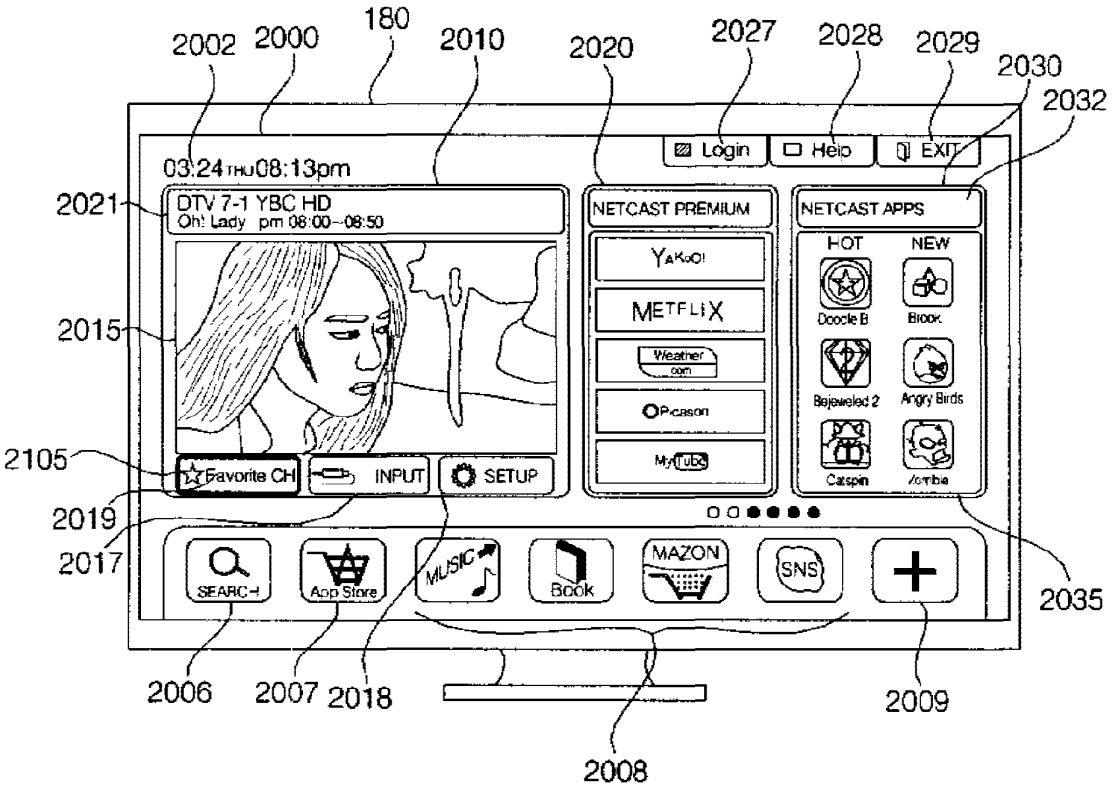

2070
RECORDED LIST
2060
FAVORITE CH
2050
TV GUIDE
2040
CHANNEL BROWSER
2030
NETCAST APPS
2020
NETCAST PREMIUM
2010
BROADCAST
180

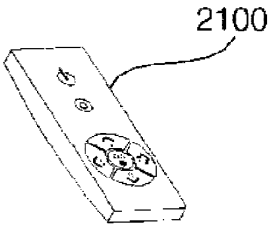
[Fig. 37]


2062
2060
2065
2002
2000
180
2010
2027
2028
2029
2070
2105
2072
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
FAVORITE CH
RECORDED LIST
Evening News
2015
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008

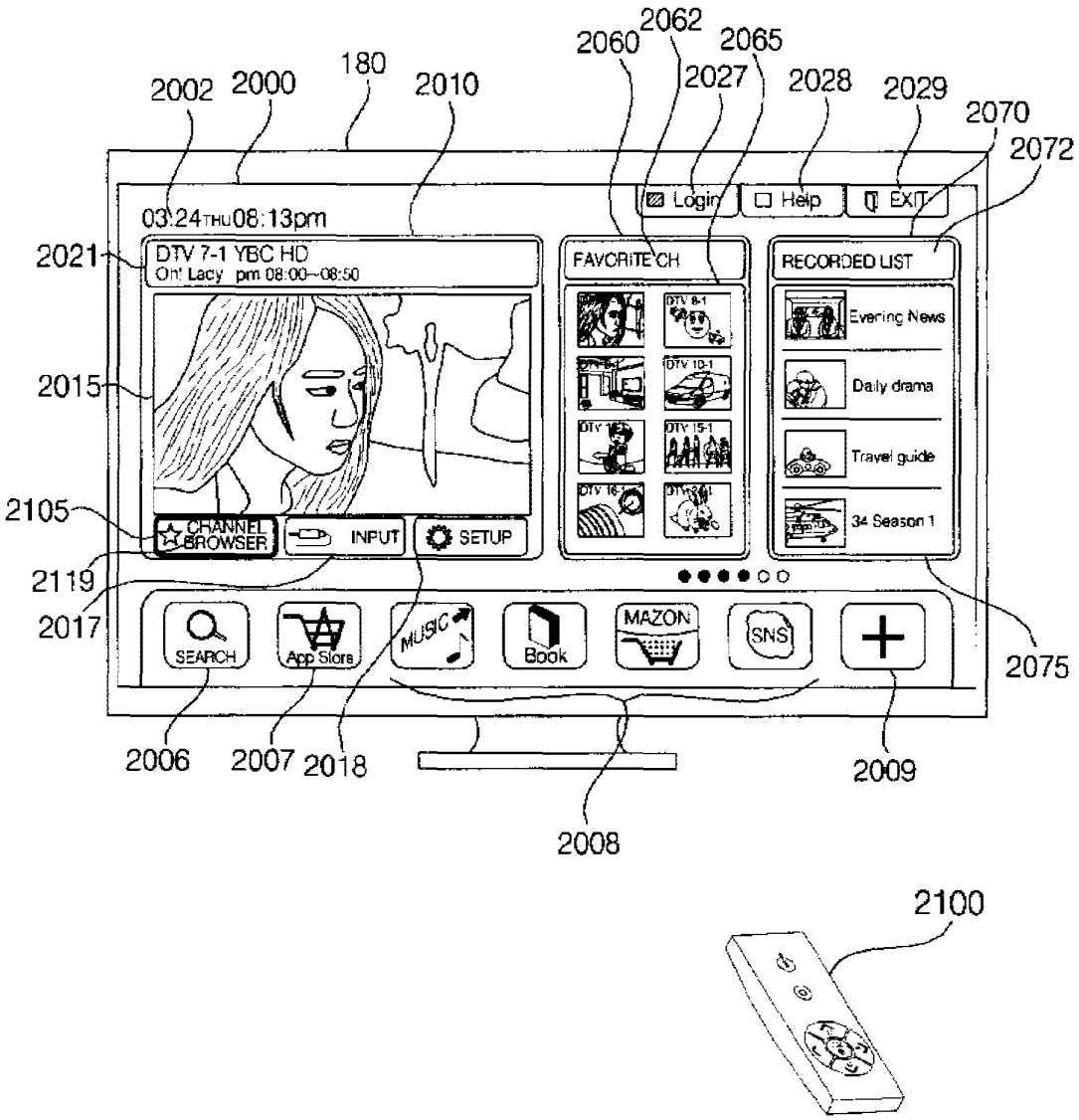
2100

[Fig. 38]


2002
2000
180
2010
2020
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2015
YAHOO!
METFLIX
Weather
Picasa
Doodle B
Block
Bejeweled 2
Angry Birds
Catspin
Zombie
2105
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2035
2006
2007
2018
2009
2008

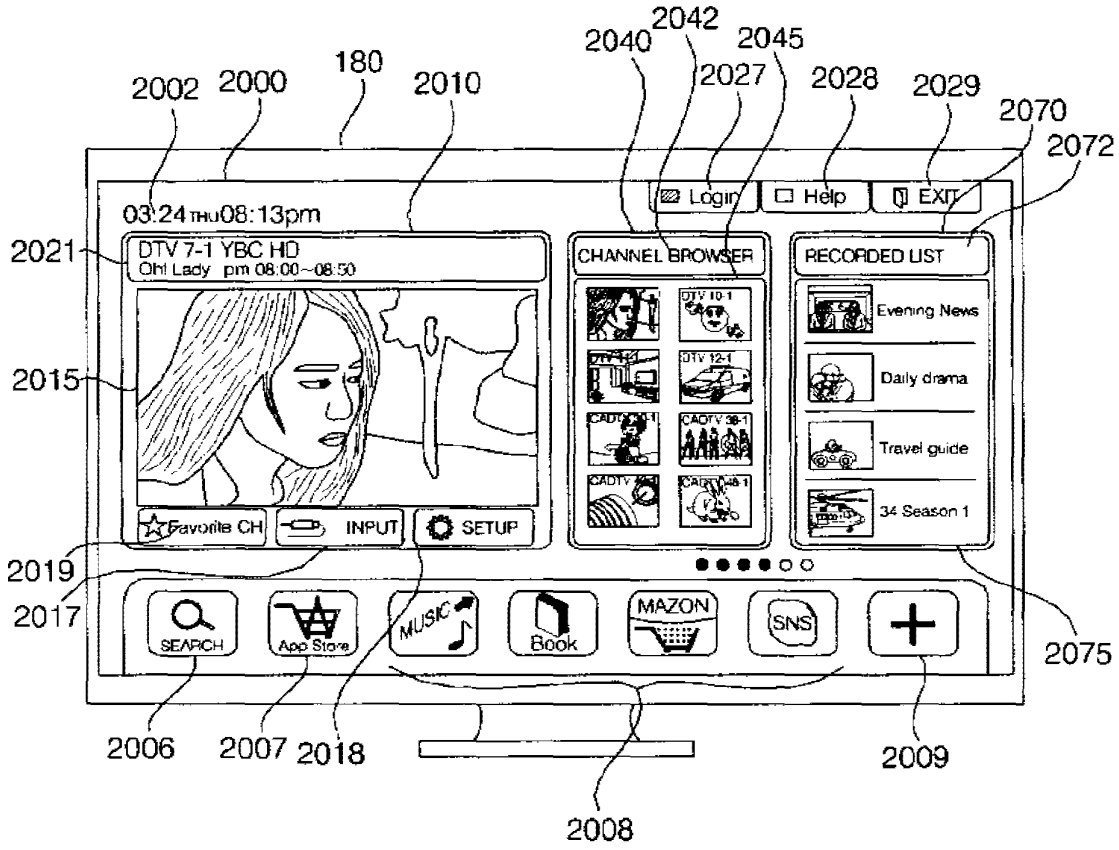

2100

[Fig. 39]

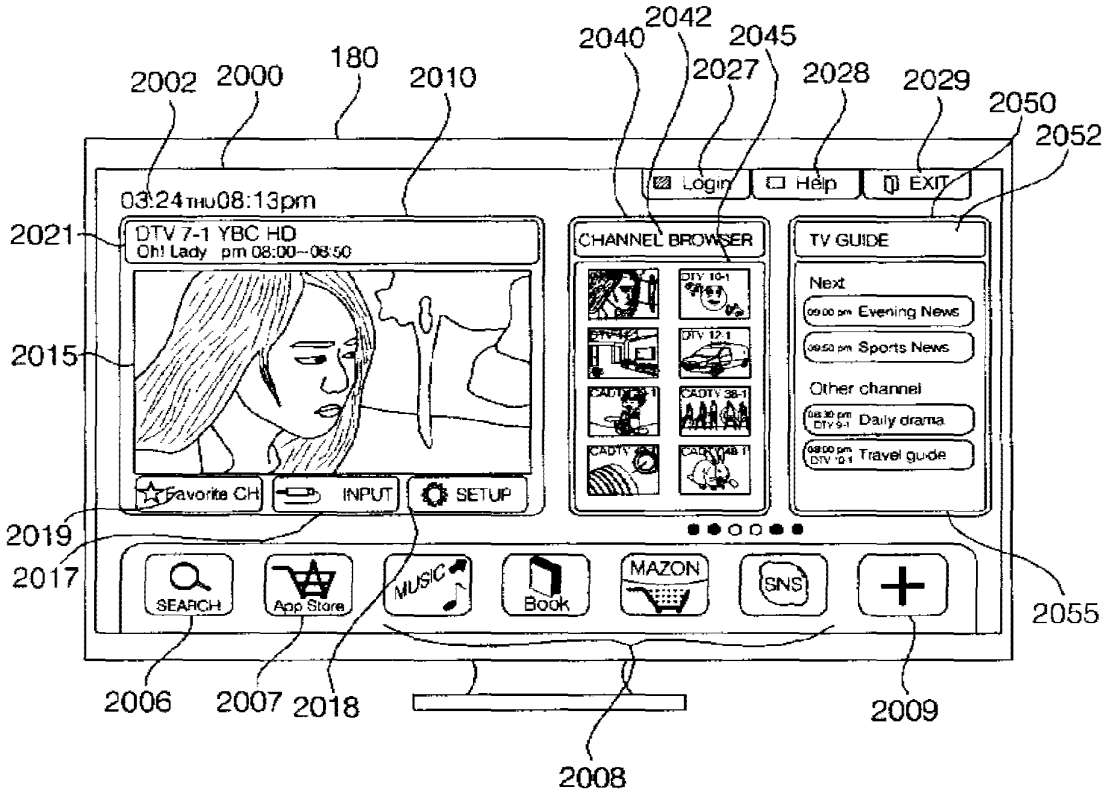

2062
2060
2065
180
2002
2000
2010
2027
2028
2029
2070
2072
Login
Help
EXIT
03.24THU08:13pm
2021
DTV 7-1 YBC HD
On Lacy pm 08:00~08:50
FAVORITE CH
RECORDED LIST
Evening News
2015
Daily drama
Travel guide
34 Season 1
2105
CHANNEL BROWSER
INPUT
SETUP
2119
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008

2100

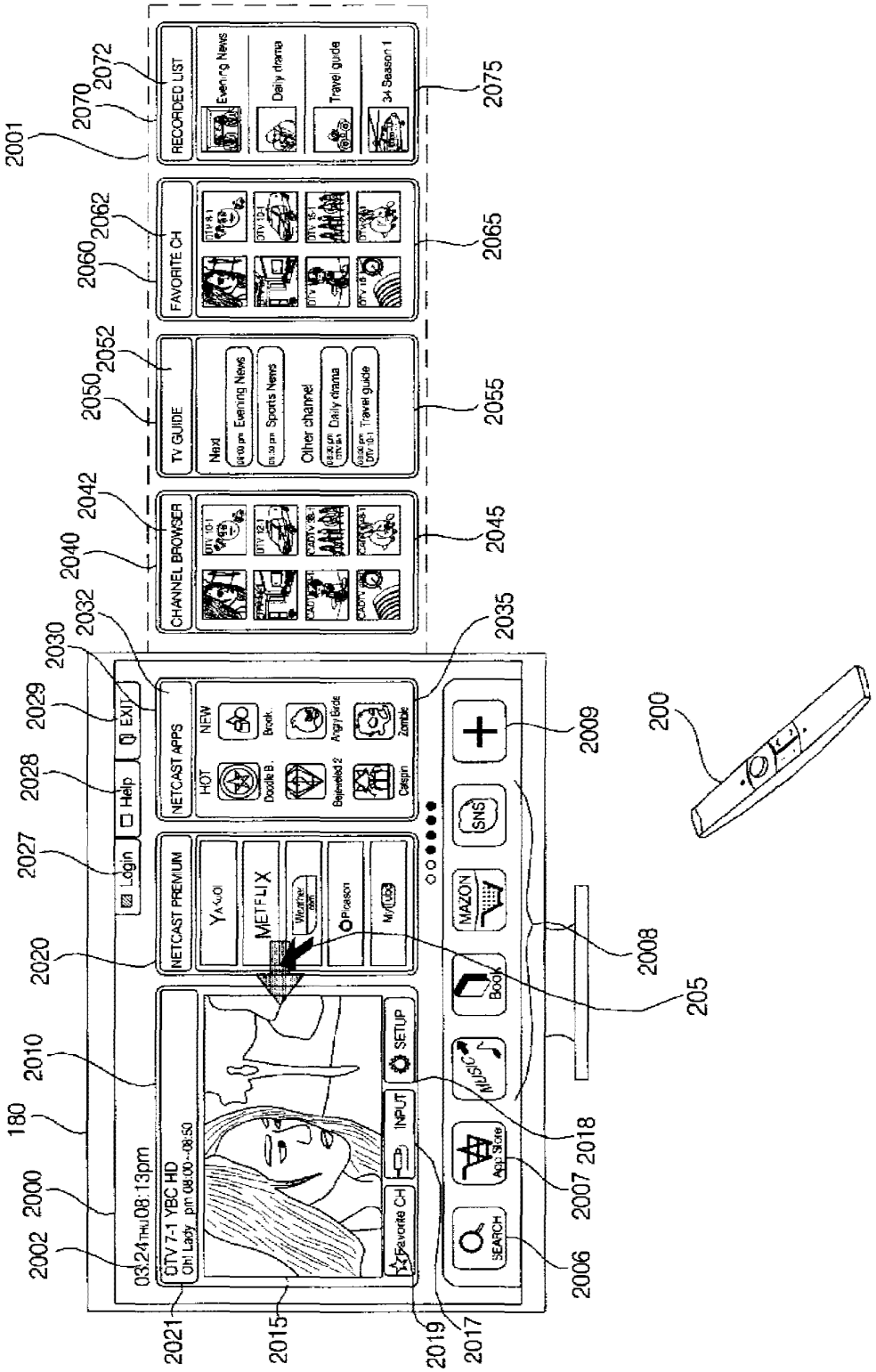
[Fig. 40]


2042
2040
2045
180
2002
2000
2010
2027
2028
2029
2070
2072
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
CHANNEL BROWSER
RECORDED LIST
Evening News
2015
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008

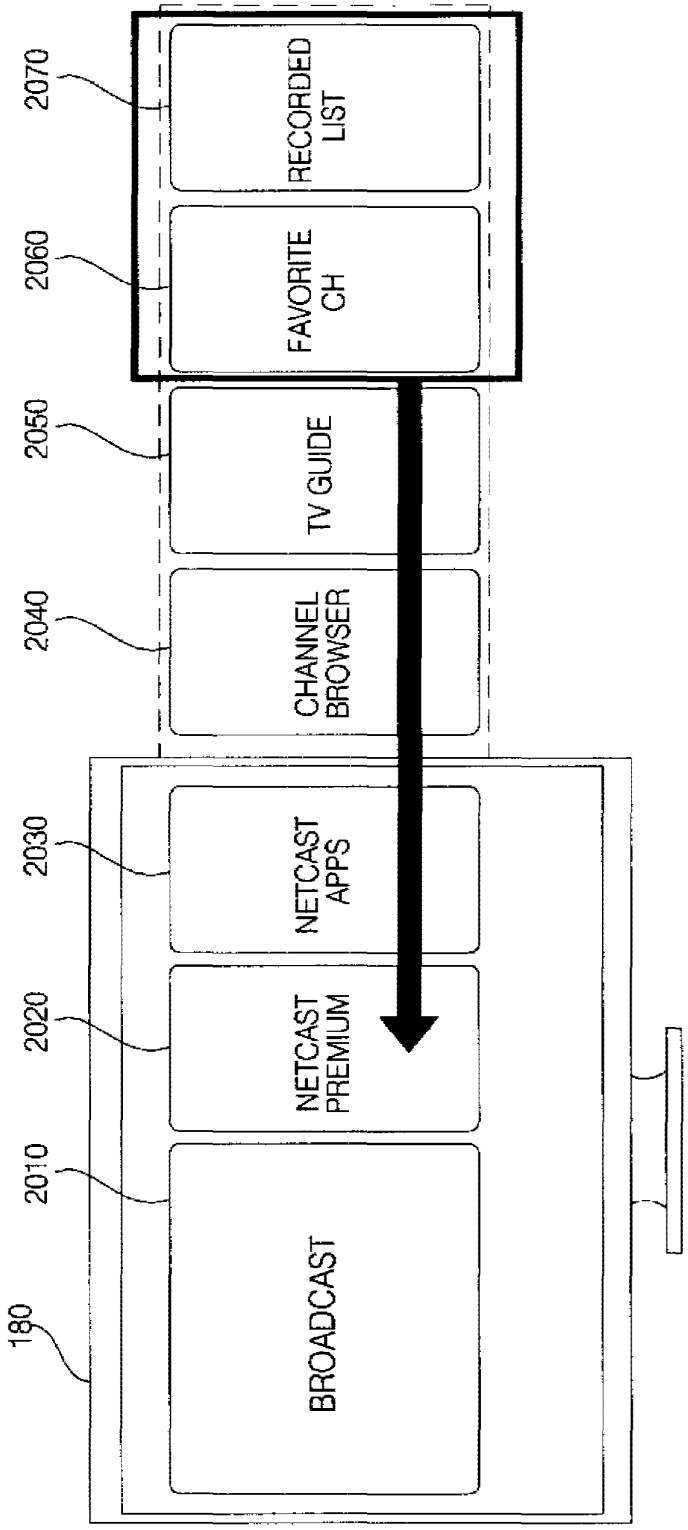
[Fig. 41]


2042
2040
2045
180
2002
2000
2010
2027
2028
2029
2050
2052
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
CHANNEL BROWSER
TV GUIDE
Next
Evening News
2015
Sports News
Other channel
Daily drama
Travel guide
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2055
2006
2007
2018
2009
2008

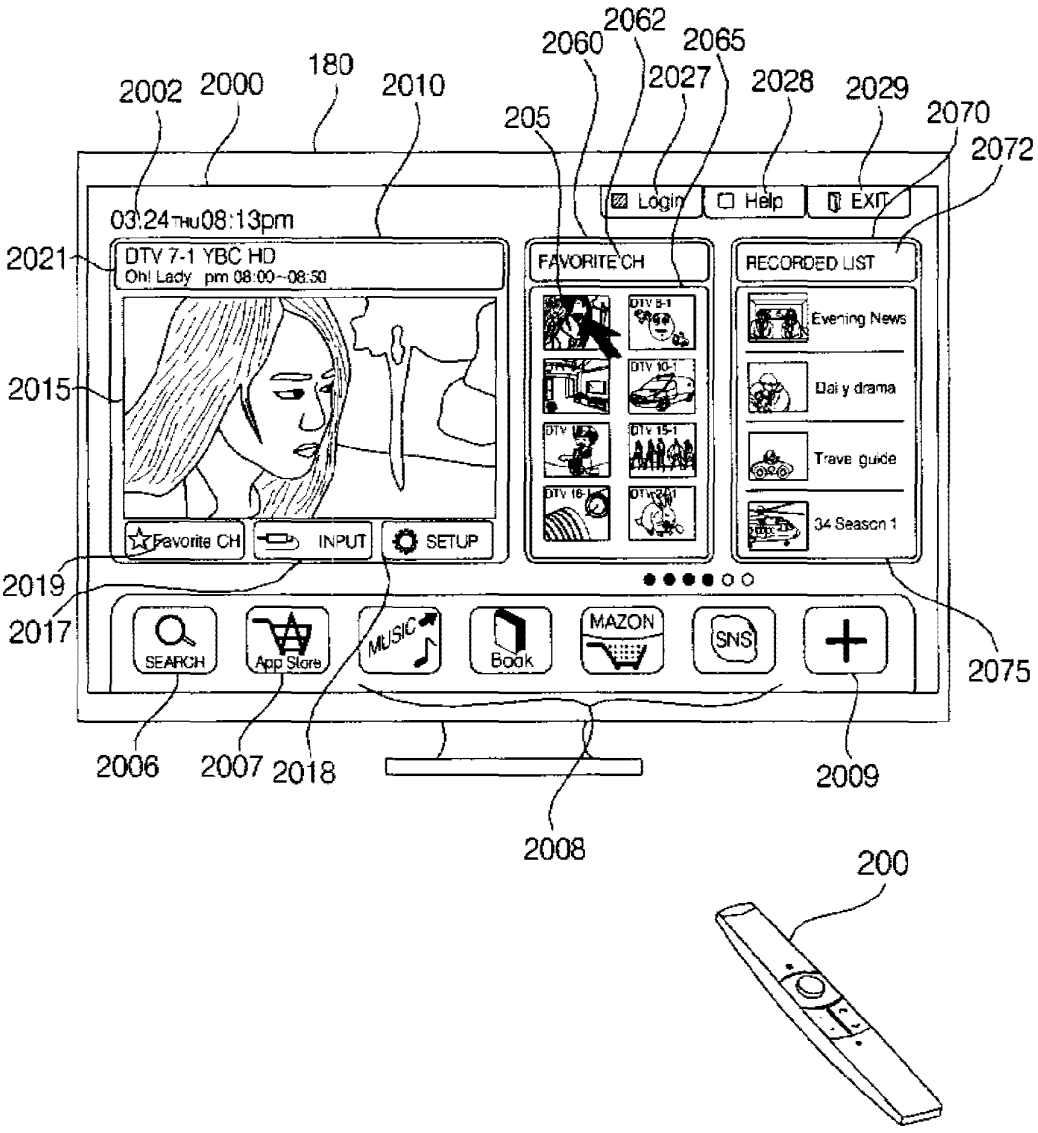
[Fig. 42]


RECORDED LIST
Evening News
Daily drama
Travel guide
34 Season 1
FAVORITE CH
TV GUIDE
Next
Evening News
Sports News
Other channel
Daily drama
Travel guide
CHANNEL BROWSER
NETCAST APPS
HOT
NEW
Doodle B.
Brook
Bejeweled 2
Angry Birds
Zombie
Caspin
NETCAST PREMIUM
YAHOO!
METFLIX
Weather
Picasso
MyTube
EXIT
Help
Login
SNS
MAZON
Book
MUSIC
App Store
SEARCH
SETUP
INPUT
Favorite CH
DTV 7-1 YBC HD
03:24THU08:13pm
180
2000
2001
2002
2006
2007
2008
2009
2010
2015
2017
2018
2019
2020
2021
2027
2028
2029
2030
2032
2035
2040
2042
2045
2050
2052
2055
2060
2062
2065
2070
2072
2075
200
205

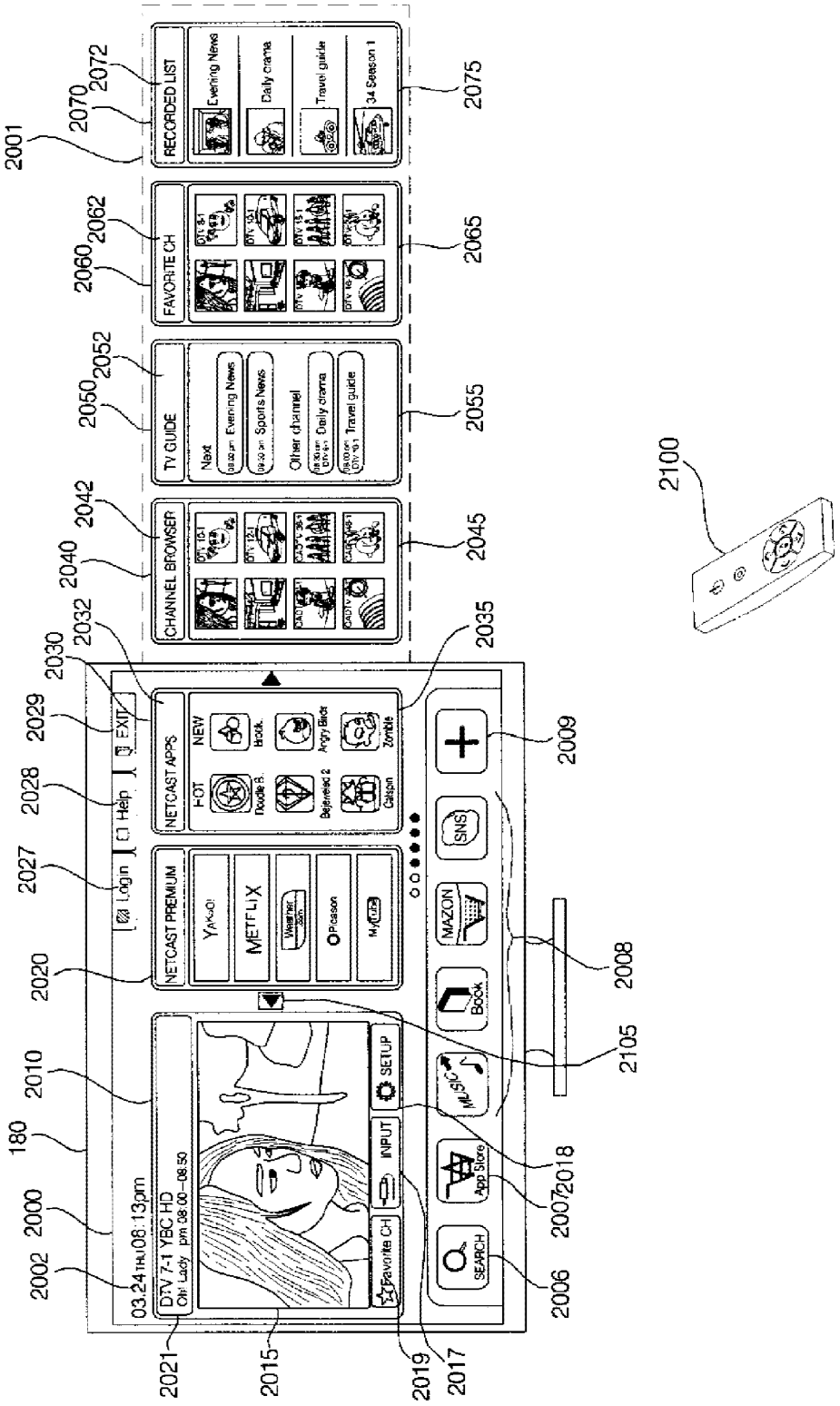
[Fig. 43]


2070
RECORDED LIST
2060
FAVORITE CH
2050
TV GUIDE
2040
CHANNEL BROWSER
2030
NETCAST APPS
2020
NETCAST PREMIUM
2010
BROADCAST
180

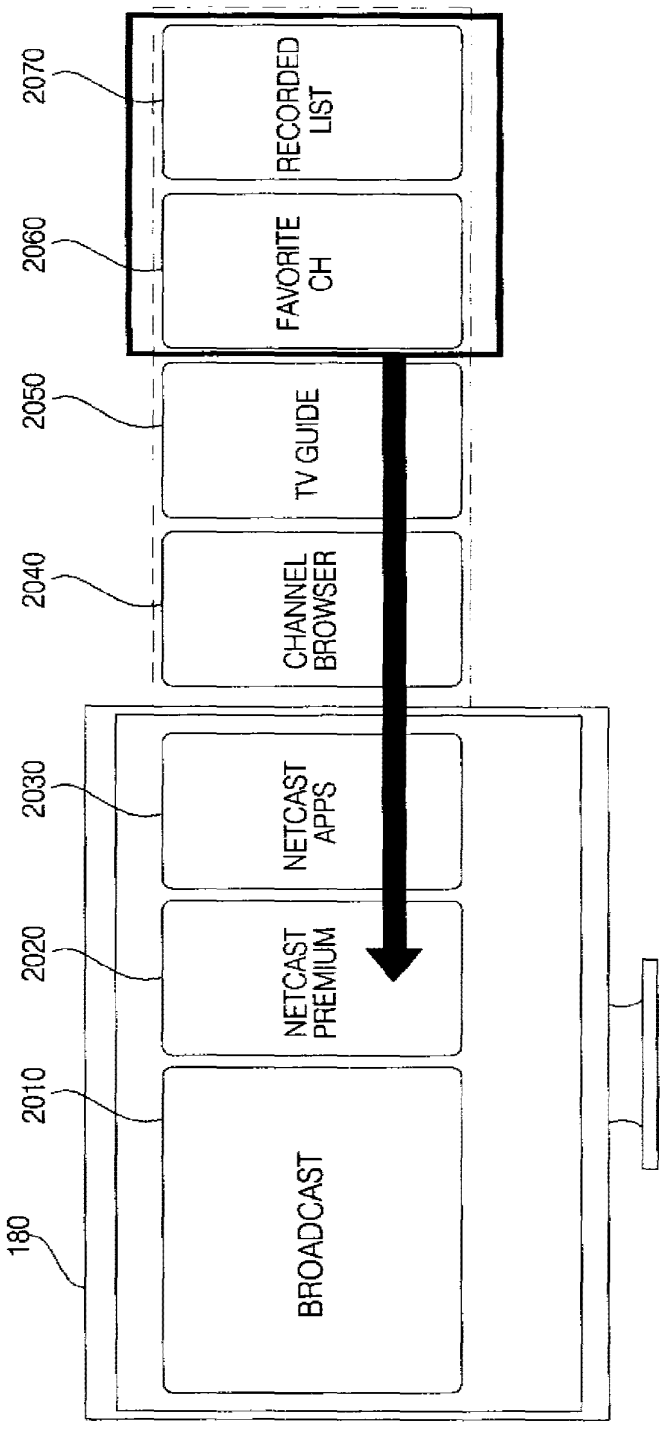
[Fig. 44]


2062
2060
2065
180
2002
2000
2010
2027
2028
2029
2070
205
2072
Login
Help
EXIT
03:24 Thu 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
FAVORITE CH
RECORDED LIST
2015
Evening News
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008
200

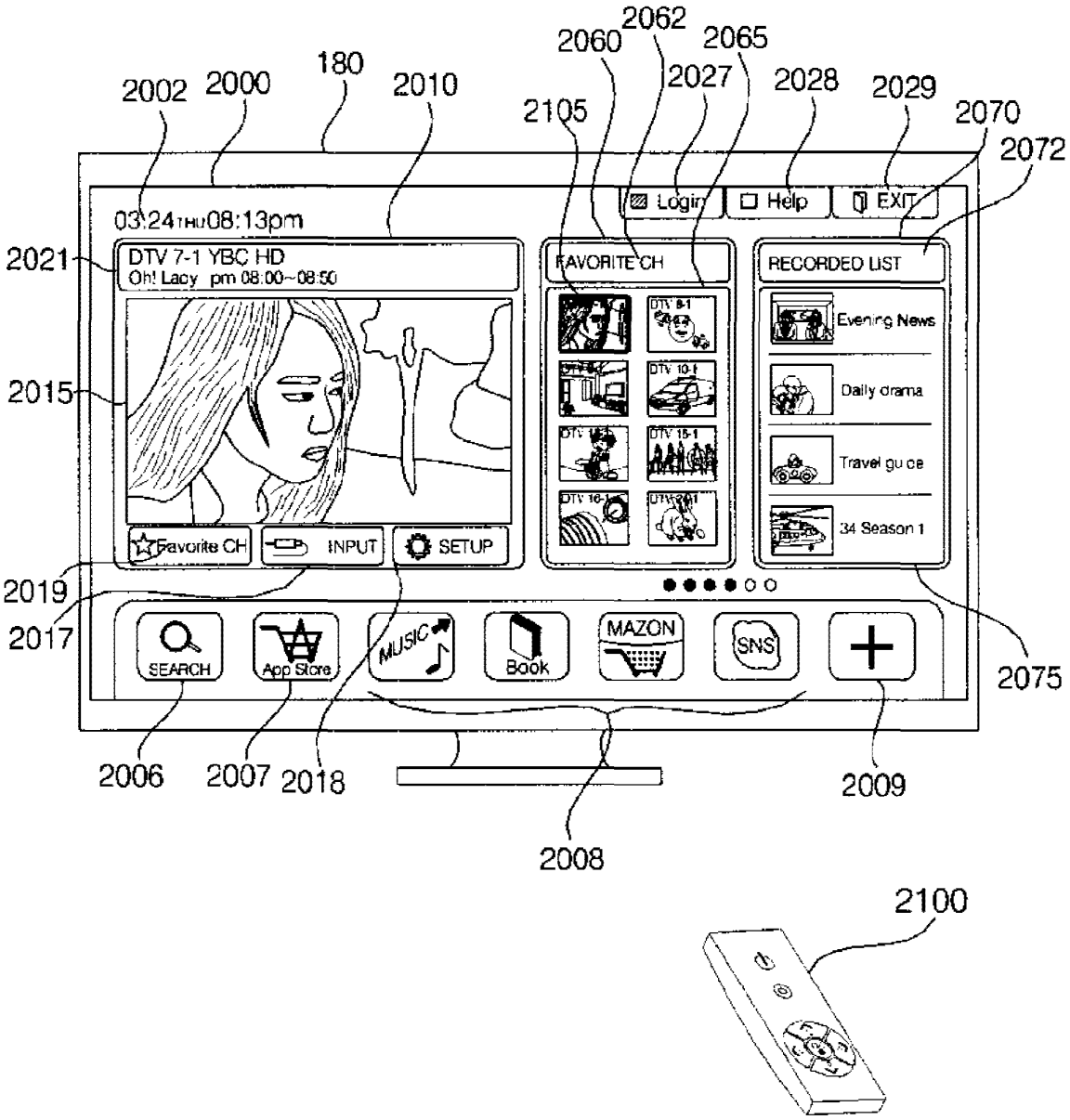
[Fig. 45]


2001
2070
2072
RECORDED LIST
Evening News
Daily crama
Travel guide
34 Season 1
2075
2060
2062
FAVORITE CH
2065
2050
2052
TV GUIDE
Next
Other channel
2055
2040
2042
CHANNEL BROWSER
2045
2030
2032
2035
2029
EXIT
2028
Help
2027
Login
2020
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2009
2008
2105
2010
180
2000
2002
03.24 THU 08:13 pm
DTV 7-1 YBC HD
Oh! Lady pm 08:00 ~ 08:59
SETUP
INPUT
Favorite CH
SEARCH
App Store
BOOK
SNS
2007
2018
2006
2021
2015
2019
2017
2100

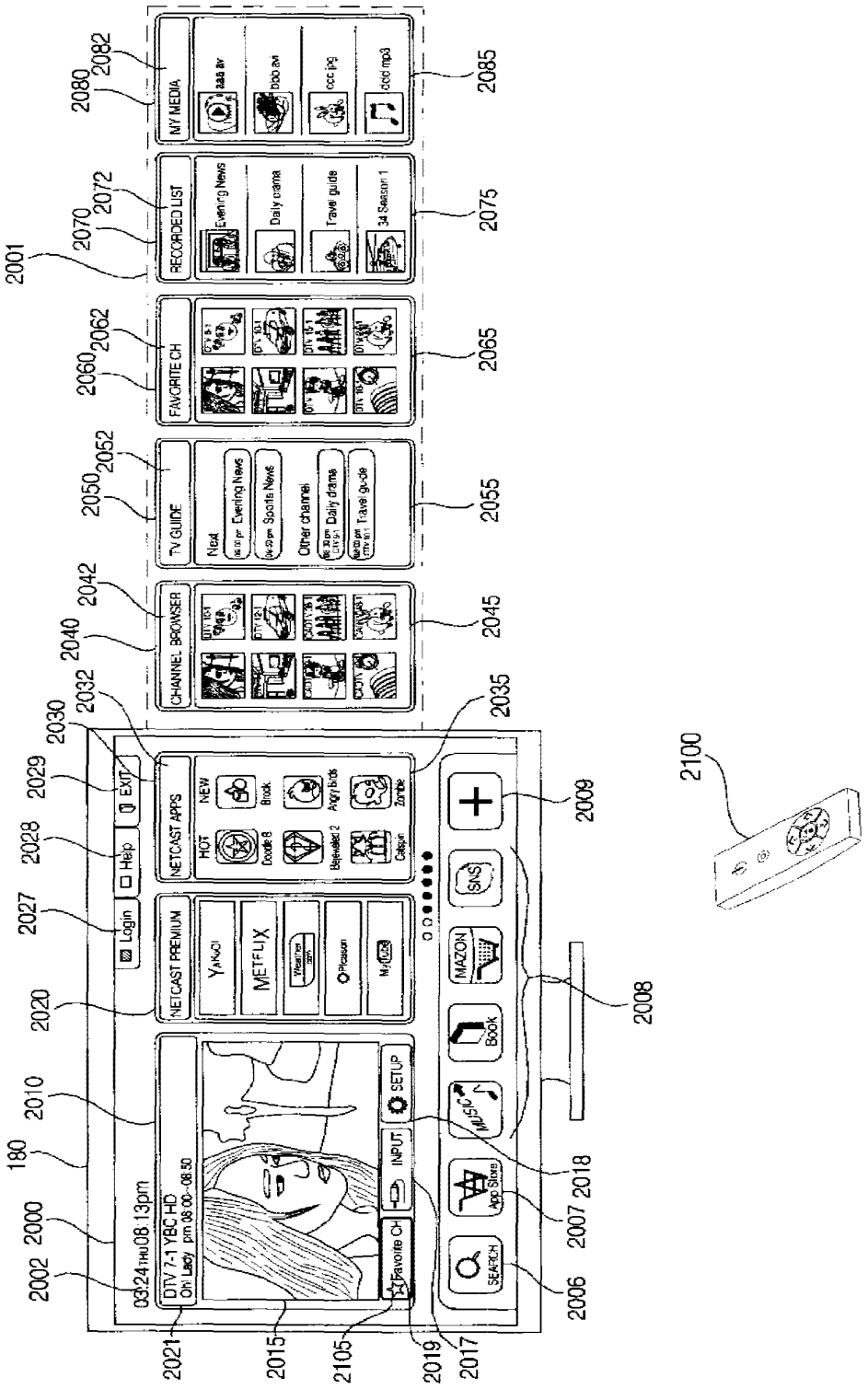
[Fig. 46]


2070
RECORDED LIST
2060
FAVORITE CH
2050
TV GUIDE
2040
CHANNEL BROWSER
2030
NETCAST APPS
2020
NETCAST PREMIUM
2010
BROADCAST
180

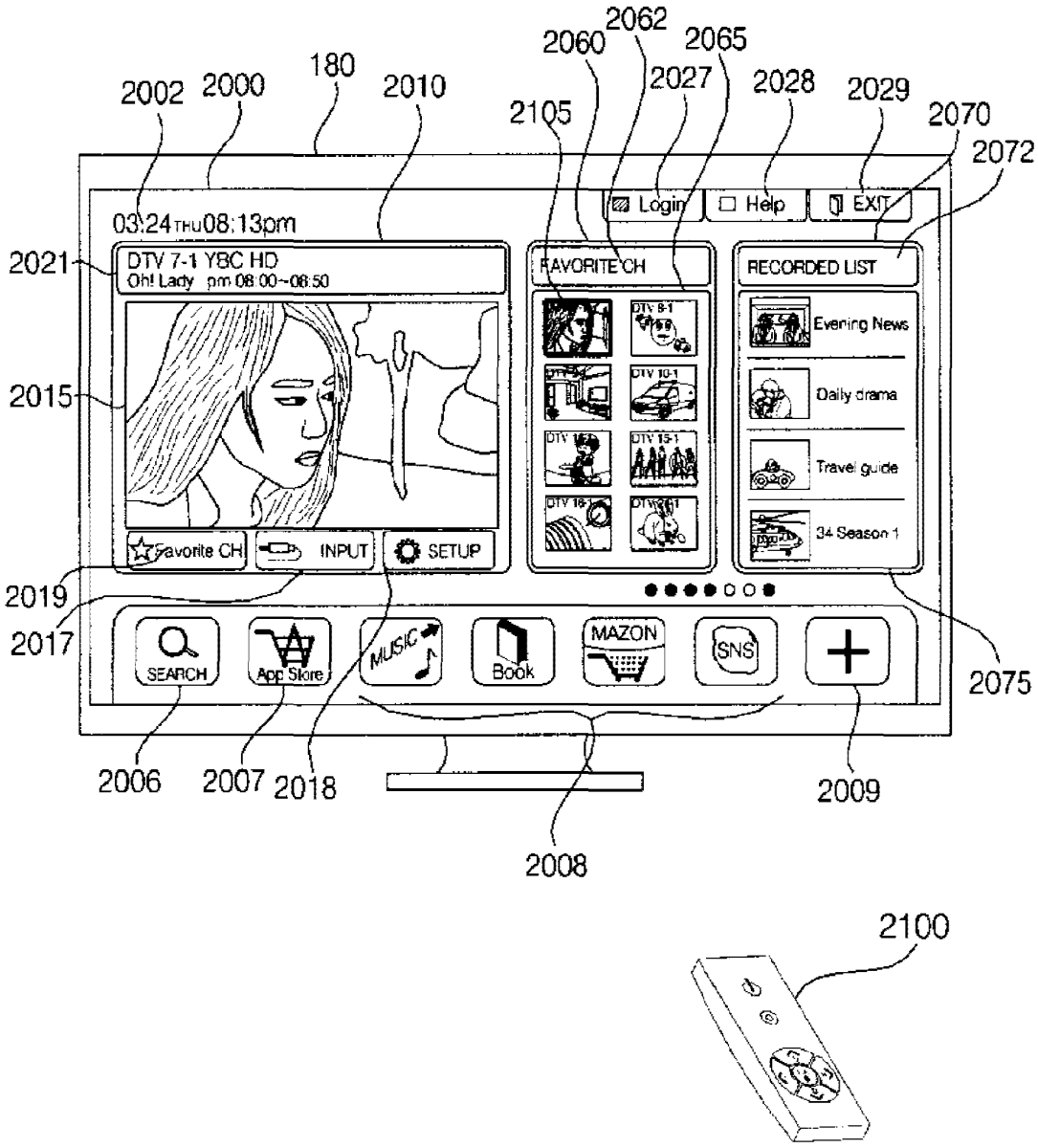
[Fig. 47]


2062
2060
2065
180
2002
2000
2010
2027
2028
2029
2105
2070
2072
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lacy pm 08:00~08:50
FAVORITE CH
RECORDED LIST
2015
Evening News
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008
2100

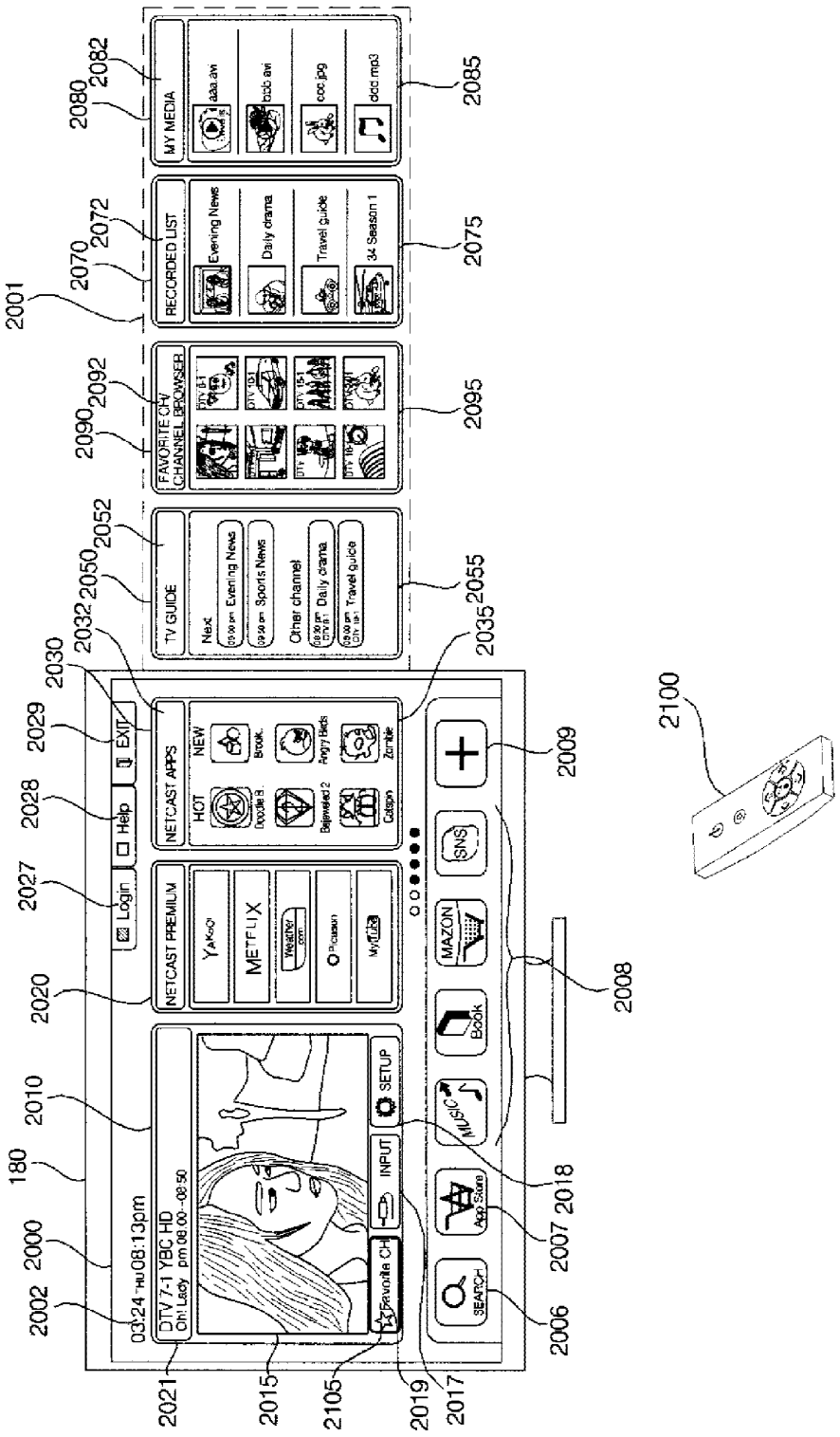
[Fig. 48]


2001
2080
2082
MY MEDIA
2085
2070
2072
RECORDED LIST
Evening News
Daily drama
Travel guide
34 Season 1
2075
2060
2062
FAVORITE CH
2065
2050
2052
TV GUIDE
Next
Evening News
Sports News
Other channel
Daily drama
Travel guide
2055
2040
2042
CHANNEL BROWSER
2045
2030
2032
2035
2029
EXIT
2028
Help
2027
Login
NETCAST APPS
NEW
HOT
2020
NETCAST PREMIUM
YAHOO!
METFLIX
Picasa
2009
SNS
NAZON
BOOK
MUSIC
App Store
SEARCH
2008
2100
180
2010
2000
2002
03:24 THU 08.13pm
DTV 7-1 YBC HD
On Lady pm 08:00~08:50
Favorite CH
INPUT
SETUP
2006
2007
2018
2021
2015
2105
2019
2017

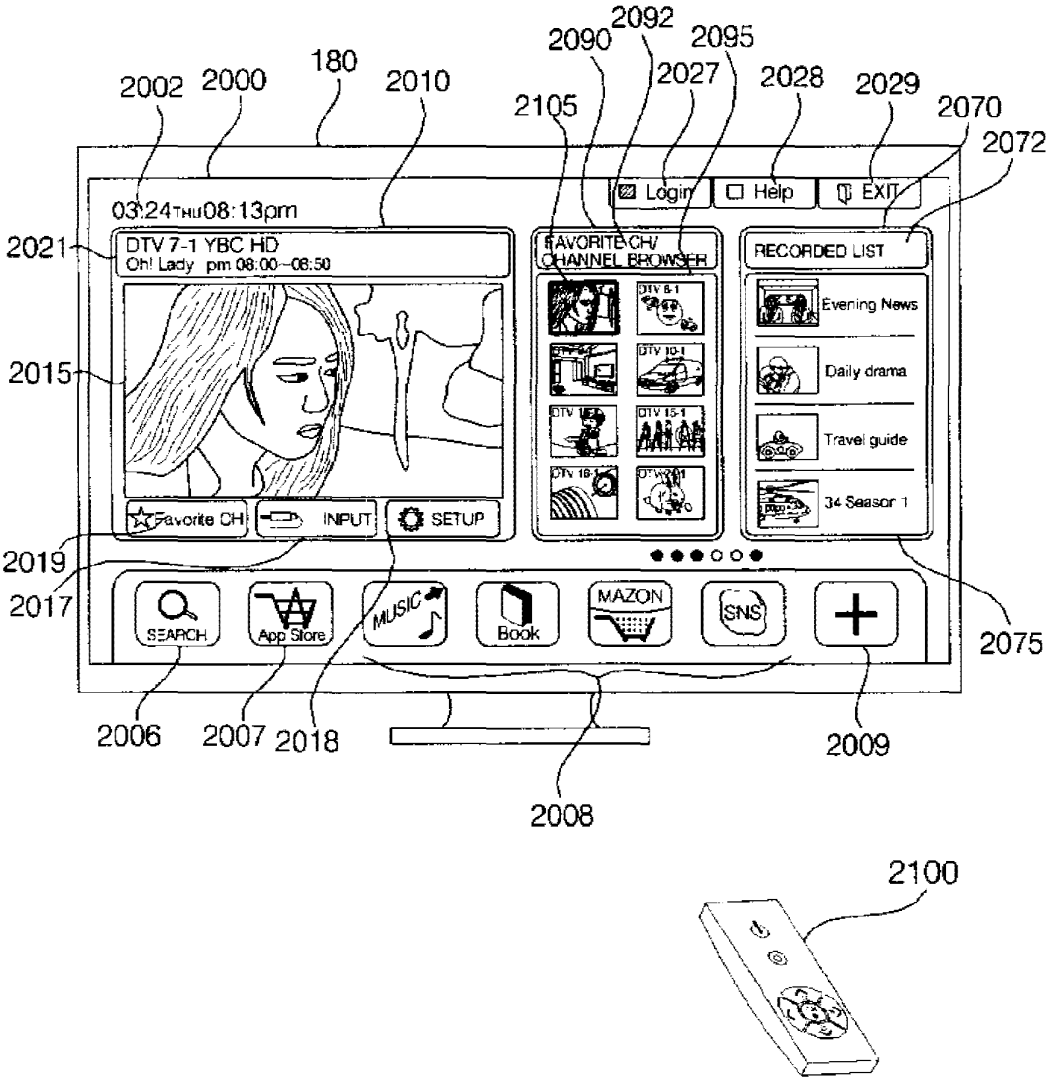
[Fig. 49]


2062
2060
2065
180
2002
2000
2010
2027
2028
2029
2105
2070
2072
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
FAVORITE CH
RECORDED LIST
Evening News
2015
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008
2100

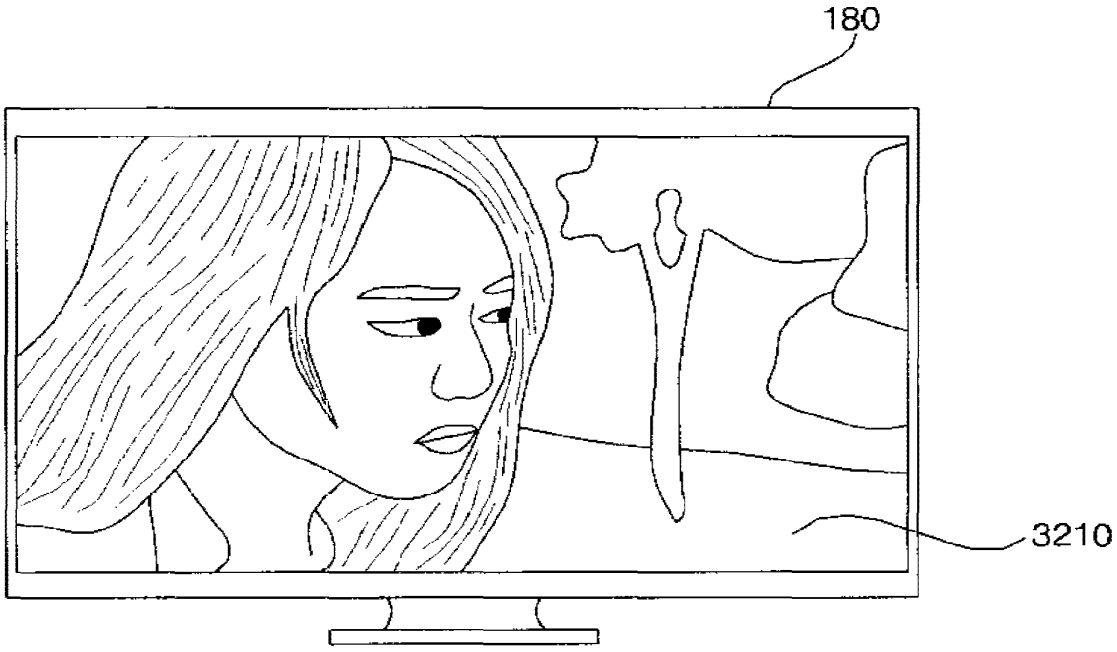
[Fig. 50]


MY MEDIA
aaa.avi
bbb.avi
ccc.jpg
ddd.mp3
RECORDED LIST
Evening News
Daily drama
Travel guide
34 Season 1
FAVORITE CH/ CHANNEL BROWSER
TV GUIDE
Next
Evening News
Sports News
Other channel
Daily drama
Travel guide
NETCAST APPS
HOT
NEW
Angry Birds
Zombie
Login
Help
EXIT
NETCAST PREMIUM
METFLIX
Weather.com
Picasso
MyTube
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
03:24 Thu 08:13pm
Favorite CH
INPUT
SETUP
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2001
2002
2000
180
2010
2020
2027
2028
2029
2030
2032
2035
2050
2052
2055
2070
2072
2075
2080
2082
2085
2090
2092
2095
2021
2015
2105
2019
2017
2006
2007
2018
2008
2009
2100

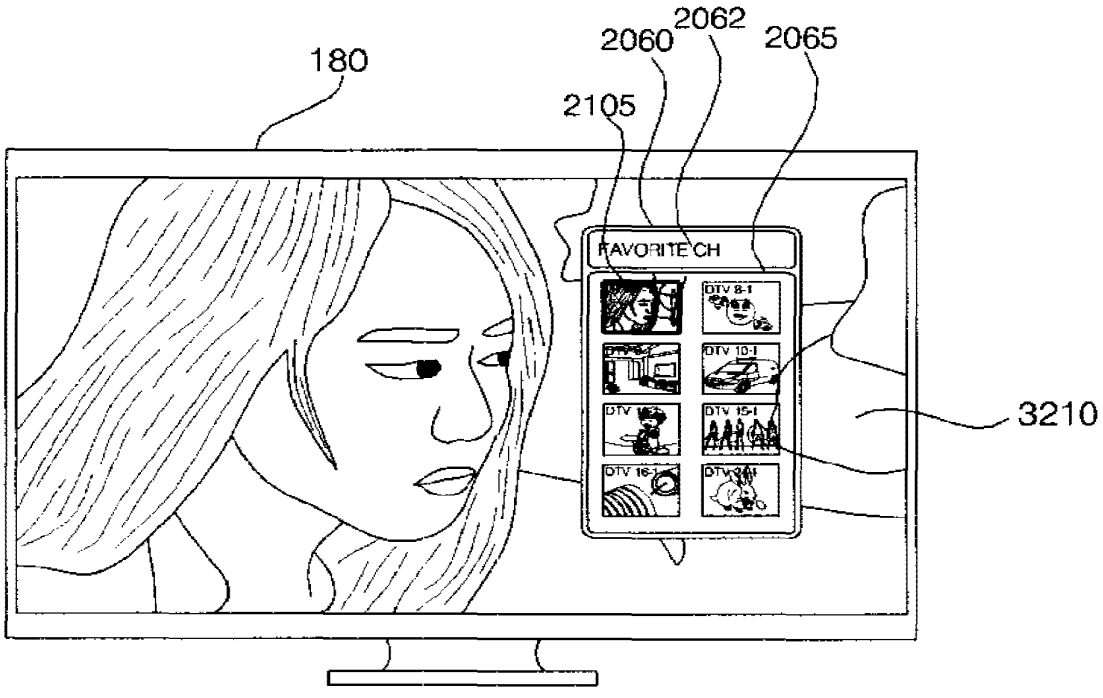
[Fig. 51]


2092
2090
2095
2002
2000
180
2010
2027
2028
2029
2105
2070
2072
Login
Help
EXIT
03:24THU08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
FAVORITE CH/
CHANNEL BROWSER
RECORDED LIST
Evening News
2015
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008
2100

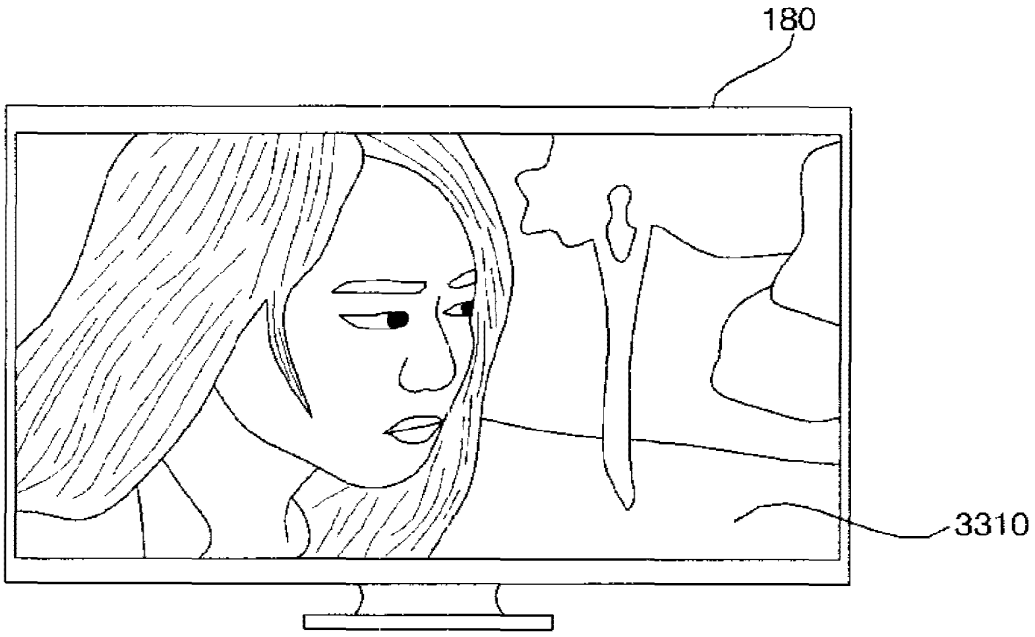
[Fig. 52]



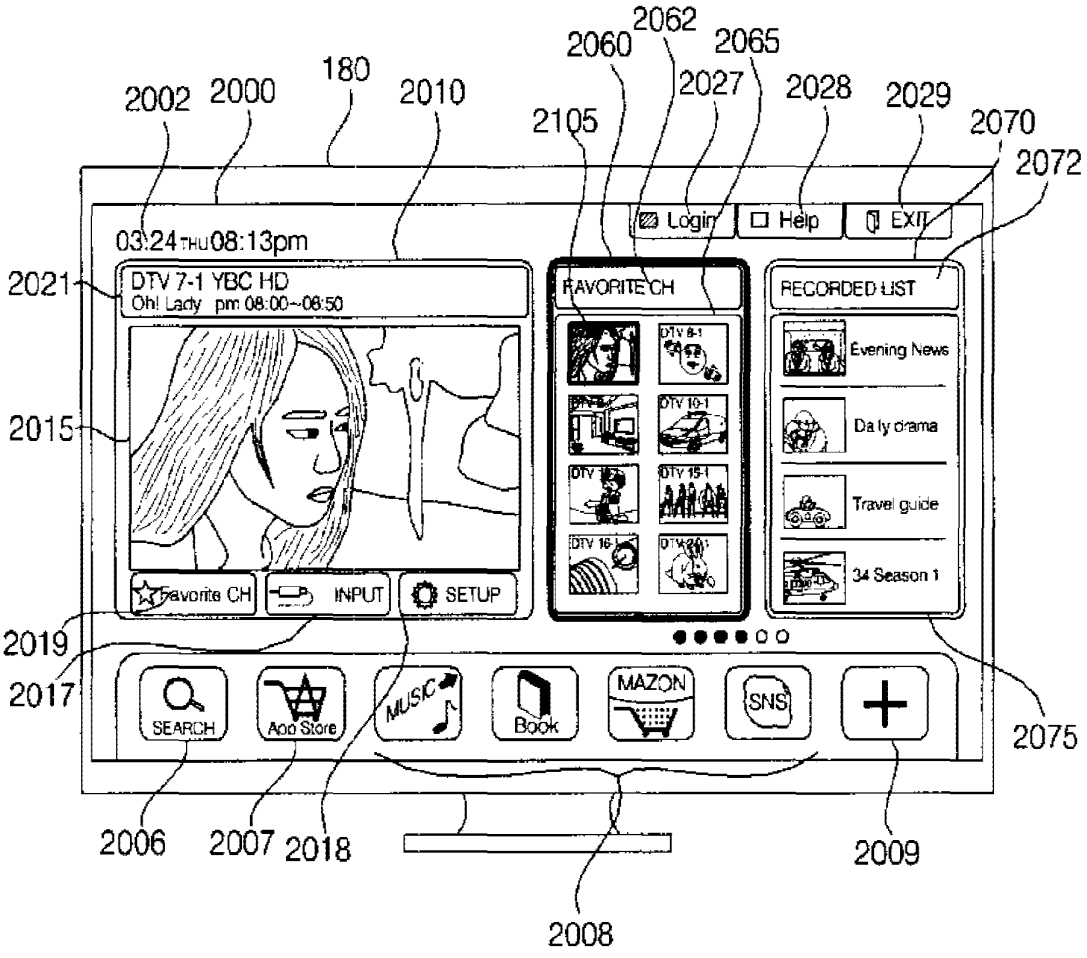
[Fig. 53]



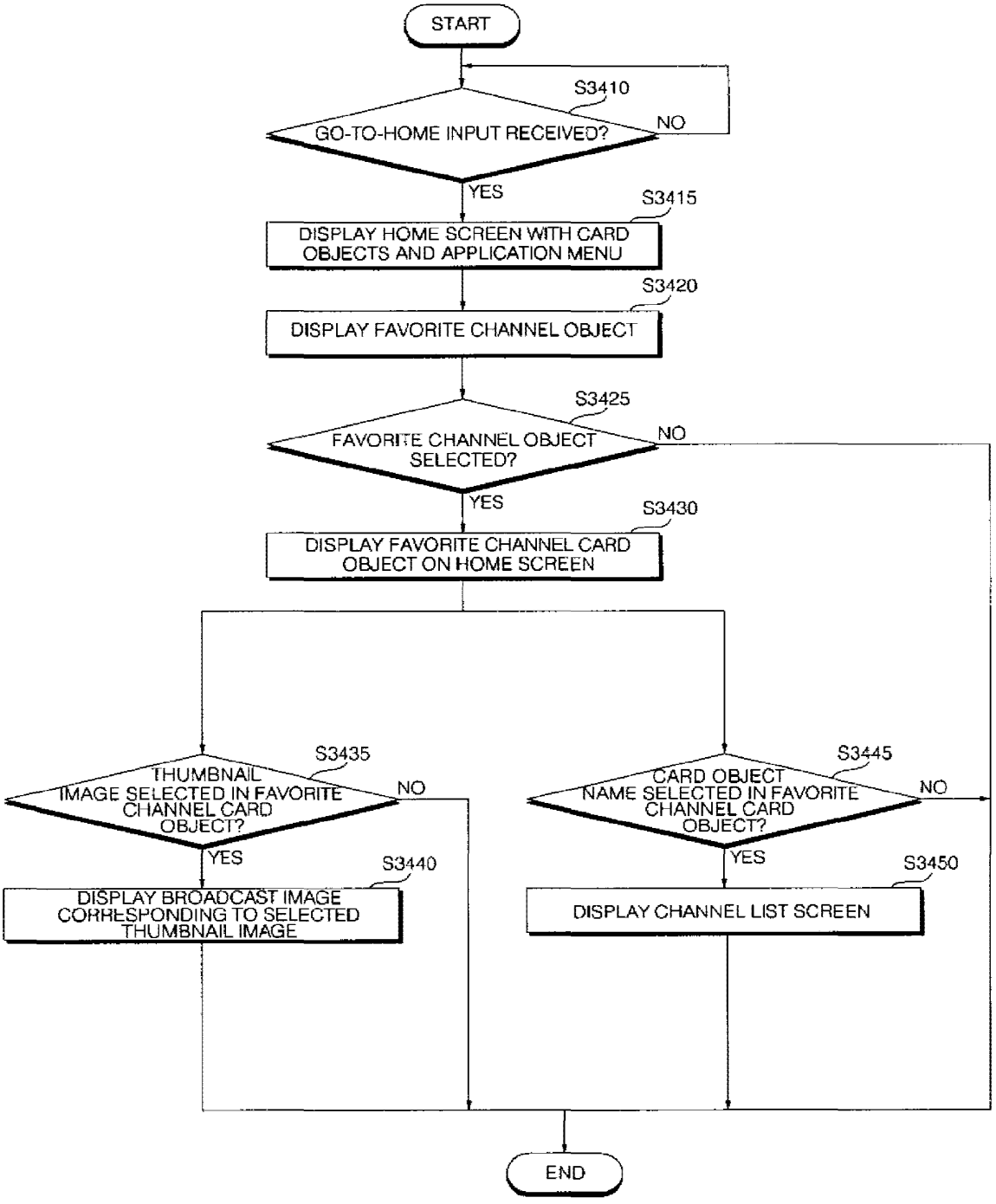
[Fig. 54]


180
3310

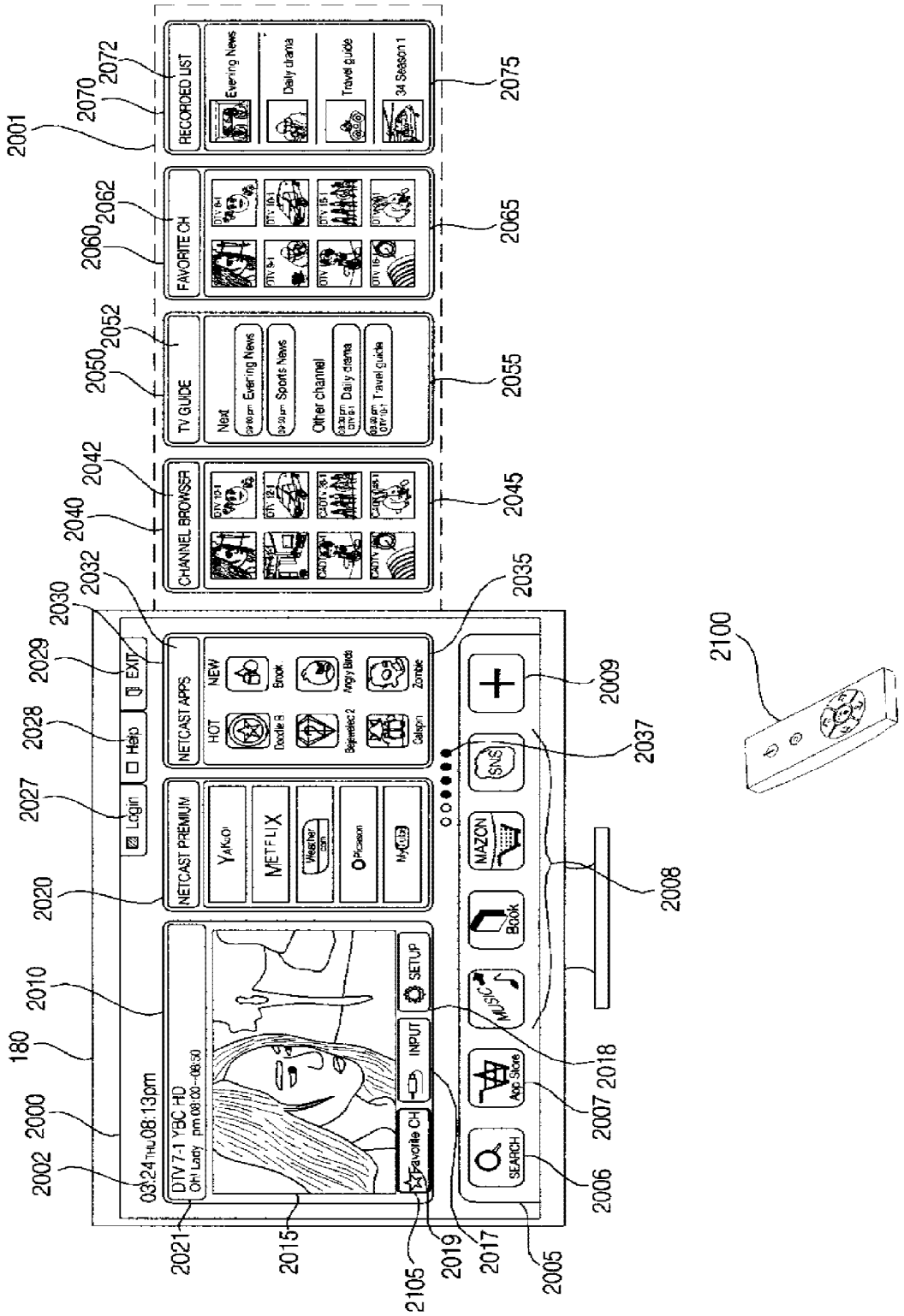
[Fig. 55]


2062
2060
2065
180
2002
2000
2010
2027
2028
2029
2070
2105
2072
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
FAVORITE CH
RECORDED LIST
Evening News
2015
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008

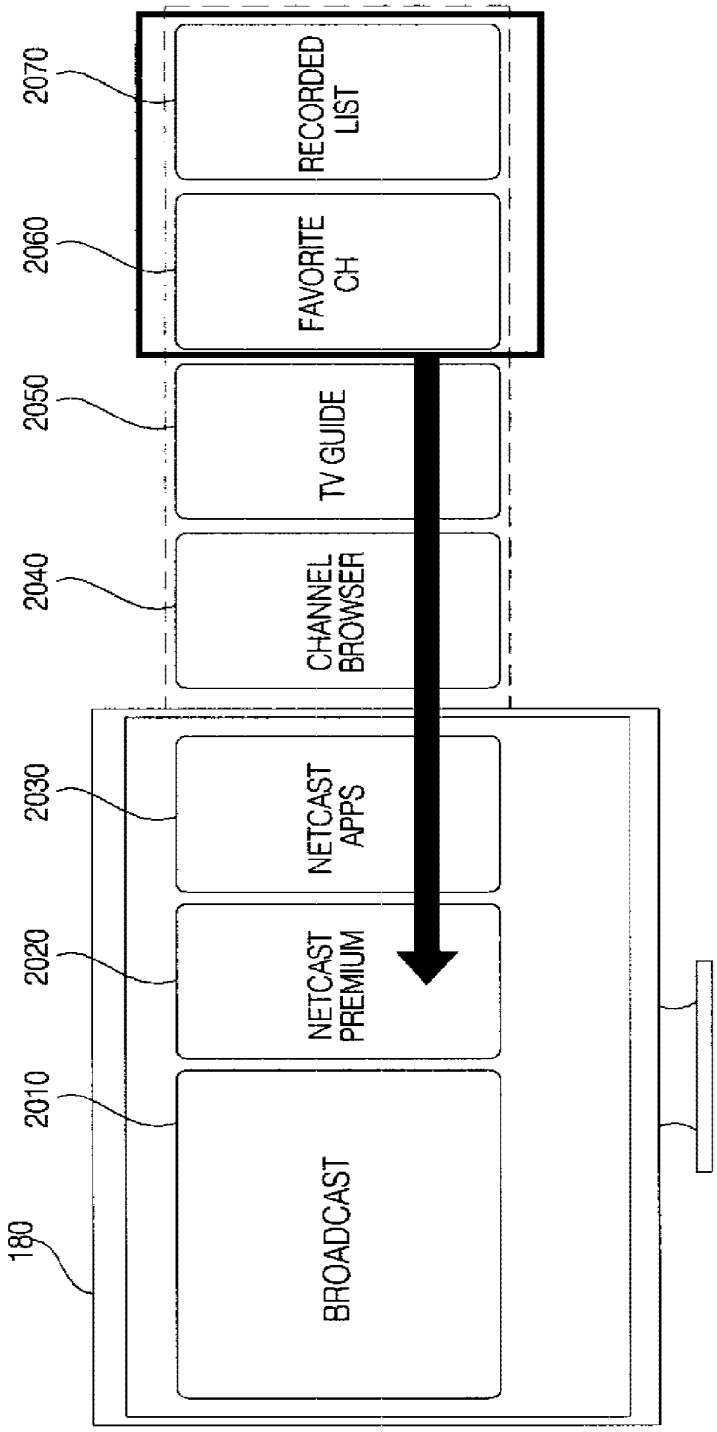
[Fig. 56]


START
S3410
GO-TO-HOME INPUT RECEIVED?
NO
YES
S3415
DISPLAY HOME SCREEN WITH CARD OBJECTS AND APPLICATION MENU
S3420
DISPLAY FAVORITE CHANNEL OBJECT
S3425
FAVORITE CHANNEL OBJECT SELECTED?
NO
YES
S3430
DISPLAY FAVORITE CHANNEL CARD OBJECT ON HOME SCREEN
S3435
THUMBNAIL IMAGE SELECTED IN FAVORITE CHANNEL CARD OBJECT?
NO
YES
S3440
DISPLAY BROADCAST IMAGE CORRESPONDING TO SELECTED THUMBNAIL IMAGE
S3445
CARD OBJECT NAME SELECTED IN FAVORITE CHANNEL CARD OBJECT?
NO
YES
S3450
DISPLAY CHANNEL LIST SCREEN
END

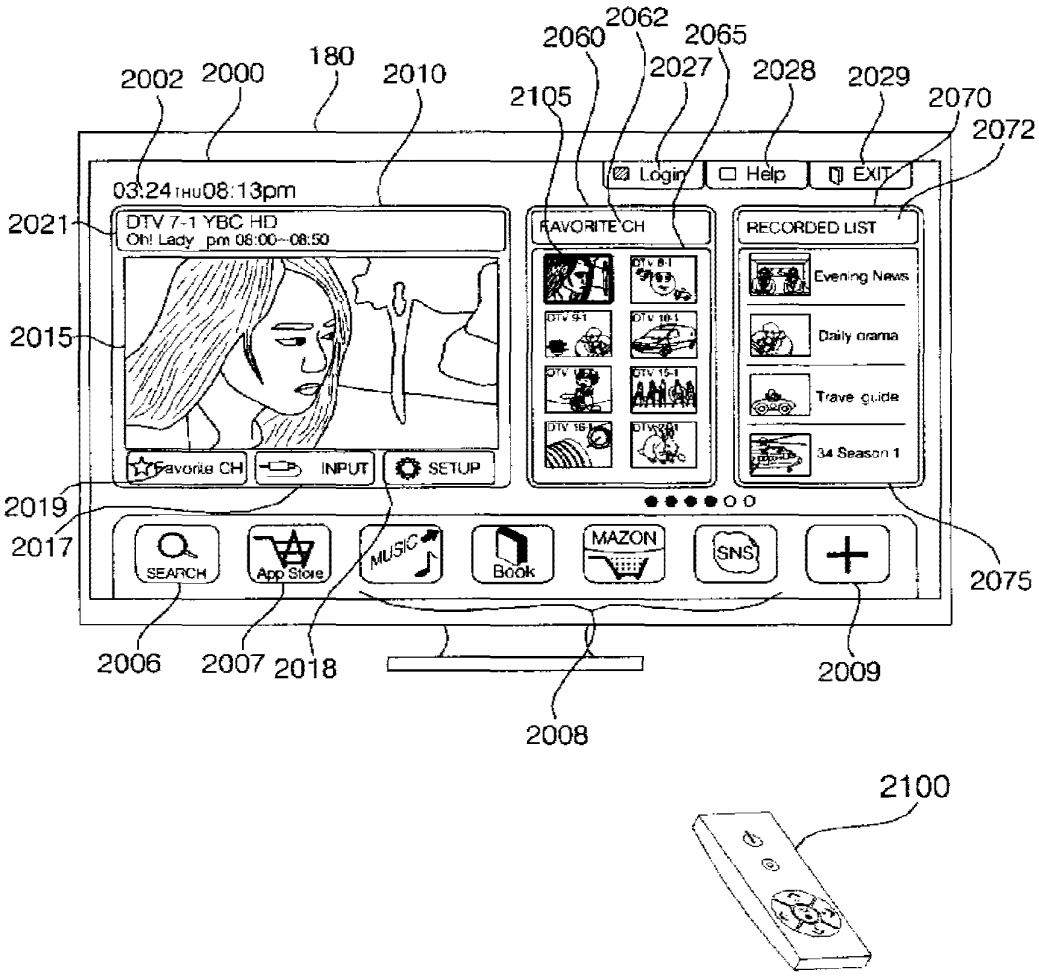
[Fig. 57]


RECORDED LIST
Evening News
Daily drama
Travel guide
34 Season 1
FAVORITE CH
TV GUIDE
Next
Evening News
Sports News
Other channel
Daily drama
Travel guide
CHANNEL BROWSER
NETCAST APPS
HOT
NEW
NETCAST PREMIUM
Login
Help
EXIT
SETUP
INPUT
Favorite CH
SEARCH
App Store
Book
SNS
2100
2105

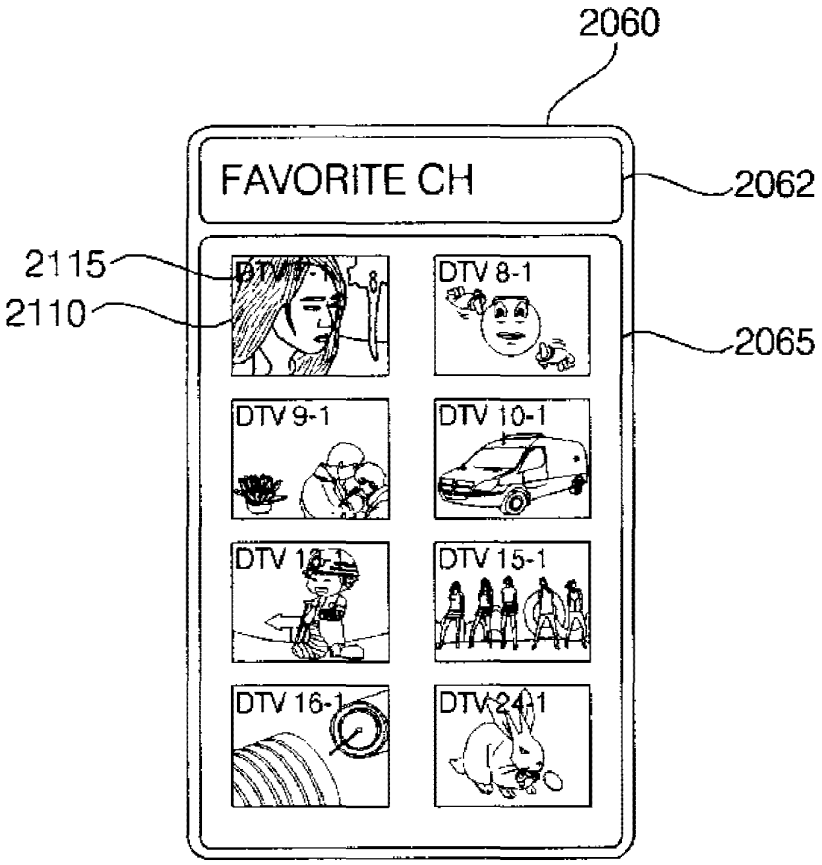
[Fig. 58]


2070
RECORDED LIST
2060
FAVORITE CH
2050
TV GUIDE
2040
CHANNEL BROWSER
2030
NETCAST APPS
2020
NETCAST PREMIUM
2010
BROADCAST
180

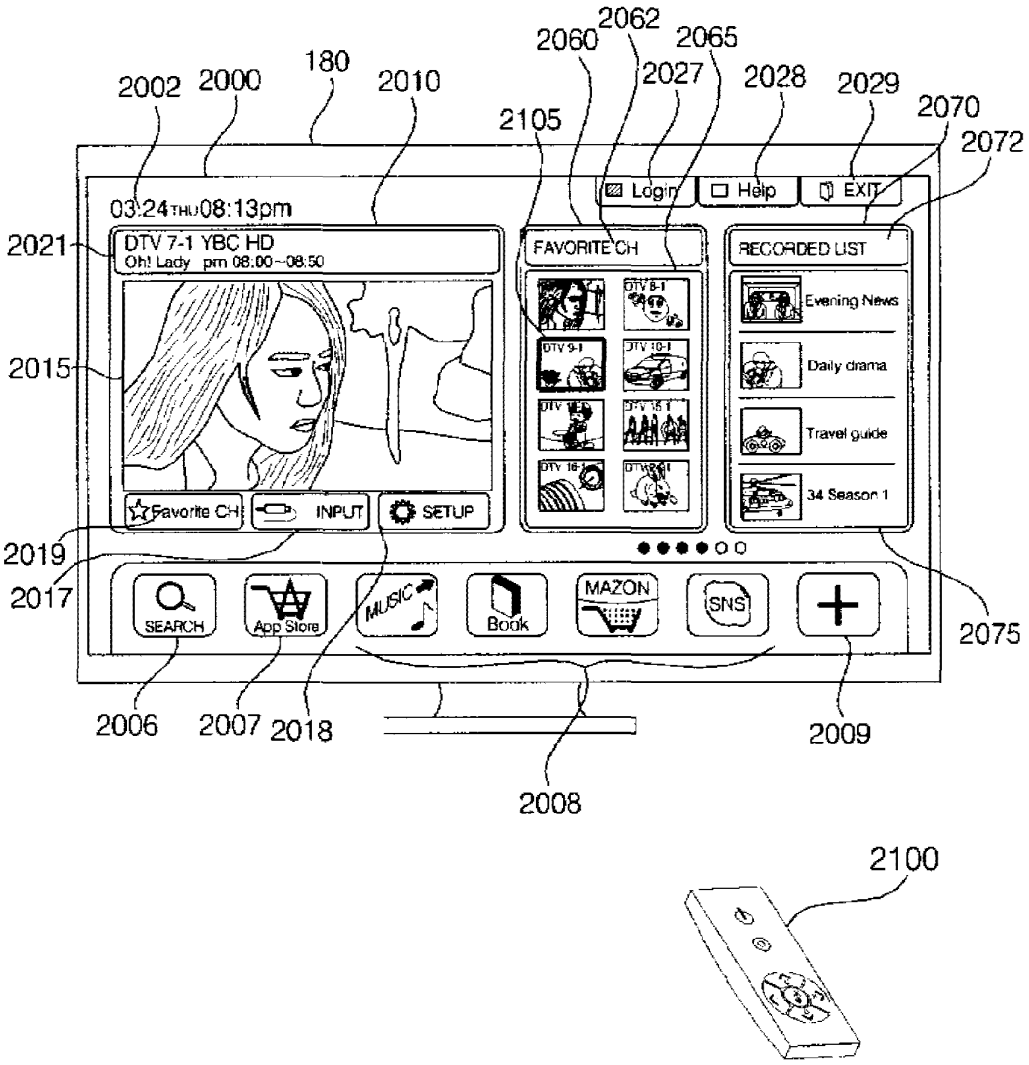
[Fig. 59]


2062
2060
2065
2027
2028
2029
2070
2072
2002
2000
180
2010
2105
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
FAVORITE CH
RECORDED LIST
Evening News
Daily drama
Trave guide
34 Season 1
2015
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008
2100

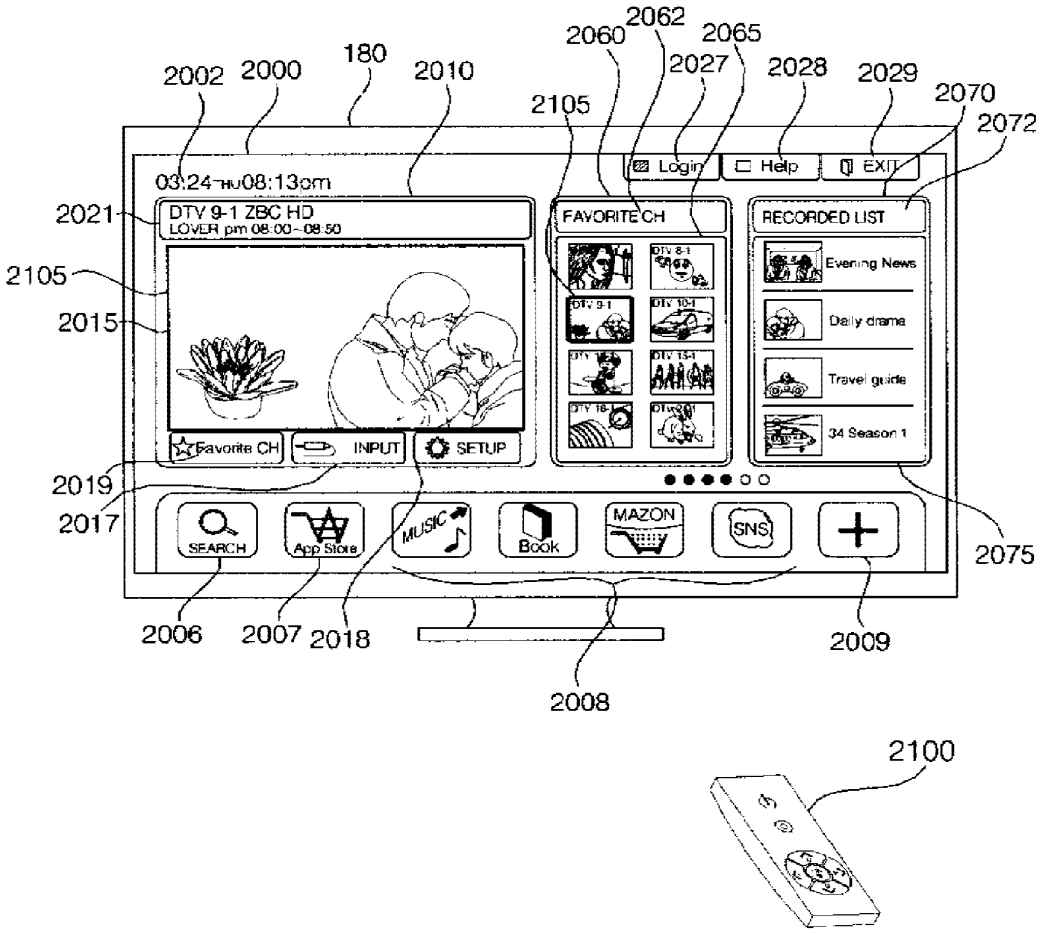
[Fig. 60]


2060
FAVORITE CH
2062
2115
2110
2065
DTV 8-1
DTV 9-1
DTV 10-1
DTV 15-1
DTV 16-1
DTV 24-1

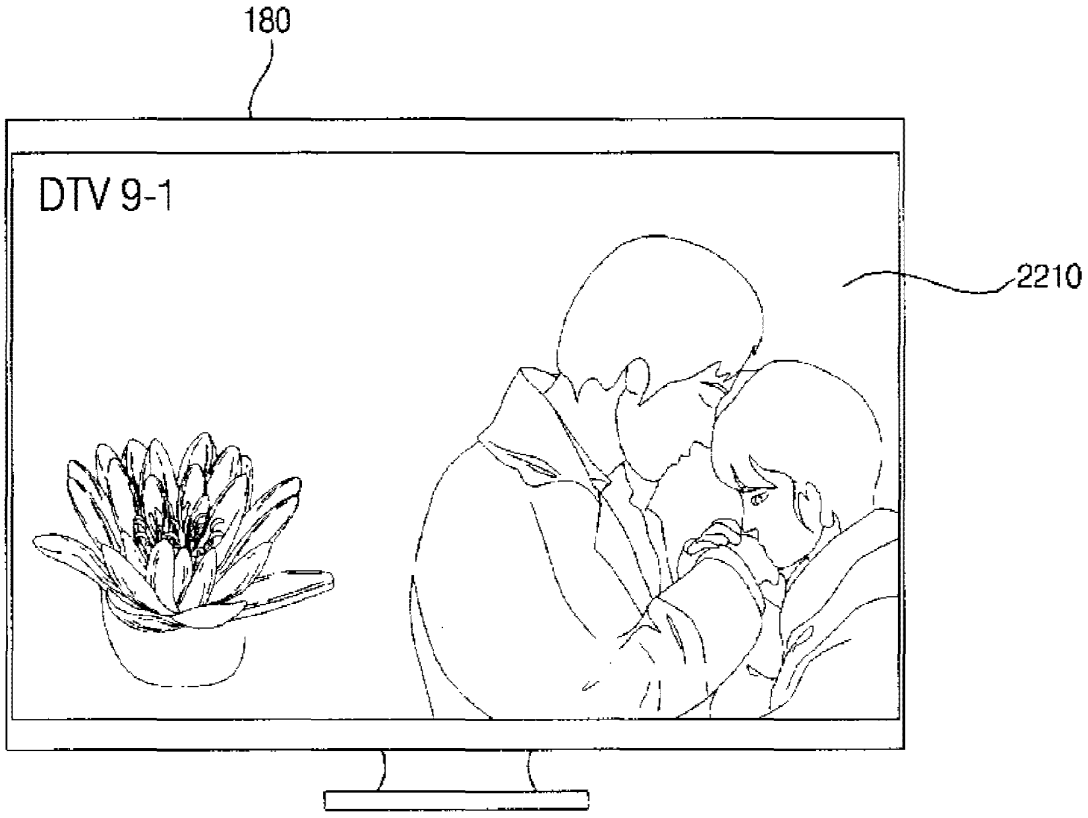
[Fig. 61]


2062
2060
2065
2027
2028
2029
2070
2072
2002
2000
180
2010
2105
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
FAVORITE CH
RECORDED LIST
Evening News
Daily drama
Travel guide
34 Season 1
2015
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008
2100

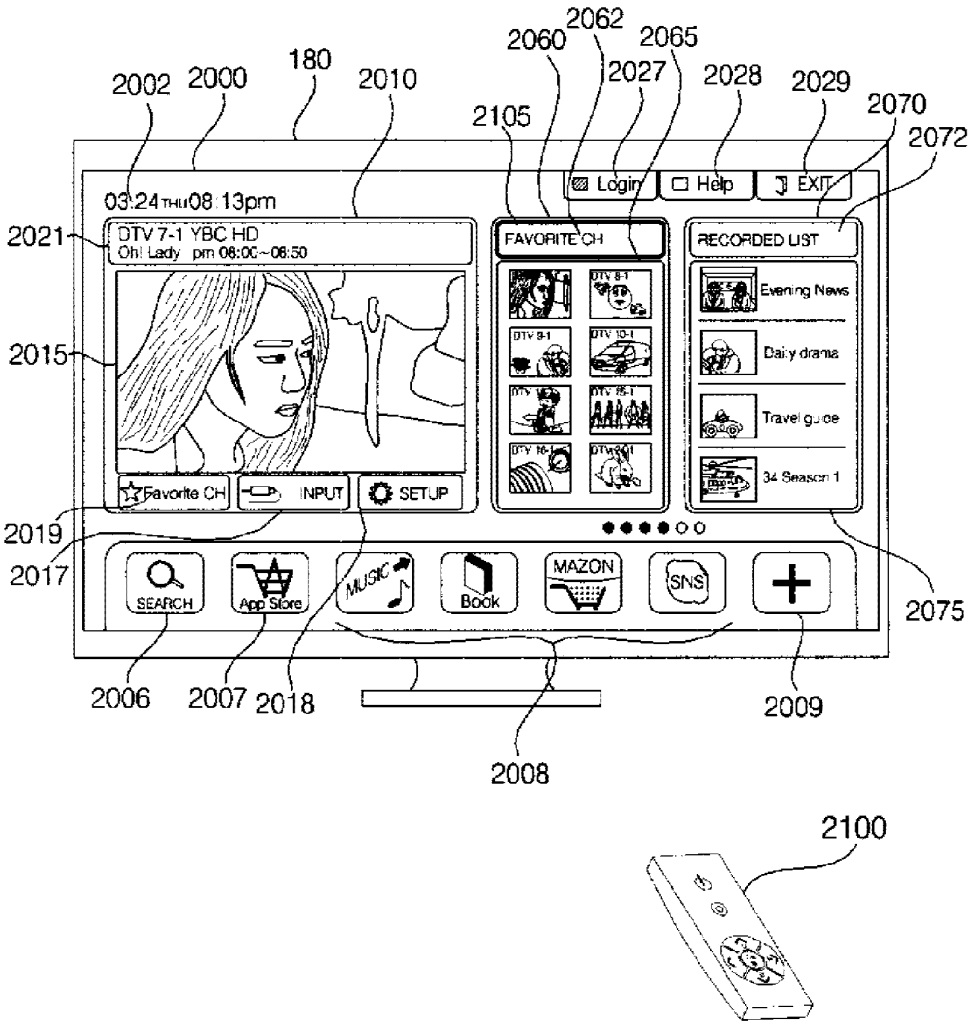
[Fig. 62]


2002
2000
180
2010
2060
2062
2065
2027
2028
2029
2070
2072
2105
03:24~HU08:13pm
Login
Help
EXIT
2021
DTV 9-1 ZBC HD
LOVER pm 08:00~08:50
FAVORITE CH
RECORDED LIST
Evening News
Daily drama
Travel guide
34 Season 1
2105
2015
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008
2100

[Fig. 63]



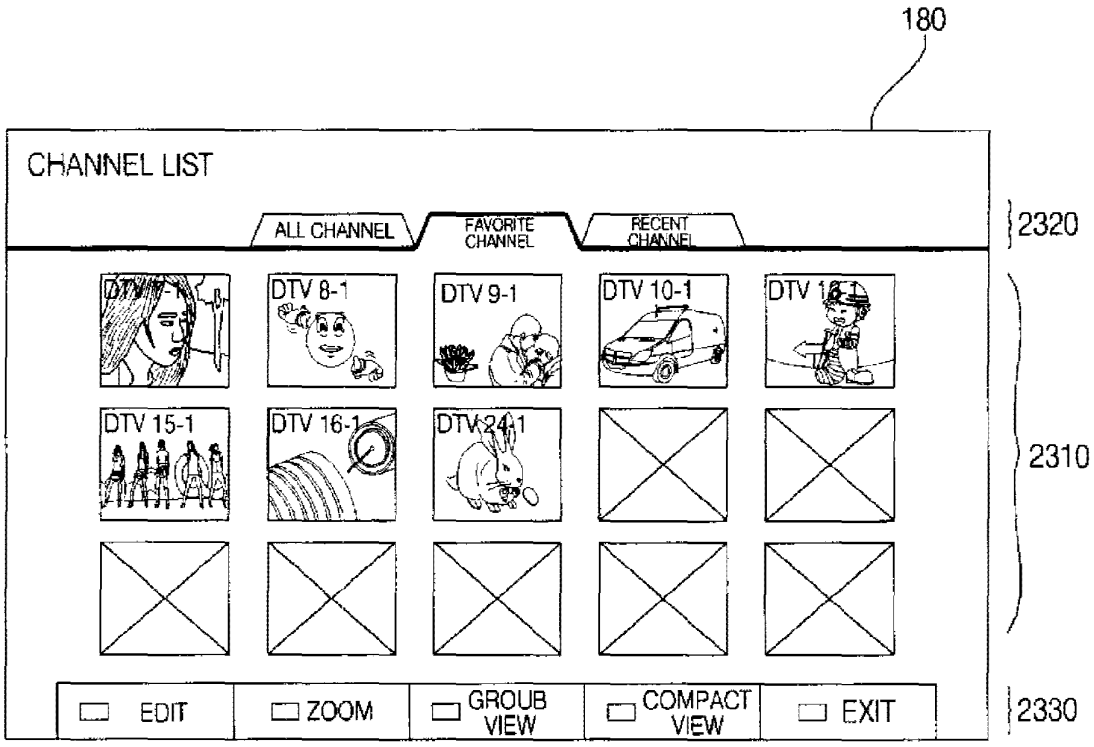
[Fig. 64]


2062
2060
2065
180
2002
2000
2010
2027
2028
2029
2070
2105
2072
Login
Help
EXIT
03:24 THU 08 13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 06:00~06:50
FAVORITE CH
RECORDED LIST
Evening News
2015
Daily drama
Travel guide
34 Season 1
Favorite CH
INPUT
SETUP
2019
2017
SEARCH
App Store
MUSIC
Book
MAZON
SNS
2075
2006
2007
2018
2009
2008

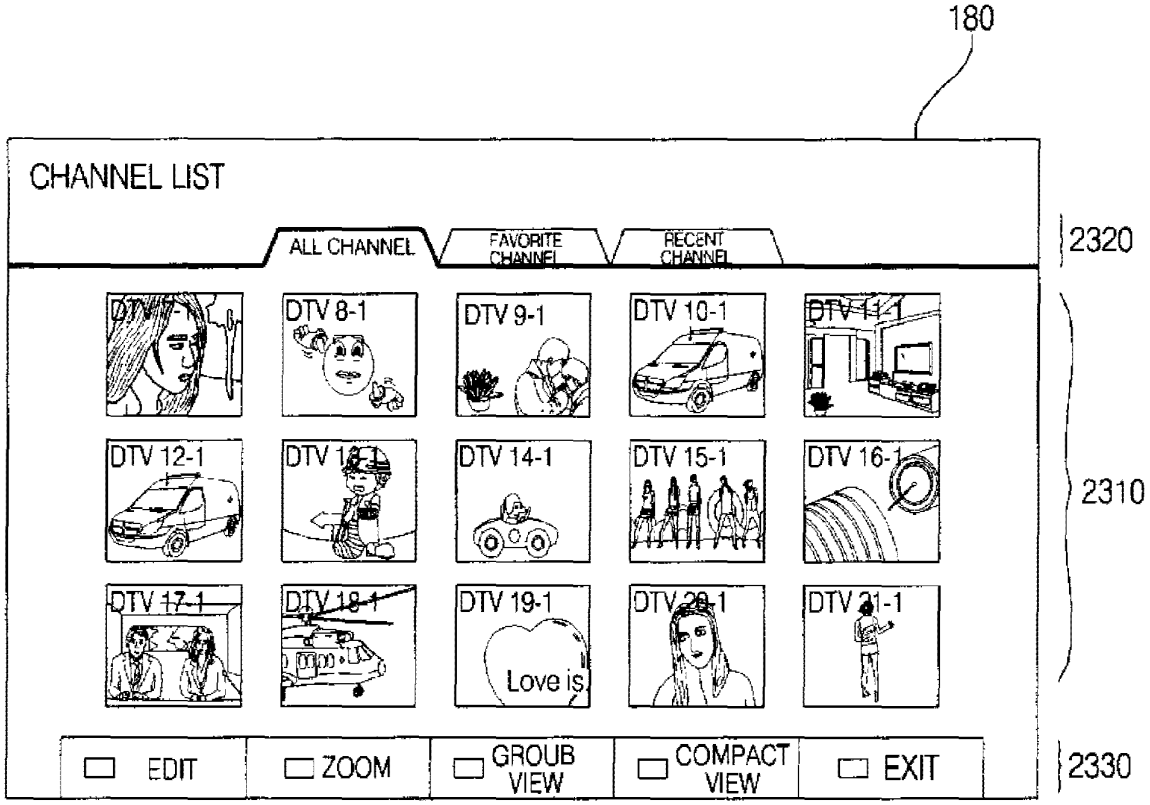
2100

WO 2012/030024 PCT/KR2010/009046

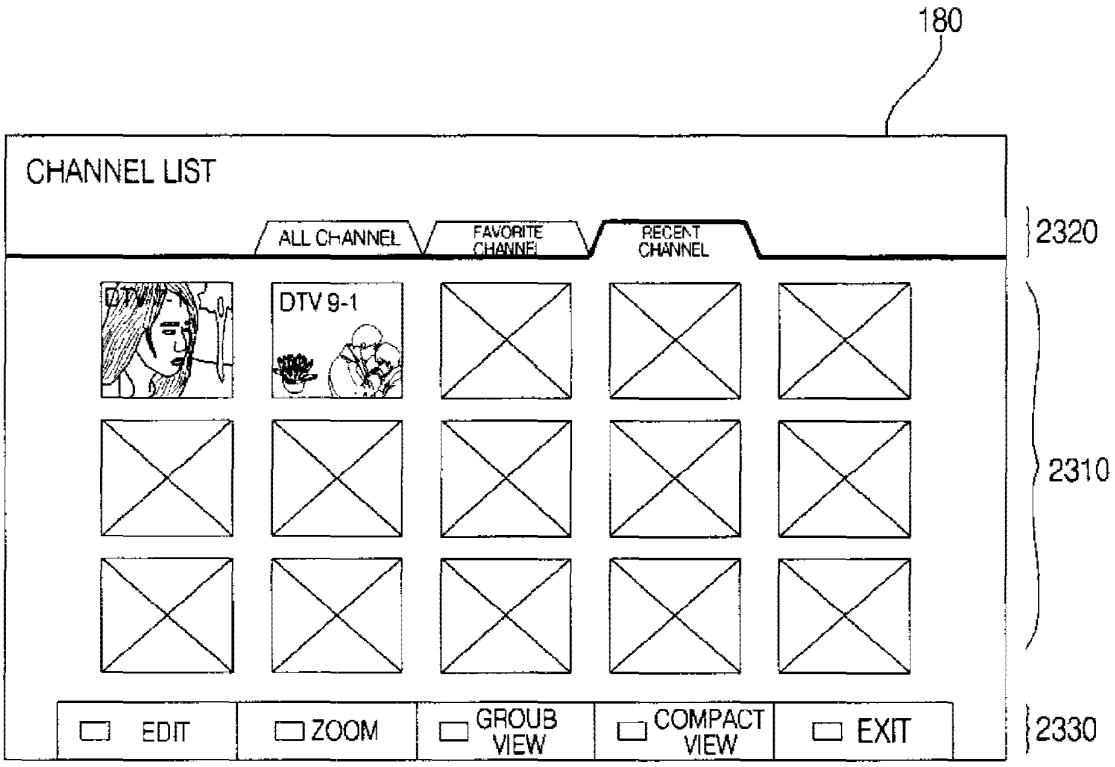
[Fig. 65]



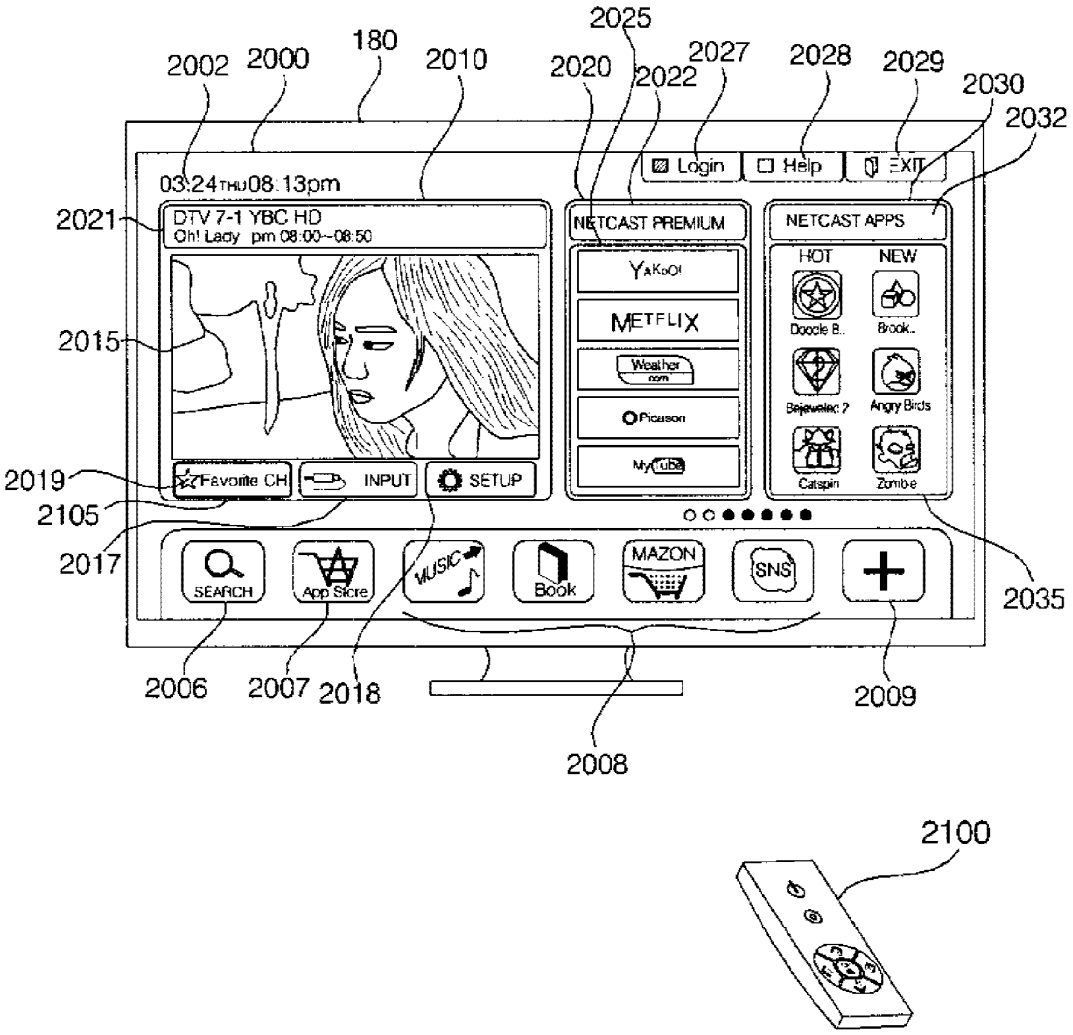
[Fig. 66]



[Fig. 67]

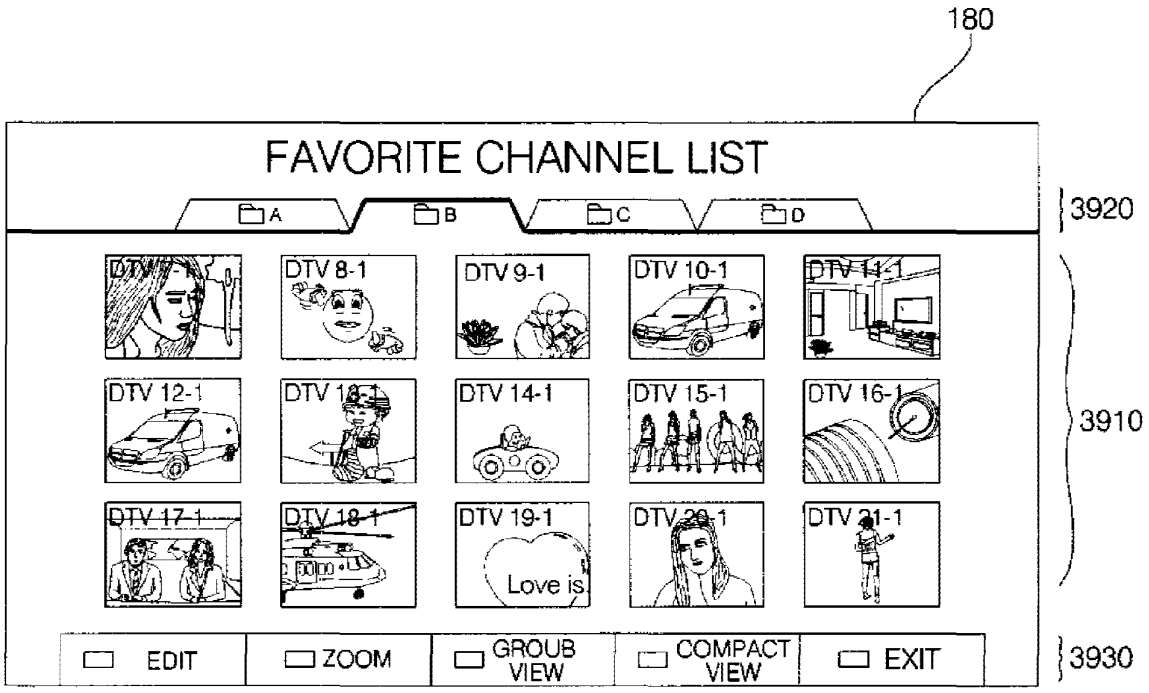

180
CHANNEL LIST
ALL CHANNEL
FAVORITE CHANNEL
RECENT CHANNEL
2320
DTV 9-1
2310
EDIT
ZOOM
GROUB VIEW
COMPACT VIEW
EXIT
2330

[Fig. 68]


2025
180
2002
2000
2010
2020
2022
2027
2028
2029
2030
2032
Login
Help
EXIT
03:24 THU 08:13pm
2021
DTV 7-1 YBC HD
Oh! Lady pm 08:00~08:50
NETCAST PREMIUM
NETCAST APPS
HOT
NEW
2015
YAHOO!
NETFLIX
Weather.com
Picasa
MyYouTube
Doodle B..
Brook..
Bejeweled 2
Angry Birds
Catspin
Zombie
2019
Favorite CH
INPUT
SETUP
2105
2017
SEARCH
App Store
MUSIC
Book
AMAZON
SNS
2035
2006
2007
2018
2009
2008

2100

[Fig. 69]


180
FAVORITE CHANNEL LIST
A
B
C
D
3920
DTV 8-1
DTV 9-1
DTV 10-1
DTV 11-1
DTV 12-1
DTV 13-1
DTV 14-1
DTV 15-1
DTV 16-1
DTV 17-1
DTV 18-1
DTV 19-1
Love is
DTV 20-1
DTV 21-1
3910
EDIT
ZOOM
GROUB VIEW
COMPACT VIEW
EXIT
3930

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2010/009046

A. CLASSIFICATION OF SUBJECT MATTER

H04N 21/431(2011.01)i, H04N 21/45(2011.01)i

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 21/431; H04N 7/173; G06F 3/00; H04N 21/4227; G06F 13/00; H04N 21/475; H04N 5/445

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

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: user interface, favorite channel&list, display.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2004-0066222 A (HA, Gil Su) 27 July 2004 See abstract, page 3, line 2-page 4, line 20; claim 1 and figures 6-8,11.	1-20
A	US 2008-0046933 A1 (Kim, Mun Seok et al.) 21 February 2008 See abstract, column 2, line 34-column 4, line 56; claim 1 and figures 1-3.	1-20
A	US 2010-0017825 A1 (Shin, Seung Chul et al.) 21 January 2010 See abstract, column 3, line 72-column 4, line 91; claim 1 and figures 1,3A-3B.	1-20
A	KR 10-2010-0050067 A (Kim, Hee Young et al) 13 May 2010 See abstract, page 4, line 31-page 5, line 40; claim 1 and figures 2-3.	1-20

☐ 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 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	Date of mailing of the international search report
15 SEPTEMBER 2011 (15.09.2011)	**15 SEPTEMBER 2011 (15.09.2011)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 189 Cheongsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Kim Eung Kwon Telephone No. 82-42-481-8510

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2010/009046

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2004-0066222 A	27.07.2004	None	
US 2008-0046933 A1	21.02.2008	CN 101127845 A	20.02.2008
		CN 101127845 C0	20.02.2008
		EP 1890492 A2	20.02.2008
		KR 10-2008-0015627 A	20.02.2008
		KR20080015627A	20.02.2008
		KR20080015627A	20.02.2008
US 2010-0017825 A1	21.01.2010	KR 10-2010-0010013 A	29.01.2010
KR 10-2010-0050067 A	13.05.2010	None	

VIZIO Ex. 1002, Page 1381 of 3573
VIZIO v. MMT, IPR2024-00722

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 May 2012 (24.05.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/068438 A1

(51) International Patent Classification:
G06F 17/30 (2006.01)

(21) International Application Number:
PCT/US2011/061346

(22) International Filing Date:
18 November 2011 (18.11.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/415,468 19 November 2010 (19.11.2010) US

(71) Applicant *(for all designated States except US)*: **THOMSON LICENSING** [FR/FR]; Thomson Licensing, 1-5 rue Jeanne d'Arc, F- 92130 Issy Les Moulineaux (FR).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **CALVERT, Kerry, Wayne** [US/US]; 8354 Twin Pointe Circle, Indianapolis, Indiana 46236 (US).

(74) Agents: **SHEDD, Robert, D.** et al.; Thomson Licensing LLC, 2 Independence Way, Suite #200, Princeton, New Jersey 08540 (US).

(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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

Published:

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

(54) **Title**: METHOD AND APPARATUS FOR AGGREGATING SERVER BASED AND LAN BASED MEDIA CONTENT AND INFORMATION FOR ENABLING AN EFFICIENT SEARCH

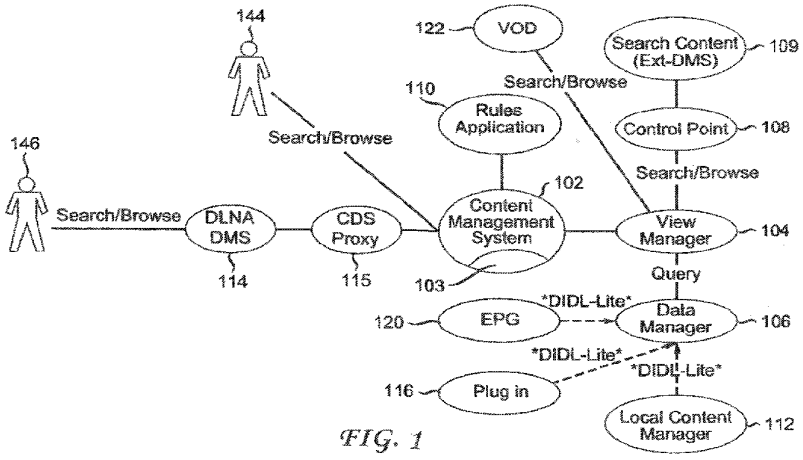


FIG. 1

(57) **Abstract**: A method and apparatus for aggregating server based and LAN based media content and information for enabling an efficient search include discovering local and external content directory service instances, storing at least one of content of the discovered content directory service instances and metadata identifying content available via the discovered content directory service instances in a common database and providing a user interface such that a user is able to search for content across the discovered content directory service instances. In one embodiment a common database comprises a de-serialized database which provides use of indexes for enabling searches.

WO 2012/068438 A1

METHOD AND APPARATUS FOR AGGREGATING SERVER BASED AND LAN BASED MEDIA CONTENT AND INFORMATION FOR ENABLING AN EFFICIENT SEARCH

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application Serial No. 61/415,468 , entitled "METHOD FOR AGGREGATING SERVER BASED AND LAN BASED MEDIA DICTIONARY FOR EFFICIENT SEARCH", filed November 19, 2010, which is incorporated by reference herein in its entirety.

FIELD OF THE INVENTION

The present invention generally relates to content management systems and, more particularly, to a method and apparatus for creating a directory of media assets from multiple sources for enabling an efficient search.

BACKGROUND OF THE INVENTION

Content/data can be stored on any number of different devices. Sharing such content across various devices, however, can sometimes be limited to sharing content/data across local networked devices. For example, the Digital Living Network Alliance (DLNA) vision for sharing content/data in a home network is predicated on assets that exist solely in a local area network (LAN). Often times, however, it can be desirable for content/data to be available and downloadable from servers outside of the LAN. For example, commercial entities desire a means to make available a portal to media that can be streamed or downloaded to the LAN in a transaction model that generates revenue for the provider. A common way to unify content/data from multiple sources outside of a LAN includes importing content/data into a common database and utilizing replication to bring server based data into the local system. This approach, however, has scalability problems for the server side in that too much network bandwidth and server computational resources are needed to replicate content/data to multiple clients. In addition, such an approach requires a client to

maintain a large storage capacity, which is not feasible from a cost and ergonomic perspective in present consumer devices.

Alternate available approaches require a client to visit and search multiple portals to search for content/data, which is time consuming and inefficient.

SUMMARY OF THE INVENTION

Embodiments of the present invention address the deficiencies of the prior art by providing a method and apparatus for creating a directory of data assets from multiple sources for enabling an efficient search.

In one embodiment of the present invention, a method for creating a directory of data assets from multiple sources for enabling an efficient search includes discovering local and external content directory service instances, storing at least one of content of the discovered content directory service instances and metadata identifying content available via the discovered content directory service instances in a common database and providing a user interface such that a user is able to search for content across the discovered content directory service instances.

In an alternate embodiment of the present invention, an apparatus for creating a directory of data assets from multiple sources for enabling an efficient search includes

BRIEF DESCRIPTION OF THE DRAWINGS

The teachings of the present invention can be readily understood by considering the following detailed description in conjunction with the accompanying drawings, in which:

FIG. 1 depicts a high level block diagram of a system for aggregating remote and local media dictionary for efficient search in accordance with an alternate embodiment of the present invention;

FIG. 2 depicts a result of a sorting of partial data sets of two devices;

FIG. 3 depicts a high-level block diagram of a view that has been defined to

aggregate video content search results in accordance with an embodiment of the present invention;

FIG. 4 depicts a high-level block diagram of a view that has been defined to aggregate video content search results in accordance with an alternate embodiment of the present invention;

FIG. 5 depicts a flow diagram of a method for aggregating content from local and remote sources for enabling the performance of an efficient search in accordance with an embodiment of the present invention; and

FIG. 6 depicts a high level block diagram of a CMS device 600 for aggregating server based and LAN based media content and information for enabling an efficient search in accordance with an embodiment of the present invention.

It should be understood that the drawings are for purposes of illustrating the concepts of the invention and are not necessarily the only possible configuration for illustrating the invention. To facilitate understanding, identical reference numerals have been used, where possible, to designate identical elements that are common to the figures.

DETAILED DESCRIPTION OF THE INVENTION

The present invention advantageously provides a method and apparatus for creating a directory of data assets from multiple sources and enabling optional preferential ordering of such assets based on rules. Although the present invention will be described primarily within the context of a Digital Living Network Alliance (DLNA) content management system and DLNA/UPnP Content Directory Service (CDS) components, the specific embodiments of the present invention should not be treated as limiting the scope of the invention. It will be appreciated by those skilled in the art and informed by the teachings of the present invention that the concepts of the present invention can be advantageously applied in any commercial or residential environment for managing content using other formats and proxies other than DLNA and CDS components.

The functions of the various elements shown in the figures can be provided through the use of dedicated hardware as well as hardware capable of executing software in association with appropriate software. When provided by a processor, the functions can be provided by a single dedicated processor, by a single shared processor, or by a plurality of individual processors, some of which can be shared. Moreover, explicit use of the term "processor" or "controller" should not be construed to refer exclusively to hardware capable of executing software, and can implicitly include, without limitation, digital signal processor ("DSP") hardware, read-only memory ("ROM") for storing software, random access memory ("RAM"), and non-volatile storage. Moreover, all statements herein reciting principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure).

Thus, for example, it will be appreciated by those skilled in the art that the block diagrams presented herein represent conceptual views of illustrative system components and/or circuitry embodying the principles of the invention. Similarly, it will be appreciated that any flow charts, flow diagrams, state transition diagrams, pseudocode, and the like represent various processes which may be substantially represented in computer readable media and so executed by a computer or processor, whether or not such computer or processor is explicitly shown.

In one embodiment of the present invention, a Content Management System (CMS) of the present invention provides local devices and DLNA control points with the ability to search and store media content and metadata on a local device, and on DLNA compatible devices discovered in the LAN. In one embodiment of the present invention, every source of content models a DLNA/UPnP Content Directory Service (CDS), and supports the services defined by the UPnP committee for a CDS implementation. This includes search, browse, sorting, ordering, eventing, storing, copying, deletion, and data modeling. Such core features are defined in the ContentDirectory:3 Service Template Version 1.01 specification which can be found at http://www.upnp.org/specs/av/UPnP-av-

ContentDirectory-v3-Service.pdf.

In such an embodiment described above, the CMS of the present invention comprises an aggregator of CDS instances, which it manages through logical views that define which CDS instances are to be included in an aggregation. Requests for services (e.g., searches/queries) from the CMS are performed through these logical views, and the CMS will handle the details of interfacing with each CDS in the view such that the consumer of CMS services is logically operating with a single control entity and result set from queries.

FIG. 1 depicts a high level block diagram of a system 100 for aggregating remote and local media dictionary for efficient search in accordance with an embodiment of the present invention. The system 100 of FIG. 1 illustratively comprises a content management system (CMS) 102, a view manager 104, a data manager 106, a control point 108 and an optional rules applicator 110. In the system 100 of FIG. 1, the CMS 102 presents an API to consumer components interested in searching for content. The CMS 102 provides the management interface to expose and create views. The CMS 102 provides search, update, and delete interfaces for content metadata when allowed. The CMS 102 implements an API to support the DLNA CDS functions. In various embodiments, the CMS invokes the optional rules components to process result sets prior to presentation of the results to the requesting clients. That is, the CMS 102 enables optional preferential ordering of collected assets based on rules.

In the embodiment of the system 100 of FIG. 1, the View Manager 104 creates and manages content hierarchies/views, and applies search and update requests to them. The view manager 104 establishes connections to components called out in the view definitions and uses the components to bring content into the result sets for queries or to apply updates. The view manager 104 uses the view definitions to determine the strategy for content management of the content providers.

The Data Manager 106 of the system 100 presents an abstraction to components for search and updating the persistent storage used for storing metadata and content directories.

The CMS 102 relies on the Control Point 108 (e.g., DLNA control point) to discover DLNA devices that are in the LAN. The Control Point 108 provides a common interface for all known (as defined above) components. The CMS 102 uses the Control Point 108 to discover other CDS instances in the LAN and to implement the control and data interface to discovered devices through a DLNA stack and external DMS 109.

The optional Rules Applicator 110 implements data manipulation of query result sets. The Rules Applicator 110 is implemented by the CMS 102 to operate on a query result set, and the CMS 102 passes the processed results on to its users. That is, as described above, the CMS 102 enables optional preferential ordering of collected assets based on rules. In alternate embodiments of the present invention, a system can have multiple rules applicators defined, and a CMS view definition that defines which rules applicators and the order in which the rules should be applied will be used to generate a result set. Rules to be applied to resulting search sets can include rules on the ordering of a presentation of search results or what content/metadata to present or not present to a user.

The system 100 of FIG. 1 can further include a Local Content Manager 112 which provides an API for known components to add media and metadata to a common database 103, illustratively in FIG. 1 located in the CMS 102. The Local Content Manager 112 is able to scan media files to extract embedded metadata and perform services such as caching image files/thumbnails in the common database. In one embodiment of the present invention, metadata is mapped into a DIDL-Lite form, and presented to the Data Manager 106 for persistent storage and view management. In such an embodiment, the Data Manager 106 receives requests to update, insert, and delete content, and uses a Local Content API to perform cache management on modified content.

The system 100 of FIG. 1 can receive content and metadata from external content providers or services such as an EPG, a camera, a USB drive, etc. Such content providers provide content provider plug-ins 116. The content provider plug-in 116 provides specialized knowledge about a device type or service (EPG, camera, USB drive, etc). In one embodiment, the Content Provider plug-in 116 abstracts its device's content metadata into a DIDL-Lite form and presents the

data to the Data Manager 106 for persistence management. The Content Provider plug-in 116 provides the functionality to mark the content and its associated metadata as "offline" when the device is detached, and re-enable and update the cached data when the device is re-attached. It also provides purging functionality for cached data.

In the system 100 of FIG. 1, the Content Management System 102 accepts search requests from clients through its exposed API. Known components access the CMS 102 directly through its API. External UPnP users see the CMS 102 as proxied through an associated local digital media server (DMS) 114 and CDS proxy 115. A known component can select different views of content, where a UPnP client has no concept of a view and will see the results as defined by a default view. As described above, a known component/device is a component/device whose content and/or metadata is stored in the central/common database already.

In the system 100 of FIG. 1, the CMS 102, the View Manager 104, Data Manager 106, and the Local Content Manager 112 are illustrated as separate components to assist in illustrating and explaining the various functionalities of a system of the present invention. However, in alternate embodiments of the present invention, the functionalities of one or all of the components, the CMS 102, the View Manager 104, Data Manager 106, and the Local Content Manager 112, can be implemented in a single device considered, in one embodiment, a CMS 102 of the present invention. In addition, although in the system 100 of FIG. 1 the common database 103 is illustratively located in the CMS 102, in alternate embodiments of the present invention, the common database 103 can comprise a separate component or alternatively can be integrated into any other component of the system 100 of FIG. 1.

For example, in an embodiment of the present invention, the CMS 102 aggregates content and metadata in a common database for enabling efficient searching of LAN-based and Server-based content. More specifically, in an embodiment of the present invention, the CMS of the present invention discovers all local and external CDS instances to aggregate content and metadata in a common database for enabling efficient searching of LAN-based and Server-

based content. In various embodiments of the present invention, local CDS instances, such as the EPG 120 and VOD 122 of FIG. 1, can be discovered directly through an API or through an associated local digital media server (DMS) 114. In addition, in one embodiment of the present invention, a CMS can discover external CDS instances using content provider plug-in components, such as the Plug-In 116 of FIG. 1, that will implement the actual interfaces to the content media and metadata. Some examples of plug-ins can include a Program Database, a Recording Manager, and various external services. Each plug-in will have a proprietary API that the CMS codes to and it is the responsibility of the CMS to transform data extracted from the plug-ins and store such information into a common database system, for example in one embodiment using SQLite (described in more detail below).

In various embodiments of the present invention, components able to interface with the CMS implement the UPnP search and browse syntax if such components are to be included in views that get exposed to DLNA requests. In addition to the content provider plug-ins, in an embodiment the CMS can discover external CDS instances by interfacing with a DLNA control point component (running locally), such as the control point 108 of FIG. 1. The CMS uses the control point's data model to discover external CDS devices, and will use the control point's interfaces to exchange information and data with those devices.

In addition to discovering CDS instances, the CMS stores at least one of content of the discovered content directory service instances and metadata identifying content available via the discovered content directory service instances in a common database. In one embodiment of the present invention, the common database of the present invention comprises an XML database that has the ability to generate indexes to support XQuery based access mechanisms. For example, in one embodiment, the common database can comprise Berkeley DB or eXist XML database. There are, however, cost issues with using the Berkeley DB solution, and eXist requires a Java SDK implementation.

As such, in a preferable embodiment, the common database comprises a SQLite database. Metadata that is stored in the SQLite database is de-serialized into a relational model. This provides the benefit of the use of indexes to support

search and ordering requests, which avoids the necessity for a serial scan of the entire data set.

It should be noted that for systems including remotely located (server based) repositories of data and metadata, such as VOD systems, the data and metadata is not ingested, and result sets must be collected separately and merged with locally gathered results. For metadata not able to be stored in the common database, the CMS of the present invention is capable of querying metadata through plug-ins to such content providers. In one embodiment of the present invention, the CMS does support update, deletion, or creation of metadata in such plug-ins, unless those plug-ins have a supporting API, and such metadata extracted from plug-ins are presented as "read only" objects to clients searching using the CMS of the present invention.

Accordingly, the query strategy of the present invention accounts for the need to collect data from disparate providers, and the data is merged, sorted, and ordered in accordance with various embodiments of the present invention described below. When this is done, however, there is complexity introduced because in the normal access method, the result sets being merged can be partial result sets, which require processing logic to insure the merged result is correct. It is a normal practice in UPnP request operations to limit the result set extracted to X records, starting at record number Y in the list. This creates the potential for a sorting/grouping problem as illustrated in FIG. 2.

That is, FIG. 2 depicts a result of sorting of partial data sets of two devices. In the example of FIG. 2, Device 1 and Device 2 are queried for content, with a sort on Artist Name. Each request for data is limited to 5 records. The result sets returned from each device is grouped into 5 items, with the relative order of extraction illustrated by the vertical sequence illustrated in FIG 2. In the embodiment of FIG. 2, if the contents from Result Set 1 of device 1 and device 2 were simply merged, the first result set returned to the consumer would be correct. However, as depicted in FIG. 2, the second request would result in the repetition of terms starting with "A" Device 1's results, creating confusion and incorrect sort order over the total result scan.

As such, in various embodiments of the present invention, the CMS pulls enough data from each device in a query to insure that the correct ordering of data is presented. This requires the CMs to send multiple requests to a device to extract data until the output result set count boundary is reached, or until it is clear that the values being returned are preceded by items from other devices.

For various embodiments of the present invention the location of data has a significant performance impact on the approach by which search, sort, and filtering operations are performed and some of those approaches are discussed below.

Majority of Content is Locally Stored

The following sequence describes a use case where a system has the majority of its metadata stored in a local SQLite database on the system executing the CMS, where the number of data items on plug-in devices or external CDS instances are small in comparison. When a query request is received, processing time will be minimized by:

1) Merging the smaller result sets into a common database (e.g., SQLite database)
2) Running query on database
3) Using database to perform sorting and grouping operations (SQLite, stored procedures, views)
4) Use the query handle to iterate result sets to the consumer

Performing a query in this manner uses a large number of performance features that are internal to the database implementation. The database utilizes caching techniques and indexes to minimize the memory and disk I/O needed.

In an alternate embodiment XQuery can be used instead (without the support of an XML database), however, a linear search over the entire data set is performed, and results are copied to a result set. That is, in one embodiment of the present invention, sorting and ordering can be performed with XQuery from

memory resident data. This results in serial scans and memory copying of the data which will be expensive on large datasets. This approach is much less efficient than a SQLite query that generates a vector tree so that data is only copied when it is explicitly called for in the query result iteration. With XQuery there is no caching, other than the OS cache for its open files. Additionally, the use of XQuery will require that a customized iteration and data merge management of the result set be built. However, because in some applications the search usage model limits the number of records in result set (explained in more detail below), this can be an acceptable tradeoff.

Majority of Data is Stored Externally

When the data is located on a device that is remote from the CMS instance, the cost of the search processing is born by the external device. That is, in one embodiment of the present invention, when the desired data is collected from the network, it is located in memory, in a form suitable for searching with XQuery/XPath. The cost of inserting this data into a sparsely populated database of local content in order to gain the use of indexing for searches may not be warranted. Merging the external results with local content in memory, and performing an XQuery operation can provide the quickest turnaround.

Hybrid Strategy

Given the conflict of benefits/costs implicit from either SQL or XQuery processing models in the described use cases, in one embodiment of the present invention a hybrid approach to querying and processing data that can be configured or selected is implemented. The selected configuration would be for either a distributed or a centralized data storage model.

For example, in a centralized model, the data storage interfaces will aggregate all metadata from local, known devices in a single database. There will be a "replicator" that discovers unknown CDS services in the LAN, and will replicate their metadata instances and use the UPnP eventing model to keep the data synchronized.

For content providers, such as VOD providers, whose content inventory is too large to practically ingest into the database, the CMS instances will merge result sets extracted from the database with results collected from the non-replicated providers.

In the distributed model, there is no content ingestion into a centralized database. The CMS queries all CDS instances found in the LAN, and merges the result sets with its locally managed metadata. That is, the CMS instance determines from its configuration the set of content providers it has. When operating in the Distributed Data Model, a control point discovers CDS instances in the LAN, and publishes those instances so that the CMS is aware of the content providers that it can access. Specific internal components, such as a VOD instance, and the Storage Manager will register their presence, and the CMS will include them as CDS instances that it manages. Each CDS instance is treated as a query processor that will support the UPnP API for Content Directory Services. The CMS manages all data aggregation from the CDS sources through a hierarchy that is defined by a view (as described above and further below). The CMS creates a default view, which consists of all CDS instances with a single "virtual" CDS. The CMS consumer can then selectively define views by which to organize the content.

The only difference between the Distributed and Centralized Data Model is the CMS instance no longer has a Control Point publishing CDS instances for it to manage. All data that is persisted is accessed through the Storage Manager. This allows all metadata to be queried from a central repository, with the exception of those metadata sources that are not persisted in the database, such as VOD instances. This architecture is more efficient for querying content when there are numerous CDS instances in the LAN, and there are suitable resources for aggregating all of the metadata in a single database.

In one embodiment of the present invention, a Control Point is configured to interface with a Replicator component. The Replicator ingests metadata from external DLNA devices, and merges it into a shared database with other metadata. It subscribes to eventing for content changes with DLNA devices that it discovers in order to keep the database in sync. When the Replicator discovers a

DLNA device that identifies itself as a known device, it will not enter into the content replication/eventing model with that device. Known devices are devices whose metadata is stored in the central database already.

In accordance with various embodiments of the present invention, searching and browsing content can be accomplished by providing a user with a user interface. In various embodiments of the present invention, such user interface can comprise a graphical representation of one or more views of the content. In accordance with one embodiment of the present invention, a view comprises a hierarchical representation of content. A view defines the grouping and sorting criteria that is used to present content. In one embodiment, the definition of a view is expressed in an XML syntax, and the CMS keeps a repository of view definitions that it manages. A view node is associated with specific CDS instances, such that the source of data for that branch of the hierarchy can be controlled. In one embodiment, view nodes are defined by conditional logic that uses content metadata to determine whether an item should be included as a child of the node. In one embodiment, a view may limit the CDS devices to internally managed content only, while an alternate embodiment of a view can include external DLNA devices discovered, and an alternate embodiment of a view can limit itself to electronic program guides (EPG) or video on demand (VOD). In accordance with embodiments of the present invention, a user can decide how to construct the view they would like to operate on, and they can change their view dynamically, and operate on multiple views simultaneously.

FIG. 3 depicts a high-level block diagram of a view that has been defined to present aggregated video content from, for example a search result, in accordance with an embodiment of the present invention. The content of FIG. 3 is organized into Premium, EPG, PVR, and Personal categories. In the embodiment and example of FIG. 3 only the sub-hierarchy of the Premium node has been illustrated. The other video node categories can be defined to have similar or completely different hierarchy nodes.

For the purpose of explaining the embodiment of the present invention of the example of FIG. 3, the Premium category is illustratively sourced from a server based application, and the EPG and PVR categories are sourced from a local

DMS, and the Personal category is sourced from a PC that has a generic DMS exposed. The exemplary view in FIG. 3 has a relationship between the physical source of content and its logical representation that enables a more optimal response time to requests. In FIG. 3 it is clearly illustrated how content providers can be removed from request processing based on the location in the content hierarchy where the search is performed. Such action is illustrated in FIG. 3 using the color coding of the hierarchy nodes.

FIG. 4 depicts a high-level block diagram of a view that has been defined to aggregate video content search results in accordance with an alternate embodiment of the present invention. The view of FIG. 4 is logical in organization, such that content from different sources is merged in the hierarchy. For example, in the "genre" category, content from a VOD provider, local content, and external DMS is populated in the hierarchy according to the metadata. The only source for "New Releases" and "Suggestions" is the VOD server, so those nodes are defined to receive content specifically from the VOD and not send search/browse requests to CDS instances that would never return results for the category. In the embodiment of FIG. 4, the same configuration applies to the photo and audio categories.

Logical view segments are those portions of the hierarchy that combine data from multiple CDS instances. For example, in FIG. 4 the "Video/Genre" node is logical because it combines content from VOD, Local, and External DMS sources. In one embodiment of the present invention, such segments will be automatically assigned the DLNA restricted property, to prevent modification. In addition, view nodes can be manually defined as restricted in the view definition XML. For example, the "New Releases" node in FIG. 4 can be defined as restricted if the VOD service does not accept updates from clients for such data.

It should be noted that it is possible to define rules of a view such that data elements presented from a CDS instance have no slot in the hierarchy. For example, if the node definitions for genre are based on matching values from the content metadata into a discrete list of values, such as "Action", "Thriller", etc, and a content item has a genre value not in the list, the content item will not appear in the view. If this is not intended behavior, then rules specifications for the node

should have a wildcard node for items not accounted for in the discrete rules.

In various embodiments of the present invention, there are three classes of content providers in a view:

1) Content that is stored locally to the CMS that is always available.
2) Content that is server based or too large (VOD is an example) and cannot be cached.
3) Content that is on external devices that may go online and offline, and is cacheable, but for which the state of availability must be accounted.

In one embodiment of the present invention, when defining a view, the content providers are classed as to the type of cache with which they are implemented. Once the view is constructed, the cacheable content and hierarchy is persisted, and DLNA event notification is used to keep it synchronized with its source provider. When a provider goes offline and then comes back online, the cache must be resynchronized. While the provider is offline, its cache is retained, but it is marked offline and not available for searching or browsing. If a provider goes offline, and never comes back, then its cache will be deleted based on aging and/or space considerations. In one embodiment of the present invention, the data that is cached for offline providers is the content hierarchy tree, represented as a nested set model and the metadata that describes the content is referenced in the hierarchy tree.

In various embodiments of the present invention, searches generate a result set with a temporary lifespan and result sets will eventually be discarded. The result set is referred to as a Search Context Instance. In one embodiment, the lifecycle of the Search Context Instance is from the time of the initial search request until a different search request from the same control point is received. The search Context Instance contains references to the actual content items contentID value and does not contain the data itself. The Search Context Instance of the present invention is a hierarchical data model that organizes virtual content identifiers extracted from the search request per the organizational and

sorting rules defined by the view (described above). Virtual content identifiers and hierarchies are discussed below.

Alternatively, a component can save a Search Context Instance from destruction and re-enable it for iteration/browsing, allowing the component to manage multiple search requests simultaneously. The default Search Context Instance destruction mechanism accounts for external UPnP control points that are not cognizant of the extended view processing occurring behind the scenes of their standard DLNA CDS requests.

For example, referring back to the embodiment of FIG. 3, when a search request is received that specifies the "Video" node as the starting point for the search, the request is sent to the "VOD" provider. The request is applied to the view's cache, specifying the "Video" node as the starting point of the search, and the result sets are merged to construct the Search Context Instance. An issue with collecting adequate content from each provider requires that enough content is pulled from a non-cached provider to insure the virtual tree is populated correctly as discussed above. This will potentially result in a given provider or providers being queried multiple times per single search request iteration to collect enough data to populate the view segment correctly.

When adequate results are collected to fulfill the search request, a DOM is constructed of items and containers, such as in one embodiment, DIDL-Lite items and containers. If rules components are installed, the DOM is sent to the rules processors. Once rules processing is complete, the DOM is transmitted to the requesting control point. As the search request is iterated through, the incremental data received from the non-cached providers is merged with the search instance data, and the results parceled out to the control point per its search request parameters. The Search Context Instance is then discarded per the direction of a component or the receipt of a new search request from the same control point.

Referring back to FIG. 1, as described above, the CMS 102 aggregates content and metadata in a common database for enabling efficient searching of LAN-based and Server-based content. That is and as described above, the CMS of the present invention discovers all local and external CDS instances to

aggregate content and metadata in a common database for enabling efficient searching of LAN-based and Server-based content. The CMS then accepts search requests from clients through its exposed API. Known components access the CMS directly through its API. External UPnP users see the CMS as proxied through an associated local digital media server (DMS). A known component can select different views of content, where a UPnP client has no concept of a view and will see the results as defined by a default view. For example, in FIG. 1, a known consumer/client 142 submits a search request directly to the CMS 102 through its API using a provided user interface (e.g., hierarchical logic tree) as described above in, for example FIG. 3 and FIG. 4. Alternatively, an unknown consumer/client 144 submits a search request to the CMS 102 via a local DMS 146 using the provided user interface (e.g., hierarchical logic tree).

In either instance, the search request received from the consumer is sent to each CDS instance that is registered and included in the consumer's view. For example, in such cases, each of the searches are processed individually by the CDS instance, and the result set is aggregated into a single document object model (DOM) along with results collected from the CMS managed content and metadata database. In an embodiment of the present invention, the wisest use of resources is accomplished by leaving up to the individual component implementations. In such embodiments, the components are aware that the result sets they create are being copied into the CMS for processing into an aggregate DOM, and that they should implement a solution that only applies the search processing once in a data request/iteration sequence and that resource consumption should be minimized to process query results as much as possible.

In one embodiment of the present invention, the data extracted from the CDS instances is a DIDL-Lite compliant XML document. Each item has a unique identifier that is assigned by the content provider. The results from each provider are aggregated into a single dataset. Each item in the aggregate set must have a unique identifier. The identifiers are virtualized to maintain unique identifiers in the result set that can be referenced back to the unique identifier assigned by the content provider to the item.

In various embodiments of the present invention, the search requests from the CMS consumers limit the number of records to return, and iterate over the result set. The CMS instructs the content providers to present results in the sort order requested by its consumer. As in the search operation, the content providers perform the sort on their result set just once over the life of the CMS iterating over the result set. The CMS merges the results from the different content providers into a sorted list on each fetch iteration.

In one embodiment of the present invention, the view specification is an XML document, and processing logic follows the XML hierarchy from top to bottom, and left to right. Requests for data are sent to the declared datasources at points in the hierarchy where content segments are declared. The query constructed will reflect all match specifications that have been declared on each ancestor node in the hierarchy for the content declaration. When the XML specifies a group, it is treated as a DIDL-Lite container. The container name (title) is either declared statically in the XML with a 'name' attribute, or if the 'derivedName' attribute is declared, the container name is extracted from the specified property for a content item that meets the match condition specified for the group. When the XML specifies a content segment, a query is constructed and sent to each non-cached datasource declared in the hierarchy path. The results from these queries are organized into a result set, with ordering rules specified in the view specification applied.

The view hierarchy table is queried to get the ordered set of content items for each content declaration, and the content item data inserted into the result set. When merging and ordering results from the cached hierarchy with the non-cached hierarchy, the additional queried to non-cached datasources may be necessary to insure proper ordering of the aggregate is maintained. The constructed result set is persisted for subsequent iteration management. The result set will be discarded when a new search request is received. There is additional overhead and latency when issuing queries to non-cached datasources. Consideration should be given in view definition to limit references to non-cached datasources to points in the hierarchy where they will return data. For example, it would be inefficient to declare a non-cached datasource at the root of the

hierarchy if that datasource will only provide audio content.

FIG. 5 depicts a flow diagram of a method for aggregating content from local and remote sources for enabling the performance of an efficient search in accordance with an embodiment of the present invention. The method 500 of FIG. 5 begins at step 502 during which all local and external CDS instances are discovered. For example and as described above, the discovery of local and external CDS instances can include at least one of communicating directly with local content directory service devices to exchange data and information, identifying local content directory service devices using a local digital media server to exchange data and information, using a local control point component data model and control point interfaces to exchange data and information with external content directory service devices and using a content provider plug-in device's API to implement interfaces to content and metadata of the content provider plug-in device. The method 500 can then proceed to step 504.

At step 504, at least one of content of the discovered CDS instances and metadata identifying content available in the discovered CDS instances are stored in a common database. As described above, in one embodiment of the present invention, the common database comprises a de-serialized database which provides use of indexes for enabling searches. The method 500 can then proceed to step 506.

At step 506, a user interface is provided such that a user is able to search for content across the discovered CDS instances. As described above, in one embodiment of the present invention the user interface can include a logical view which can take the form of a hierarchical tree. The method 500 can then proceed to optional step 508 or can be exited.

At optional step 508, rules implementing custom data manipulation of query result sets are applied to search result sets. In one embodiment of the present invention, such rules are applied prior to presenting search results to a search requester/user. The method 500 can then be exited.

FIG. 6 depicts a high level block diagram of a CMS device 600 for aggregating server based and LAN based media content and information for enabling an efficient search in accordance with an embodiment of the present

invention. More specifically, the CMS device 600 of FIG. 6 illustratively comprises a processor 610 as well as a memory 620 for storing control programs, file information, stored media and the like. The CMS device 600 cooperates with conventional support circuitry 630 such as power supplies, clock circuits, cache memory and the like as well as circuits that assist in executing the software routines stored in the memory 620. As such, it is contemplated that some of the process steps discussed herein as software processes may be implemented within hardware, for example, as circuitry that cooperates with the CMS device 600 to perform various steps. The CMS device 600 also contains input-output circuitry 640 that forms an interface between various functional elements communicating with the CMS device 600.

Again, although the CMS device 600 of FIG. 6 is depicted as a general purpose computer that is programmed to perform various control functions in accordance with the present invention, the invention can be implemented in hardware, for example, as an application specified integrated circuit (ASIC). As such, the process steps described herein are intended to be broadly interpreted as being equivalently performed by software executed by a processor, hardware, or a combination thereof. In addition, although the CMS device 600 of FIG 6 is depicted as a separate component, the functionalities of the CMS device 600 in accordance with the concepts and embodiments of the present invention described herein can be incorporated into an existing content management system component such as a set-top box, personal video recorder, digital video recorder or content provider server and the like.

Having described various embodiments for a method and apparatus for aggregating server based and LAN based media content and information for enabling an efficient search (which are intended to be illustrative and not limiting), it is noted that modifications and variations can be made by persons skilled in the art in light of the above teachings. It is therefore to be understood that changes may be made in the particular embodiments of the invention disclosed which are within the scope and spirit of the invention. While the forgoing is directed to various embodiments of the present invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof.

CLAIMS

1. A method, comprising:

discovering local and external content directory service instances;

storing at least one of content of the discovered content directory service instances and metadata identifying content available via the discovered content directory service instances in a common database; and

providing a user interface such that a user is able to search for content across the discovered content directory service instances.

2. The method of claim 1, wherein discovering local content directory service instances comprises communicating directly with local content directory service devices to exchange data and information.

3. The method of claim 1, wherein discovering local content directory service instances comprises identifying local content directory service devices using a local digital media server to exchange data and information.

4. The method of claim 1, wherein discovering external content directory service instances comprises using a local control point component data model and control point interfaces to exchange data and information with external content directory service devices.

5. The method of claim 1, wherein discovering content directory service instances comprises using a content provider plug-in device's API to implement interfaces to content and metadata of the content provider plug-in device.

6. The method of claim 1, wherein said common database comprises a de-serialized database which provides use of indexes for enabling searches.

7. The method of claim 1, comprising performing a search on the content and metadata stored in the common database and sorting and ordering a result of the search.

8. The method of claim 1, wherein content and metadata unable to be stored in the common database is sorted and ordered separately during a search and results are merged with a result of a local search on the content and metadata stored in the common database, which is sorted and ordered.

9. The method of claim 1, comprising querying content and metadata unable to be stored in the common database via a content provider plug-in.

10. The method of claim 1, wherein said user interface comprises a logical view of the content directory service instances and related content and metadata.

11. The method of claim 10, wherein said logical view comprises a hierarchical tree diagram.

12. An apparatus comprising:

a memory for storing program routines and data; and

a processor for executing said program routines, said processor, when executing said program routines, configured to perform the steps of:

discovering local and external content directory service instances;

storing at least one of content of the discovered content directory service instances and metadata identifying content available via the discovered content directory service instances in a common database; and

providing a user interface such that a user is able to search for content across the discovered content directory service instances.

13. The apparatus of claim 12, wherein said memory comprises a common database.

14. The apparatus of claim 13, wherein said common database comprises a de-serialized database which provides use of indexes for enabling searches.

15. The apparatus of claim 13, wherein said apparatus communicates directly with local content directory service devices using an exposed API to exchange data and information.

16. The apparatus of claim 13, wherein said apparatus communicates with a local digital media server to exchange data and information with local content directory service instances.

17. The apparatus of claim 13, wherein said apparatus uses a local control point component data model and control point interfaces to exchange data and information with external content directory service devices.

18. The apparatus of claim 13, wherein said apparatus uses a content provider plug-in device's API to implement interfaces to content and metadata of the content provider plug-in device.

19. The apparatus of claim 13, wherein said apparatus sorts and orders content and metadata stored in the common database.

20. The apparatus of claim 13, wherein said apparatus sorts and orders content and metadata unable to be stored in the common database separately and results are merged with content and metadata stored in the common database which is sorted and ordered.

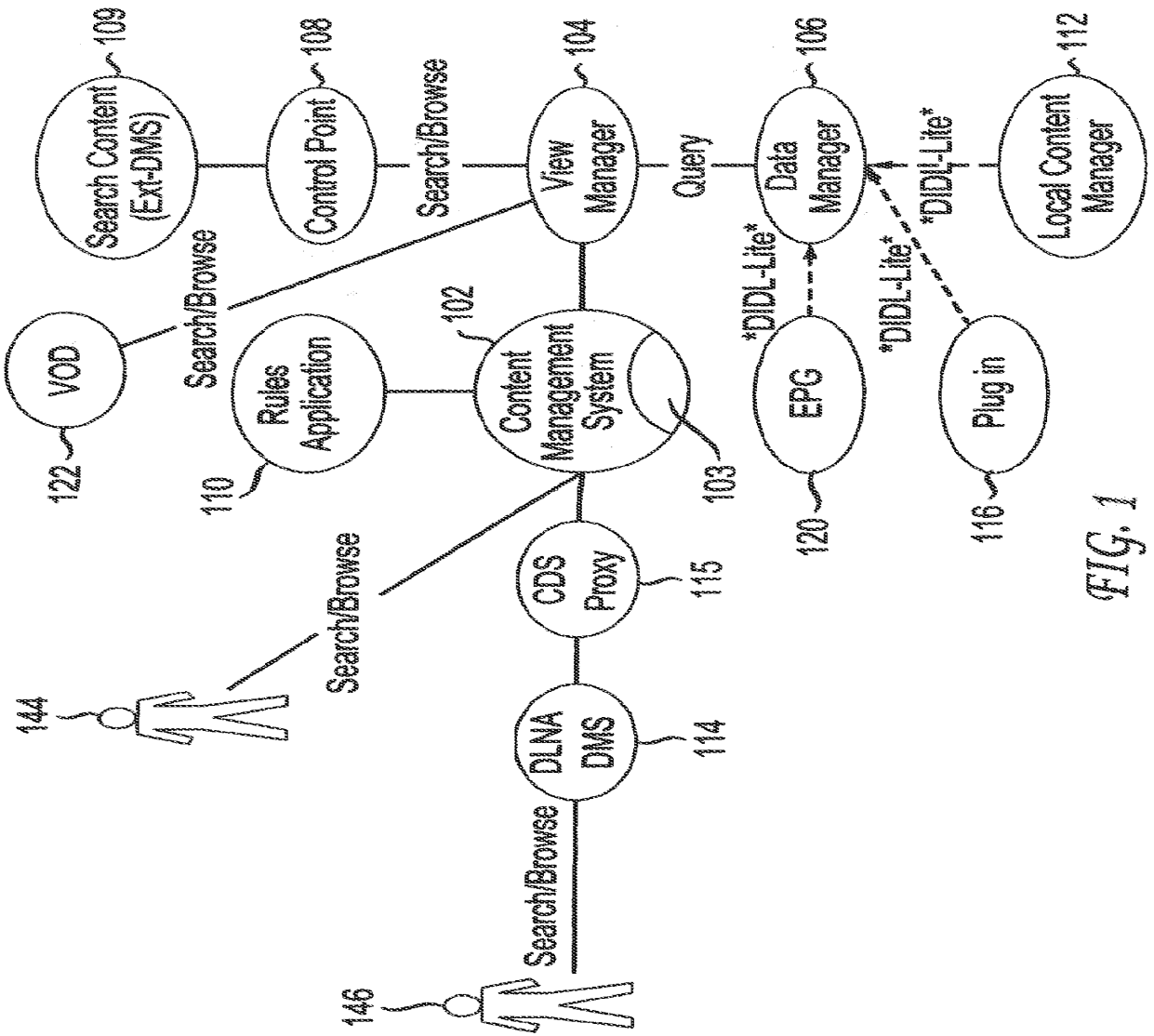


FIG. 1

VIZIO Ex. 1002, Page 1406 of 3573
VIZIO v. MMT, IPR2024-00722

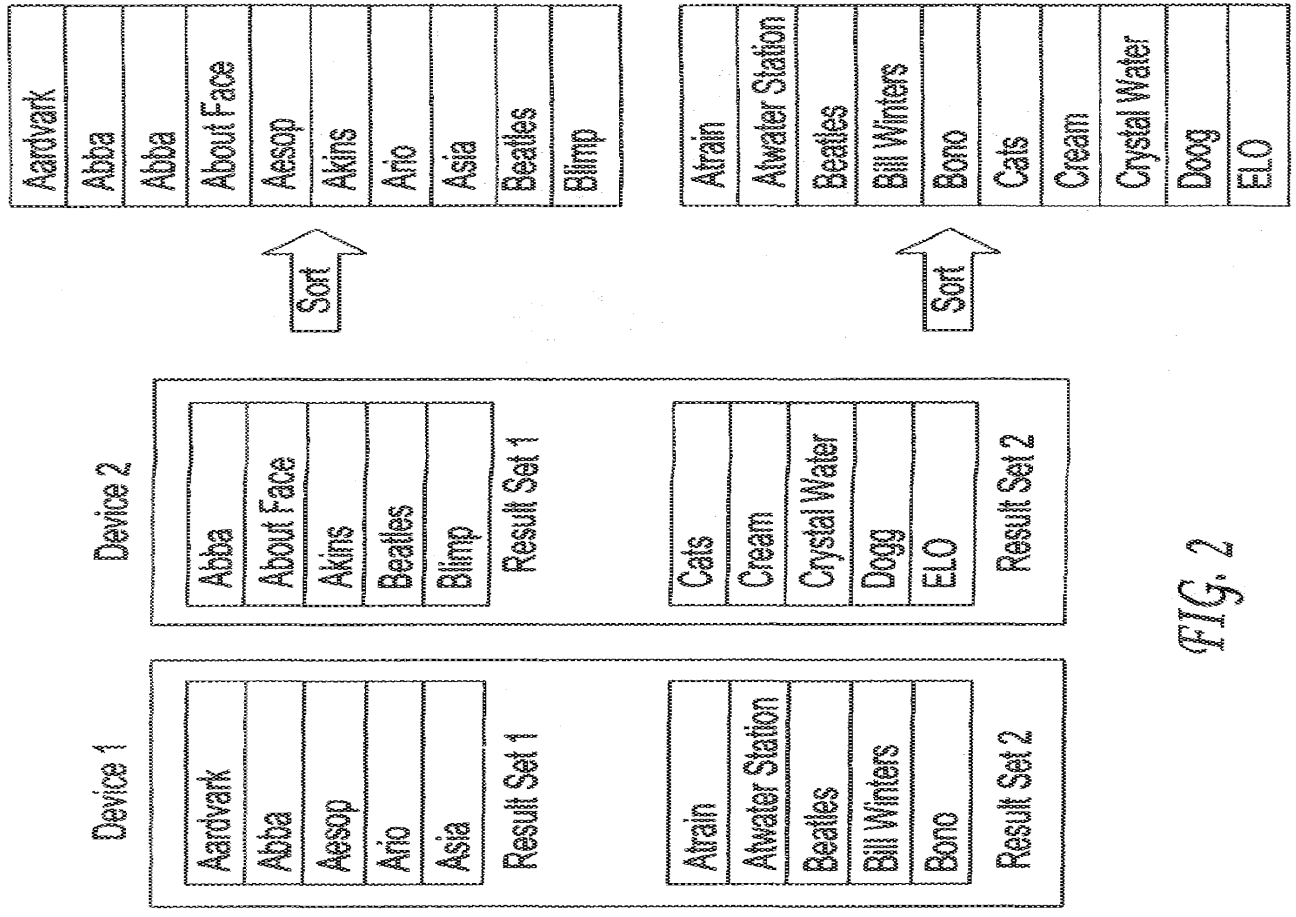


FIG. 2

VIZIO Ex. 1002, Page 1407 of 3573
VIZIO v. MMT, IPR2024-00722

FIG. 3

SUBSTITUTE SHEET (RULE 26)

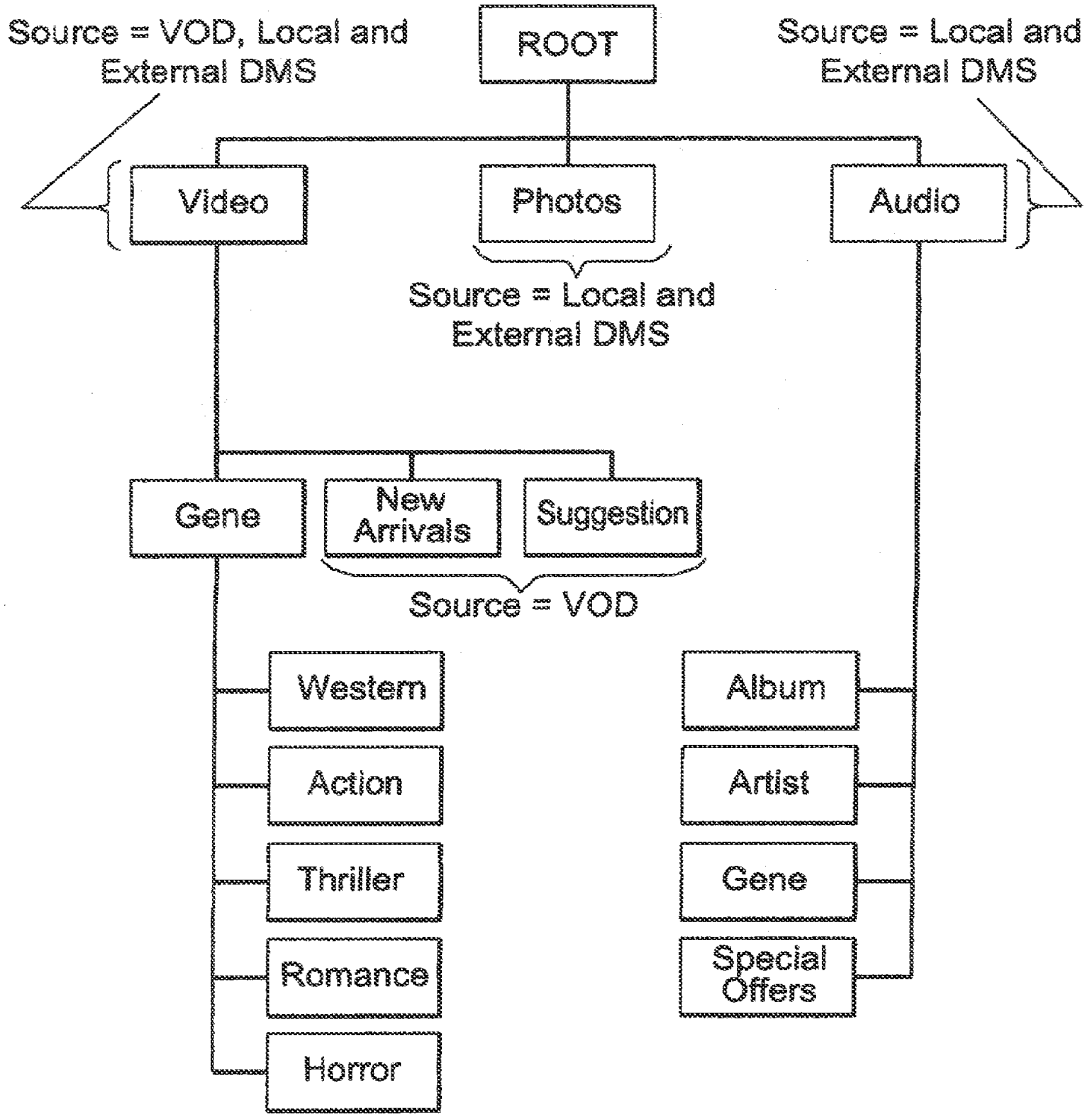


FIG. 4

VIZIO Ex. 1002, Page 1409 of 3573
VIZIO v. MMT, IPR2024-00722

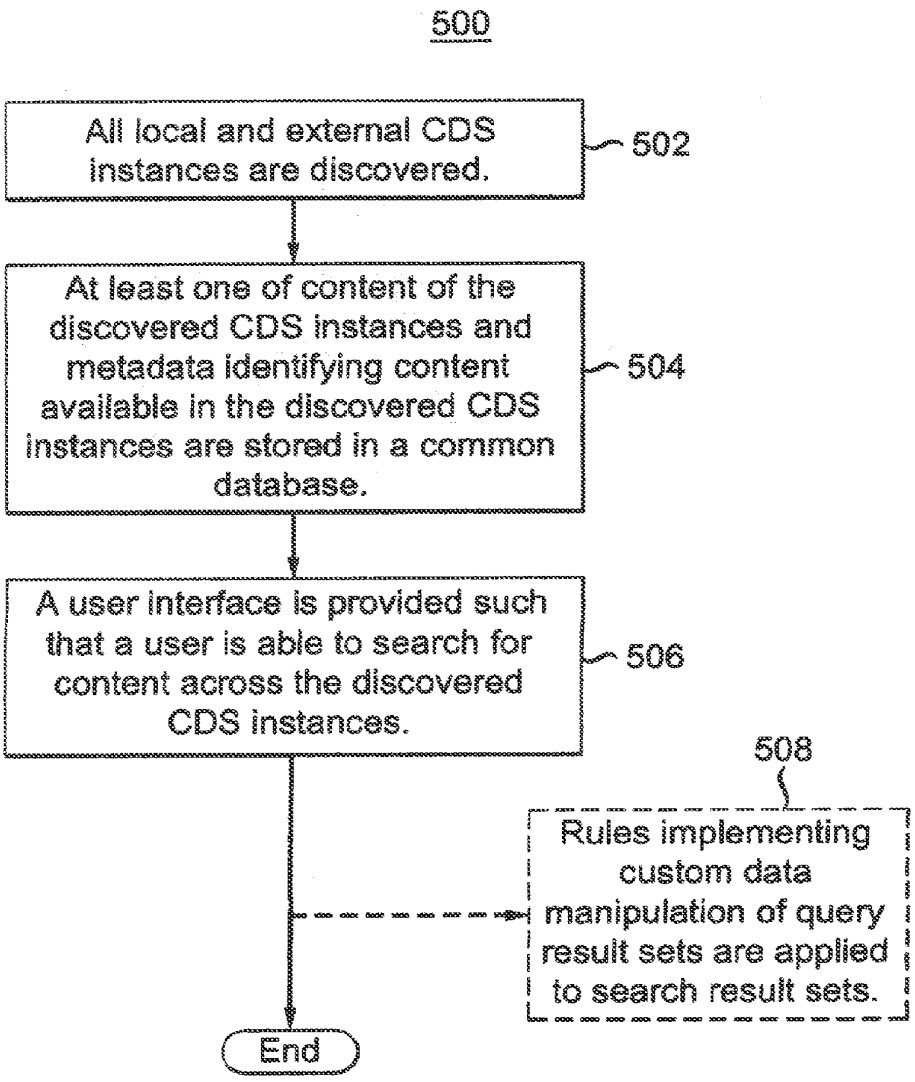


FIG. 5

VIZIO Ex. 1002, Page 1410 of 3573
VIZIO v. MMT, IPR2024-00722

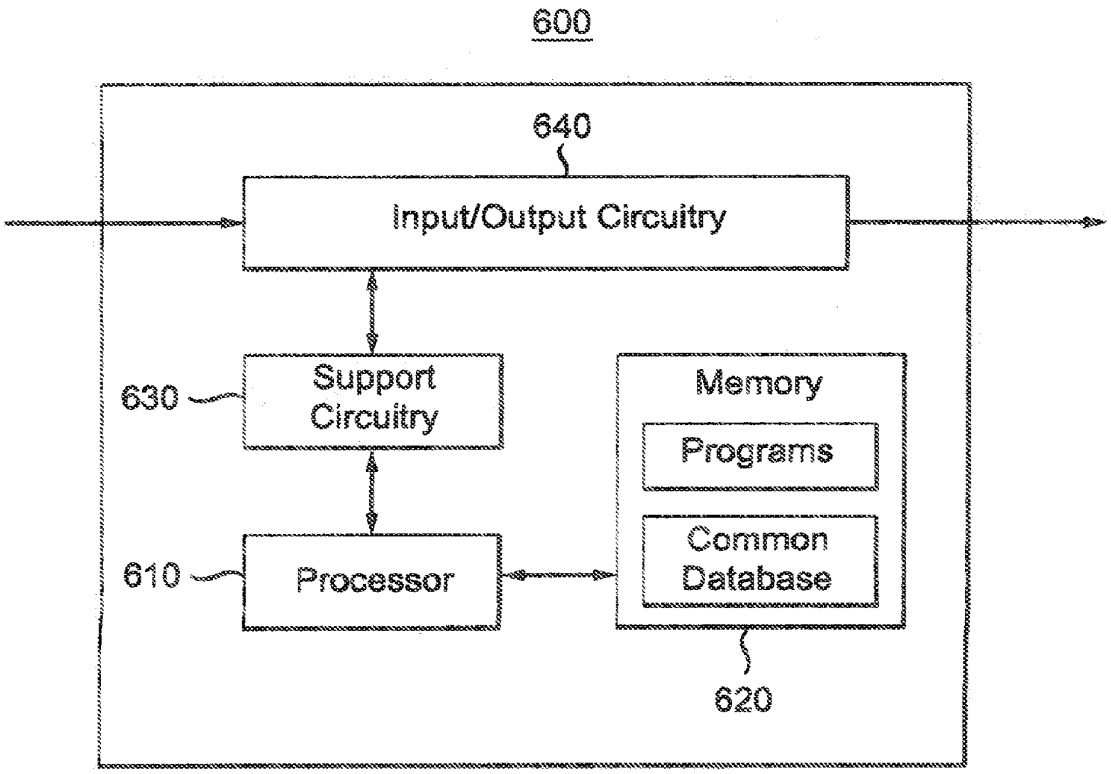


FIG. 6

VIZIO Ex. 1002, Page 1411 of 3573
VIZIO v. MMT, IPR2024-00722

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/061346

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F17/30
ADD.

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)
G06F

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/161635 A1 (LAMKIN ALLAN B [US] ET AL) 20 July 2006 (2006-07-20) paragraphs [0021], [0026], [0033] paragraphs [0049] - [0054]; figure 1 paragraph [0058]; figure 3 paragraphs [0128] - [0131] paragraphs [0230] - [0232]; figure 27	1-20
X	US 2006/159109 A1 (LAMKIN ALLAN B [US] ET AL) 20 July 2006 (2006-07-20) paragraphs [0128] - [0131] paragraphs [0049] - [0054]; figure 1	1-20
X	US 2004/193609 A1 (PHAN DAN M [US] ET AL) 30 September 2004 (2004-09-30) abstract paragraphs [0025], [0027], [0043] - [0052]; figure 3	1-20

☐ 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 document 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	Date of mailing of the international search report
27 January 2012	02/02/2012

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

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2011/061346

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006161635 A1	20-07-2006	NONE	
US 2006159109 A1	20-07-2006	NONE	
US 2004193609 A1	30-09-2004	NONE	

VIZIO Ex. 1002, Page 1413 of 3573
VIZIO v. MMT, IPR2024-00722

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 June 2012 (07.06.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/073027 A2

(51) International Patent Classification:
H04N 21/472 (2011.01)

(21) International Application Number:
PCT/GB2011/052370

(22) International Filing Date:
30 November 2011 (30.11.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1020290.1 30 November 2010 (30.11.2010) GB

(71) Applicant *(for all designated States except US)*: **YOUVIEW TV LTD** [GB/GB]; B6 Ground Floor, Broadcast Centre, 201 Wood Lane, London W12 7TP (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **HUNTER, Jeff** [GB/GB]; B6 Ground Floor, Broadcast Centre, 201 Wood Lane, London W12 7TP (GB).

(74) Agent: **KRAMER, Dani**; Mathys & Squire LLP, 120 Holborn, London EC1N 2SQ (GB).

(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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) **Title**: Content Provision

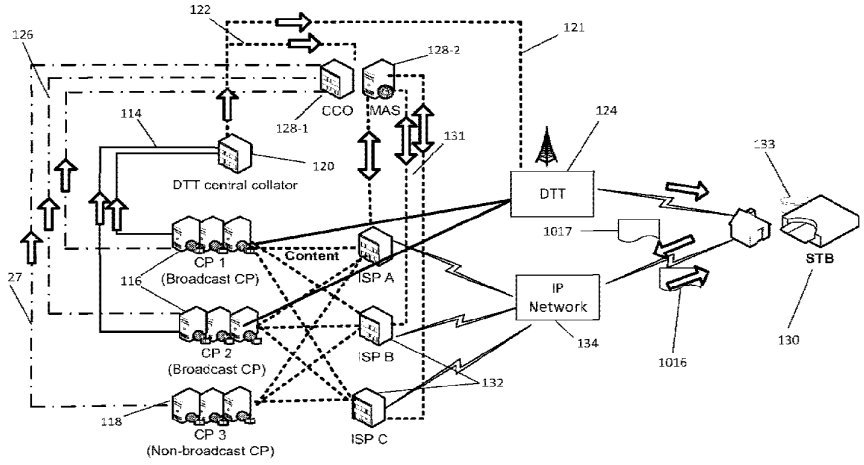


Figure 1

(57) **Abstract**: The present invention relates to a user interface for a content provision system, which comprises: means for generating graphical representations of a plurality of media content items available to a user, said media content items being provided by a plurality of media content providers; and means for enabling a user to access particular content items by selecting said graphical representations, wherein the content items are in the form of both scheduled content items and unscheduled content items. The invention also relates to a corresponding system and method.

WO 2012/073027 A2

Content Provision

This invention relates to a system and method for content provision. The invention is particularly relevant to the provision of data such as media content and related metadata from a plurality of media content providers to a media client device, such as a set-top box.

As the technology for transmission of media content to the home has developed - from radio to television broadcasts to Digital Terrestrial Television (DTT), Video-On-Demand (VOD) and Internet Protocol Television (IPTV) - there has been a dramatic increase in the number of media content providers resulting in a rich ecosystem of different modes and models of content provision, and a concomitant increase in the complexity of the user equipment for receiving the media content transmissions.

Typically, a user wishing to access a diversity of media content requires several receiving devices and faces the need to become familiar with each of their distinct modes of operation, knowledgeable about their specific configuration requirements and access restrictions - and proficient at navigating their diverse user interfaces – only to have the device rapidly achieve obsolescence.

The requirements of the content providers - not least in having a way of providing a high-quality media experience to an easily accessible large consumer base - are also not being met by currently available systems.

This invention may provide a solution to at least some of these problems.

Discovery and playback

According to one aspect of the invention, there is provided a system for providing media content to users, which comprises: means for aggregating data relating to a plurality of media content items provided by a plurality of media content providers; means for providing the aggregated data to a user; and means for enabling a user to access particular content items by means of said aggregated data, wherein the content items are in the form of both scheduled content items and unscheduled content items.

Preferably, the scheduled content item is in at least one of following forms: a scheduled broadcast content item; a scheduled multicast content item; and a scheduled streamed content item. Scheduled broadcast content items may be in the form of television programs, and scheduled multicast content items may be in the form of IP multicast programs.

Preferably, the unscheduled content item is in the form of an on-demand content item, for example, an on-demand video or audio content item. On-demand content items may be provided in the form of a virtual or placeholder channel.

Preferably, the system further comprises means for delivering content items to a user for consumption by the user, for example, to enable the user to watch and/or listen to the content items.

Preferably, the delivery means is adapted to deliver the content items via more than one delivery mechanism.

Preferably, the delivery means includes one or more communication networks.

Preferably, the communication network is in the form of at least one of the following types of network: a digital terrestrial television (DTT) network; an analogue terrestrial television network; an Internet Protocol (IP) network; a cable network; and a digital satellite network.

Preferably, the delivery means is adapted to deliver at least a portion of the aggregated data to a user.

Preferably, the delivery means is adapted to deliver content items to a user via one delivery mechanism and aggregated data to a user via a different delivery mechanism. Thus, in certain examples, aggregated data is provided, say, via an IP network, and the actual content items might be provided via a DTT network.

Preferably, the media content providers include one or more of the following: linear broadcast analogue and/or digital terrestrial channels; Video on Demand (VOD) content

providers; linear IP unicast and/or multicast channels; linear IP broadcast channels; and non-linear IP channels. Typically, the media content providers are in the form of terrestrial, satellite, Internet, or cable channels, or other channels and/or services that are able to provide media content to users.

Preferably, each content provider is adapted to deliver content items to a user via an appropriate communication network infrastructure.

Preferably, the system further comprises means for receving data relating to a plurality of media content items provided by a plurality of media content providers.

Preferably, the system further comprises means for storing the aggregated data.

Preferably, the content items are not stored together with the aggregated data. More preferably, the aggregated data is stored on a central server, and the content providers communicate with this server in order to provide metadata relating to the content items to this central server.

Preferably, the content items are stored on storage means each associated with a respective content provider.

Preferably, the data includes metadata relating to the content items.

Preferably, the data includes one or more of the following types of information relating to the content items: the location of the content item, for example, a Uniform Resource Identifier (URI) for the content item; access rights and/or user entitlement to the content item; geographical or location specific information relating to the content item; the content provider associated with the content item; the broadcast time and/or date of the content item; graphical information relating to the content items, for example, an icon or screen shot representative of the content item; the delivery method associated with the content item; and the format or type of content item.

Preferably, the system further comprises means for determining at least one characteristic associated with a user; and means for adapting access to the media content items in dependence on the at least one determined characteristic.

Preferably, the characteristic is at least one of the following: the geographical location of the user; the user's subscriptions to particular types of content items and/or content providers; an Internet Service Provider (ISP) to which the user is connected; the availability of particular content items; and the user's entitlement to particular content items.

Preferably, the access means is adapted to provide a user with access to particular content items by filtering the aggregated data provided to that user.

Preferably, the access means is adapted to provide a user with access to particular content items by providing the user with a particular subset of the aggregated data.

Preferably, the system further comprises at least one remote client device associated with a user. Preferably, the client device is in the form of an apparatus that is provided at the user's location. The apparatus is connectable to a user's display equipment (optionally a television). Alternatively, the client device might be incorporated within display equipment. Preferably, the client device includes means for playing content items, thereby to enable a user to consume content items.

Preferably, the client device is in the form of a receiver/decoder. More preferably, the client device is in the form of a Set Top Box (STB).

The term "receiver/decoder" used herein may connote a receiver for receiving either encoded or non-encoded signals, for example, television and/or radio signals, which may be broadcast, streamed, downloaded or transmitted by some other means. The term may also connote a decoder for decoding received signals. Embodiments of such receiver/decoders may include a decoder integral with the receiver for decoding the received signals, for example, in a "set-top box", such a decoder functioning in combination with a physically separate receiver, or such a decoder including additional functions, such as a web browser, a video recorder, or a television.

Preferably, the client device is connectable to a display means.

Preferably, the client device comprises means for connecting the client device to one or more communication networks.

Preferably, the communication network is in the form of at least one of the following types of network: a digital terrestrial television (DTT) network; a analogue terrestrial television network; an Internet Protocol (IP) network; a cable network; and a digital satellite network.

Preferably, the client device further comprises means for providing information relating to the client device and/or the associated user to the system.

Preferably, the information includes at least one of the following: the geographical location of the client device; user subscription information; an Internet Service Provider (ISP) to which the client is connected; and user content entitlement information.

Preferably, the system further comprises a media player for enabling users to consume content items.

Preferably, the media player is adapted to play media content items provided by a plurality of media content providers.

Preferably, the player is adapted to provide further information to a user in dependence on the content provider associated with a particular content item being played by the player, for example, relating to other content items provided by that content provider.

Preferably, the media player is provided by the client device. More preferably, the media player is stored on the client device. Alternatively, or in addition, the media player may be hosted on a server and accessible to users via a communications network.

Preferably, the system further comprises a plurality of further media players each associated with a respective content provider, and each adapted to play content items provided by that respective content provider.

Preferably, each of the further media players is adapted to provide a generic set of basic player operations.

Preferably, the system further comprises means for providing the aggregated data to a user via a user interface, thereby to enable a user to access particular content items.

Preferably, the user interface is in the form of an Electronic Programme Guide (EPG).

Preferably, the client device comprises means for displaying the aggregated data.

Preferably, the client device comprises means for storing the aggregated data. More preferably, the client device comprises means for storing the metadata.

According to another aspect of the invention, there is provided an apparatus (optionally in the form of a receiver/decoder) for enabling a user to access media content items, which comprises: means for receving aggregated data relating to a plurality of media content items provided by a plurality of media content providers; and means for enabling a user to access particular content items by means of said aggregated data, wherein the content items are in the form of both scheduled content items and unscheduled content items.

Preferably, the apparatus is in the form of a client device as herein described. More preferably, the apparatus is connectable to the system as herein described.

According to another aspect of the invention, there is provided an apparatus (optionally in the form of a server) for providing media content to users, which comprises: means for aggregating data relating to a plurality of media content items provided by a plurality of media content providers; means for providing the aggregated data to a user; and means for enabling a user to access particular content items by means of said aggregated data, wherein the content items are in the form of both scheduled content items and unscheduled content items.

Preferably, the apparatus is connectable to a plurality of user client devices as herein described.

According to a further aspect of the invention, there is provided a method of providing media content to users, which comprises: aggregating data relating to a plurality of media content items provided by a plurality of media content providers; providing the aggregated data to a user; and enabling a user to access particular content items by means of said aggregated data, wherein the content items are in the form of both scheduled

content items and unscheduled content items.

EPG

According to a further aspect of the invention, there is provided a user interface for a content provision system, which comprises: means for generating graphical representations of a plurality of media content items available to a user, said media content items being provided by a plurality of media content providers; and means for enabling a user to access particular content items by selecting said graphical representations, wherein the content items are in the form of both scheduled content items and unscheduled content items.

Preferably, the scheduled content item is in at least one of following forms: a scheduled broadcast content item; a scheduled multicast content item; and scheduled streamed content item.

Preferably, the unscheduled content item is in the form of an on-demand content item, for example, an on-demand video or audio content item.

Preferably, the graphical representations are of a uniform type regardless of the nature of the content items.

Preferably, the graphical representations are of a uniform type regardless of the delivery mechanism by which the content item is provided and/or the content provider associated with the content item.

Preferably, the graphical representations relating to the content items provided by a particular content provider are displayed adjacent to one another.

Preferably, scheduled broadcast content items are displayed adjacent to one another in accordance with their broadcast schedule.

Preferably, unscheduled content items are displayed adjacent to one another in accordance with a virtual schedule.

Preferably, the graphical representations relating to the content items provided by a particular content provider are displayed adjacent to one another thereby to form content provider bars (which are optionally horizontal), and wherein the bars representing each content provider are arranged in a stack, optionally a vertical stack.

Preferably, the arrangement of content items within the bars represents the time at which a content item is broadcast, and/or made available in accordance with a virtual schedule. More preferably, the bars define a horizontal axis which represents the time at which a content item is broadcast, and/or made available in accordance with a virtual schedule.

Preferably, the user interface further comprises means for generating a time marker for display over the content provider bars thereby to indicate the present time, and means for scrolling the bars relative to the time marker thereby to indicate the passage of time.

Preferably, the time marker is displayed in a substantially perpendicular orientation relative to the content provider bars. More preferably, the time marker is arranged in a substantially vertical orientation, and the content provider bars are arranged in a substantially horizontal orientation.

Preferably, the user interface is in the form of an Electronic Program Guide (EPG).

Preferably, the user interface further comprises means for displaying content items that have previously been broadcast together with content items that have yet to be broadcast.

Preferably, the user interface further comprises means for indicating whether a previously broadcast content item has been stored and/or recorded on a local storage means.

Preferably, the user interface further comprises means for indicating whether a content item that has yet to be broadcast has been booked to be recorded.

Preferably, the indication as to whether a content item has been previously recorded and/or has been booked to be recorded is displayed on the EPG.

Preferably, the user interface further comprises means for indicating a user's entitlement to a particular content item.

Preferably, the user interface further comprises means for indicating the availability

of a particular content item.

Preferably, the user interface further comprises means for enabling a user to access a particular content item by selecting the graphical representation relating to the particular content item.

According to a further aspect of the invention, there is provided a user interface as herein described, for providing aggregated data to a user in a system as herein described.

Software stack

According to another aspect of the invention, there is provided an apparatus, (optionally in the form of a receiver/decoder) for a content provision system, which comprises: a lower level software layer; and an upper level software layer, wherein the lower level software layer interacts directly with the hardware of the STB and provides an interface to the upper level software layer, and wherein the upper level software layer interacts with the lower level software layer and provides a user facing interface for user applications.

Preferably, the receiver/decoder is in the form of a Set top Box (STB).

Preferably, the application programming interface is provided between the software layers.

Preferably, each of the software layers is adapted to be updated independently by different parties.

Preferably, the lower level software layer is adapted to be updated by the STB manufacturer.

Preferably, the upper level software layer is adapted to be updated by a service (platform) provider.

Preferably, the upper level software layer is adapted to execute user applications.

Preferably, the upper level software layer is adapted to receive updated user applications.

Preferably, the lower level software layer includes at least some of the following modules: a kernel; a boot-loader; a root file system; and middleware.

Preferably, the upper level software layer includes at least a user interface application.

Preferably, the upper level layer includes elements or modules adapted to configure and/or modify elements and/or modules in the lower level layer.

ISP Discovery

According to one aspect of the present invention there is provided a system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising: means for determining a data communications network that a remote client device is connected to, the remote client device being adapted to provide one of the plurality of users with access to the media content; and means for providing configuration settings for the remote client device in dependence on said determined network. By providing such features the user experience may be improved, whilst optimising a remote client device for use on a particular network.

Preferably, the determining means utilises the IP address of the remote client.

Preferably, the system further comprises storage means adapted to store a data communications network look-up table, the look-up table including data relating said IP address to the data communications network.

Preferably, the means for providing configuration settings comprising storage means, adapted to store a configuration settings look-up table, the look-up table including data relating said data communications network to the configuration settings.

Preferably, the configuration settings are specific to one of: all remote client devices, a plurality of remote client devices or a specific remote client device.

Preferably, the configuration settings include at least one of: a remote client device user interface; a remote client device media content player; user identifiers; media content identifiers; and media content locations. More preferably, at least one of the user interface, media content and media player is specific to the determined data communications network.

Preferably, the configuration settings are provided to the remote client by directing the remote client, utilising a Uniform Resource Indicator, to a storage means. More preferably, the Uniform Resource Indicator comprises a plurality of components, including at least one address component and at least one remote client device identification component.

Alternatively, or in addition, the storage means is provided by the ISP, and connectable to the data communications network. In this way, advantageously, the hosting of the configuration settings may be delegated to the ISP.

Preferably, the configuration settings include one or more of the following: the location (URIs) of platform services; information that is to be presented to a user; information relating to content delivery networks; and information relating to IP linear channels.

Preferably, the Uniform Resource Indicator, comprises at least one of: a base Uniform Resource Indicator; a remote client device manufacturer identifier; a remote client device identifier; a firmware identifier; a software identifier; and a configuration settings identifier.

Preferably, the configuration settings are provided in XML format.

Preferably, the system further comprises means for receiving data from the remote client device indicating the current configuration settings. More preferably, the current configuration settings data indicates whether updated configuration settings are required.

Preferably, the system further comprises means for determining whether updated configuration settings are required. More preferably, the update determining means operates at predetermined intervals. Yet more preferably, the intervals are regular, for example, daily, hourly, or upon start-up of the remote client device.

Preferably, the system further comprises means for determining the location of a remote client device, the configuration settings being dependent on said determined location.

Preferably, the data communications network is an Internet Service Provider.

Preferably, the system further comprises means for providing the remote client device with media content in dependence on the determined data communications network.

Preferably, the system further comprises a remote client device, the remote client device adapted to receive and apply said configuration settings. More preferably, the remote client device is adapted to only accept configuration settings from an authorised data communications network.

Preferably, the system further comprises means for determining the location of a remote client device, the remote client device being adapted to provide one of the plurality of users with access to the media content; and means for determining a set of media content accessible by the remote client in dependence on the determined location.

Geo-location

According to a further aspect of the present invention, there is provided a system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising: means for determining the location of a remote client device, the remote client device being adapted to provide one of the plurality of users with access to the media content; and means for determining a set of media content accessible by the remote client in dependence on the determined location. As such the user is provided with more relevant media content.

Preferably, the location determining means utilises the digital terrestrial television signal. More preferably, the location determining means utilises the relative signal strength of the digital terrestrial signal, and or triangulation of the digital terrestrial signals.

Preferably, the location determining means utilises the IP address of the remote client.

Preferably, the system further comprises storage means, adapted to store a location look-up table, the look-up table including data relating said determined location and a set of media content.

Preferably, the system further comprises means for providing the remote client with data in relation to said set of media content. More preferably, the data includes the source location of the media content.

Preferably, the system further comprises means for receiving a plurality of media content metadata relating to media content from a plurality of media content providers; means for determining at least one media content access right of a user to media content in dependence on the media content metadata and on user information; means for generating media content availability data in dependence on the determined at least one user access right.

CREDS

According to a further aspect of the present invention there is provided a system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising: means for receiving a plurality of media content metadata relating to media content from a plurality of media content providers; means for determining at least one media content access right of a user to media content in dependence on the media content metadata and on user information; and means for generating media content availability data in dependence on the determined at least one user access right. Thereby, the user is provided with aggregated content rights, and as such the user access method to media content may be simplified.

Preferably, the user information comprises media content purchase information, and the means for determining is adapted to determine a media content access right in dependence on the media content purchase information. More preferably, the media content purchase information comprises information regarding purchase of a single item of media content. Yet more preferably, the media content purchase information comprises information regarding purchase of a subscription to media content.

Preferably, the means for generating media content availability data is adapted to generate media access options data in dependence on the media content metadata, on the user information and on the user media content purchase information. More preferably, the media access options data comprises an option for the purchase of media content.

Preferably, the media access options data comprises an option for the advertisement-sponsored consumption of media content.

Preferably, the media access options data is dependent on the identity of the user.

Preferably, the system further comprises means for receiving user information from a remote client device.

Preferably, the system further comprises means for transmitting media content availability data to a client device.

Preferably, the system further comprising: means for determining at least one characteristic of a user; and means for adapting access to the plurality of media content in dependence on the at least one determined characteristic.

According to a further aspect of the present invention there is provided a remote client device (optionally including a receiver/decoder) for providing a user with access to a plurality of media content from a plurality of media content sources, comprising: means for receiving a plurality of media content metadata relating to media content from a plurality of media content providers; means for determining at least one media content access right of the user to media content in dependence on the media content metadata and on user information; and means for generating media content availability data in dependence on the determined at least one user access right.

Chameleon System

According to a further aspect of the present invention there is provided a system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising: means for determining at least one characteristic of a user; and means for adapting access to the plurality of media content in dependence on the at least one determined characteristic. Thereby, reducing the requirement to have specialised hardware for each user characteristic.

Preferably, the at least one user characteristic includes at least one of: the location of the user; the group in which the user is categorised; the user's media content subscriptions; the user's Internet Service Provider; the user's preferences; and the availability of the media content. More preferably, the group in which the user is categorised is determined by a characteristic of the user. Yet more preferably, the characteristic being at least one of: the user's location; the user's media content subscription; the user's Internet Service Provider; the user's preferences.

Preferably, the access is adapted by at least one of: selectively providing access to media content from the plurality of media content; configuring a remote client device associated with the user; selectively providing access to media content in dependence on available bandwidth.

Preferably, the system further comprises a remote client device, adapted to provide the user access to the plurality of media content, the remote client device having a configurable media content access interface. More preferably, the interface is configurable in dependence on the determined user characteristic.

Preferably, the system further comprises means for determining a media content item selected by one of the plurality of users; means for determining at least one delivery pathway for said media content in dependence on at least one characteristic of a plurality of available delivery pathways.

Assured delivery

According to a further aspect of the present invention there is provided a system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising: means for determining a media content item selected by one of the plurality of users; means for determining at least one delivery pathway for said media content in dependence on at least one characteristic of a plurality of available delivery pathways.

Preferably, the system further comprises means for initiating delivery of said media content, from said content provider to said user, via said determined delivery pathway.

Preferably, each of the plurality of said delivery pathways originates at a respective content delivery network. More preferably, each said content delivery network having the selected media content item.

Preferably, the at least one characteristic being at least one of: the bandwidth of the delivery method; the bitrate of the media content available; and previous usage statistics.

Preferably, the determining means is adapted to determine the or each pathway capable of delivering said media content with a bitrate greater than or equal to a minimum bitrate. More preferably, the minimum bitrate is dependent on the type of media content. Yet more preferably, the type of media content including at least one of: standard-definition; and high-definition.

Preferably, the system further comprises means for providing metadata to a remote client, the metadata comprising information relating to the at least one determined delivery pathway.

Preferably, the system further comprises a remote client device, adapted to provide a user with access to the media content in dependence on said at least one determined delivery pathway.

Preferably, the remote client being further adapted to monitor the bitrate provided by a determined delivery pathway, the remote client comprising storage, adapted to store said monitored bitrate. More preferably, the monitored bitrate being utilised to determine the at least one delivery pathway.

Alternatively, or in addition, the remote client is adapted to make the decision of where to get the content from, based on information about the possible delivery options (obtained from the content provider), and/or information about the network to which the remote client is connected to (obtained from the ISP).

It is to be appreciated that certain delivery options might be provided with assured delivery / quality of service, and that others may be accessible, but without any guarantees.

Furthermore, certain delivery options might be usable via all networks, while others might not be usable via all networks.

Preferably, the system further comprises a server, the server being adapted to provide the remote client with metadata relating to the delivery pathway to utilise.

According to a further aspect of the present invention there is provided a remote client device (optionally including a receiver/decoder) for providing a user with access to a plurality of media content from a plurality of media content sources, comprising: means for determining a media content item selected by the user; means for determining at least one delivery pathway for said media content in dependence on at least one characteristic of a plurality of available delivery pathways.

According to a further aspect of the present invention there is provided, a remote client device adapted to communicate with a system as aforementioned.

According to a further aspect of the present invention there is provided a server adapted to communicate with a system as aforementioned.

The system as herein described may be in the form of an apparatus or server, connectable to a plurality of user client devices.

In one preferred embodiment, the electronic programme guide as herein described is implemented in hardware or software.

In one preferred embodiment, the graphical user interface as herein described is implemented in hardware or software.

It is envisaged that the system as herein described may be implemented wholly on a central server, or a set interconnected servers, which is/are connectable to a plurality of remote client devices. Alternatively, aspects of the system may be implemented, at least in part, on the or each remote client device.

It is envisaged that aspects of the system, client device, method, guide, user interface and/or media player described herein may be implemented in software running on a computer such as a personal computer or a receiver/decoder (which may be connected directly to a monitor or to a television or other display means), and it is to be appreciated that inventive aspects may therefore reside in the software running on such devices.

Other aspects of this system, client device, method, guide, user interface, and/or media player may be implemented in software running on various interconnected servers, and it is to be appreciated that inventive aspects may therefore reside in the software running on such servers.

According to another aspect of the invention, there is provided a computer programme product for implementing the electronic programme guide, user interface and/or media player as herein described.

The invention also extends to a server or a plurality of interconnected servers running software adapted to implement the system or method as herein described.

The invention extends to any novel aspects or features described and/or illustrated herein.

Further features of the invention include:

- a system that can amalgamate content from a plurality of content providers or sources and may provide a single space (such as an electronic programme guide or EPG) which a user can easily navigate to find the desired content without having to move between different user interfaces
- a clear indication to the user of content that the user already owns or has available (for example as part of a subscription) from any and all content providers so that it is apparent to the user which content they are already subscribed to, and can play instantly at no extra cost, against which content is only available to them by their first having to sign-up to a new subscription package, or to purchase on a one-off-basis.
- a modular approach to updating consumer devices, so that the behaviour of a device can be influenced by any number of parties, enabling functionality that is completely user-customised depending on what services or features the user requires, and

wherein updates to the device may be demanded by the various parties as opposed to being user-defined

- location-based services (such as news and weather, on-demand content or targeted advertising) which may determine what content should be displayed and accessible to the user in dependence on the location of the media client
- a data receiving and data displaying device adapted to receive and display data (such as audio/video content and related data and metadata) from a multitude of sources in a federated manner and which may be customised by attributes such as Internet Service Provider (ISP), location, data entitlement or data availability
- a media client device in two-way communication with a data aggregating server (CCO) which is itself in two way communication with a multitude of content providing sources, the CCO receiving data and metadata relating to the content and passes this onto the device.
- apparatus for generating an electronic program guide comprising elements from a multitude of sources (e.g. DTT, IPTV, VOD and PVR or Personal Video Recordings) integrated onto a single display to enable a user to choose past, present or future events from a multitude of sources using a single user interface display , the interface being generated in a seamless manner so that all content may appear in the same fashion, and displaying related content to that being played currently, or that is recommended to the user based on their current or past viewing history, or based on other information.
- a user interface, which includes an Electronic Programme Guide (EPG) showing content from a multitude of sources which may be categorised using data from content providers or other sources and integrated onto a single display (for example presenting similar, linked or other related content to the user) and which may afford the user a 'channel hopping' experience across integrated sources, preferably, displaying information to the user in a number of formats, for example as an on-screen 'mini-guide'.
- a search function provided in said EPG which may search in a seamless manner, potentially simultaneously, over all content that is available to the user, the user optionally also finding specific content via the device categorising the content in dependence on metadata about the content provided by the content provider and which may be aggregated from a multitude of sources.
- a customisable EPG preferably dependent on at least one variable e.g. user location, subscriptions or user group, which may be generated and displayed in a manner seamless to the user, and via which content displayed on the EPG has assigned to it labels indicating to the user in what capacity they can access them (e.g. now, soon, or can be available after a payment etc).
- a 'universal space' for the playback of media content, wherein the content may be played using different players, but it has similar controls and appears identical to the user, preferably such that the content can be presented to the user in a seamless manner, regardless of the source, and in which the content providers may present their content using their own technology, or alternatively the technology in-built into the system, and with user controls such as play, pause, rewind, fast-forward, for content presentation.
- a multi-level client device architecture or software stack wherein one or more levels of the architecture remotely may be configured or updated (altering the behaviour and/or properties of the client device) remotely by a plurality of external agents such as data or content providers, intermediate data-handling entities such as ISPs, device hardware manufacturers, system or network administrators or other privileged entities, the actions occurring seamlessly to the user, irrespective of the agent.
- means for determining content entitlement information (preferably relating to media content, more preferably across multiple commercial and non-commercial providers and in dependence on user credentials submitted to the content provider) and

indicating the results to the user, preferably adapted to distinguish different types of content from one another thereby allowing the user to see, for example, what video content they are entitled to watch immediately, what subscription packages are subscribed to, and to which content access may be acquired.

- means for determining a provider of media access services such as the hosting internet service provider or ISP that a client device is connected to, by means of an IP address being allocated a parameter specific to an ISP, an autonomous system number database to match IP addresses to ISPs
- means for configuring a media client device in dependence on the determined service provider
- means for determining the geographical location of a media usage device
- means for associating media services or content with a geographical region and preferably delivering regionally-targeted data or other wise modifying the media provided to a client device in dependence on information associated with the IP address or geographical location of the device
- means for defining user groups and subsequently granting or restricting access to sets of data for specific groups, such as only granting access to users that present an appropriate token or possess a certain characteristic, or restricting browsing and searching of content and services to members of defined user groups.
- a device adapted to participate in a data delivery system wherein a data delivery route from a data provider to the device is managed, preferably by allocating data delivery to the most effective delivery route, preferably such that a particular data delivery rate can be assured (for example, the route being selected in dependence on delivery latency not exceeding a predetermined value). The device may be presented with a list of assured delivery rate delivery routes and/or the media content items associated with a delivery rate, thereby allowing the device to present an indication that a data item can be delivered at a specific rate, or otherwise an estimate of a delivery delay.
- a method of determining a delivery route for media content such that the delivery of the media content at a specific rate is assured, for example by providing a client device with a list of delivery routes determined to deliver at the specified rate.

Further features of the invention are characterised by the independent and dependent claims.

The invention extends to methods and/or apparatus substantially as herein described with reference to the accompanying drawings.

The invention also provides a computer program and a computer program product for carrying out any of the methods described herein and/or for embodying any of the apparatus features described herein, and a computer readable medium having stored thereon a program for carrying out any of the methods described herein and/or for embodying any of the apparatus features described herein.

The invention also provides a signal embodying a computer program for carrying out any of the methods described herein and/or for embodying any of the apparatus features described herein, a method of transmitting such a signal, and a computer product having an operating system which supports a computer program for carrying out any of the methods described herein and/or for embodying any of the apparatus features described herein.

Any apparatus feature as described herein may also be provided as a method feature, and vice versa. As used herein, means plus function features may be expressed alternatively in terms of their corresponding structure, such as a suitably programmed processor and associated memory.

Any feature in one aspect of the invention may be applied to other aspects of the invention, in any appropriate combination. In particular, method aspects may be applied to apparatus aspects, and vice versa. Furthermore, any, some and/or all features in one aspect can be applied to any, some and/or all features in any other aspect, in any

appropriate combination.

It should also be appreciated that particular combinations of the various features described and defined in any aspects of the invention can be implemented and/or supplied and/or used independently.

Furthermore, features implemented in hardware may generally be implemented in software, and vice versa. Any reference to software and hardware features herein should be construed accordingly.

Further information may be found in the following documents, which are herein incorporated by reference: (N.B. IETF RFC, ETSI and ISO docs are industry standards)

- [DTG DBook] - The DTG 'D-Book' - Version 6.2.1 May 2010
- [DVB-IPTV FCC] - Digital Video Broadcasting (DVB); Server-Based Fast Channel Change for DVB-IPTV Systems, DVB Document A152 - August 2010
- [RFC 5652] - Cryptographic Message Syntax (CMS) – Sept 2009
- [IETF RFC 4287] - The Atom Syndication Format – December 2005
- [IETF RFC 2616] - Hypertext Transfer Protocol -- HTTP/1.1 – June 1999
- [ETSI TS 102 034 v1.4.1] - Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks – 2009-08
- [ETSI TS 102 822-3-1, TS 102 822-3-2 TS 102 822-3-3] - Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems – February 2005
- [ETSI TS 102 727] - Digital Video Broadcasting (DVB); Multimedia Home Platform (MHP) Specification 1.2.2 – July 2007
- [ISO/IEC 15938-5] - Multimedia content description interface -- Part 5: Multimedia description schemes – September 2008
- [ISO/IEC 15938-1 Clause 5] - Multimedia content description interface -- Part 1: Systems – January 2008
- [ISO 8601 Clause 5.4.1a, 5.3.3, 5.5.3.2] - Data elements and interchange formats -- Information interchange -- Representation of dates and times – March 2008
- [ISO 639-1] - Codes for the representation of names of languages -- Part 1: Alpha-2 code – February 2008
- [ISO 639-2] - Codes for the representation of names of languages -- Part 2: Alpha-3 code – July 2010
- ISO 639-3] - Codes for the representation of names of languages -- Part 3: Alpha-3 code for comprehensive coverage of languages – July 2010
- [RFC 1738] - Uniform Resource Locators (URL) – December 1994
- [RFC 2396] - Uniform Resource Identifiers (URI): Generic Syntax – August 1998
- [IETF RFC 2616] - Hypertext Transfer Protocol -- HTTP/1.1 – June 1999
- [IETF RFC 2617 Section 2] - HTTP Authentication: Basic and Digest Access Authentication – June 1999
- [RFC 2818] - HTTP Over TLS – May 2000
- [RFC 5280] - Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile – May 2008
- [IETF STD 66, RFC 3986] - Uniform Resource Identifier (URI): Generic Syntax – January 2005
- [IETF RFC 4078] - The TV-Anytime Content Reference Identifier (CRID) – May 2005
- [IETF RFC 4151] - The 'tag' URI Scheme – October 2005
- [IETF RFC 5322] - Internet Message Format – October 2008
- [IETF RFC 5321] - Simple Mail Transfer Protocol – October 2008
- [IETF STD 66, RFC 3986] - Uniform Resource Identifier (URI): Generic Syntax – January 2005
- [IETF RFC 4287] - The Atom Syndication Format – December 2005

These and other aspects of the present invention will become apparent from the

following exemplary embodiments that are described with reference to the following figures in which:

Figure 1 shows a system for providing media content and related media content metadata from a plurality of media content providers to a media client device;

Figure 2 shows an example Electronic Programme Guide (EPG);

Figure 3 shows an example of how the EPG is generated;

Figure 4 shows the Content Rights Entitlement Display System (CREDS);

Figure 5 shows the CREDS process in further detail;

Figure 6 shows the processes involved when a user selects an item of media content for playback;

Figure 7 shows a schematic showing the software architecture of the media client device;

Figures 8 and 9 show the ISP Discovery process;

Figure 10 shows the Geo-location process;

Figure 11 shows the 'Closed User Groups' concept;

Figure 12 shows the Assured Delivery process;

Figure 13 shows an overview of the IP Channels architecture;

Figure 14 shows the ingest of the linear broadcast metadata;

Figure 15 shows the 'STAGIS quick win solution' EPG generating system;

Figure 16 shows in overview the system data flow for content;

Figure 17 shows an example of the display of a 'Virtual IP' channel on the EPG;

Figure 18 shows tfurther aspects of the data flow in the system ;

Figure 19 shows example screen shots of the EPG;

Figure 20 shows an additional example of the EPG user interface;

Figure 21 shows four other views the EPG may produce;

Figure 22 shows the different sources for On Demand content;

Figure 23 shows the different elements of the playback process;

Figure 24 shows the sequence of events associated with playback;

Figure 25 shows the scenarios leading to an interrupted exit;

Figure 26 shows a possible layout of the Main Menu;

Figure 27 shows possible subcategories of the 'On Demand' category;

Figure 28 shows possible subcategories of the 'Music' category;

Figure 29 shows possible subcategories of the 'Films' category;

Figure 30 shows an indicative representation of the 'Players' section available to the user;

Figure 31 shows an indicative representation of the 'Highlights' section;

Figure 32 shows possible subcategories of the 'TV OD' category;

Figure 33 shows possible subcategories of the 'Children's' category;

Figure 34 shows possible subcategories of the 'Comedy' category;

Figure 35 shows possible subcategories of the 'Drama and Soaps' category;

Figure 36 shows possible subcategories of the 'Entertainment' category;

Figure 37 shows possible subcategories of the 'Factual' category;

Figure 38 shows possible subcategories of the 'Lifestyle' category;

Figure 39 shows possible subcategories of the 'News & Weather' category;

Figure 40 shows possible subcategories of the 'Sport' category;

Figure 41 shows possible subcategories of the 'Audio Description' category;

Figure 42 shows possible subcategories of the 'Signed' category;

Figure 43 shows possible subcategories of the 'Radio' category;

Figure 44 shows possible subcategories of the 'Music' category in Radio;

Figure 45 shows possible subcategories of the 'Talk Radio' category in Radio;

Figure 46 shows possible subcategories of the 'Sport' category in Radio;

Figure 47 shows the sequence of actions the user may take during a search;

Figure 48 shows the basic design frame;

Figure 49 shows the design grid system;

Figure 50 shows an outline of the Consumer Device Software Architecture;

Figure 51 shows the relationship between tiers of APIs and the implementation thereof;

Figure 52 shows the relationship between the updatable software and configuration components;
Figure 53 shows the architecture of the configuration components;
Figure 54 shows the integration of the core device software and the platform software;
Figure 55 shows how various sources of configuration information are managed and the order in which they are processed;
Figure 56 shows an example of the architecture used for updates;
Figure 57 shows possible settings mergers;
Figure 58 shows a possible settings user interface;
Figure 59 shows components of an offer;
Figure 60 shows an overview of a system with offer/entitlement features;
Figure 61 shows a scenario where the content is free;
Figure 62 shows the display presented to the user in the scenario of Figure 61;
Figure 63 shows a scenario where the content is pay-per-view, with a static price;
Figure 64 shows the display presented to the user in the scenario of Figure 63;
Figure 65 shows the process of a purchase transaction;
Figure 66 shows a scenario where the content is pay-per-view, with a dynamic price;
Figure 67 shows the display presented to the user in the scenario of Figure 66;
Figure 68 shows a scenario where the content is pay-per-view, with and without advertisements;
Figure 69 shows the display presented to the user in the scenario of Figure 68;
Figure 70 shows a scenario where the content belongs to a single subscription package, to which the viewer is already subscribed;
Figure 71 shows the display presented to the user in the scenario of Figure 70;
Figure 72 illustrates a scenario where the content belongs to a single subscription package, to which the viewer is not subscribed;
Figure 73 shows the display presented to the user in the scenario of Figure 72;
Figure 74 illustrates the process of a subscription transaction;
Figure 75 shows an example of a display presented to the user in a scenario where the content belongs to multiple subscription packages;
Figure 76 shows an example of a display presented to the user in a scenario where there are multiple offers (transactional and subscription) for the content;
Figure 77 shows a sequence diagram of a system with offer/entitlement features;
Figure 78 shows the data flow of ISP configuration parameters;
Figure 79 shows the ISP Discovery Service process;
Figure 80 shows the structural overview of TV-Anytime profile;
Figure 81 shows the metadata origination party concept;
Figure 82 shows an example of an asynchronous fragment update transaction;
Figure 83 shows an example of a synchronous fragment update transaction;
Figure 84 shows a transaction life-cycle represented as a state transition diagram;
Figure 85 shows examples of valid and invalid transaction shapes;
Figure 86 shows an example XML schema for Transaction Status Report;
Figure 87 shows an example XML schema for <TVAMain> instance document showing permitted tables and Fragment types;
Figure 88 shows example content description metadata archetypes for programmes;
Figure 89 shows an example 'full stack' pattern of contact transactions;
Figure 90 shows an example 'atomic' pattern of content transactions;
Figure 91 shows a modelling of a single music video, one on-demand publication of it and the associated on-demand service;
Figure 92 shows a modelling of a cinema film/movie;
Figure 93 shows an example sample with the minimum amount of metadata;
Figure 94 shows the data flow for pricing with CREDS; and
Figure 95 shows Product Membership and Package Fragments in CREDS.

Overview

Figure 1 shows a system for providing media content and related media content metadata (or information about the media content) from a plurality of media content providers to a media client device.

Media client device 130 comprises electronic circuitry for receiving signals broadcast over a digital terrestrial television (DTT) network 124 (e.g. over-the-air by means of a digital television aerial) and also electronic circuitry for connecting to a data communications network such as an IP network 134, for example the internet (e.g. via a router to a suitable internet service provider or ISP 132).

Media client device 130 can therefore receive data such as media content (typically audio-visual data) directly broadcast from media content providers (CP) 116 via the DTT network 124 and/or multicast from media content providers 116, 118 (through ISP 132) via the IP network 134. The media client device 130 can also upload data to other entities connected to the IP network 134 via the ISP 132.

Whether a particular item of media content is provided to the client device 130 over the DTT network 124 and/or the IP network 134 is determined by commercial and/or technological considerations. For example, 'IP Channels' content may also be disseminated over DTT 124, directly by the broadcast content providers. Conversely, premium or on-demand content may be disseminated via the IP networks 134 of partner ISPs 132.

Typically, media client device 130 is located at the residence of a user as part of a home entertainment system and is referred to as a consumer device or 'set-top' box (STB) – the terms are used here interchangeably. Some examples of media client device 130 have access to local storage (for example a hard drive or flash memory) either in-built and/or means for connection thereto. In some alternatives the functionality of media client device 130 is built-in as part of another device, for example a television or embodied as a computer program on a personal computer.

The user interacts (typically with a push-button remote control handset) with the STB 130 to select which media content to consume by means of a user interface or Electronic Programme Guide (EPG) on-screen menu system generated by the STB 130 and typically rendered on a television screen.

The EPG is determined from metadata 114, 126 relating to the supplied media content provided by the media content providers (CP) 116, 118. This metadata contains information relating to the media content such as, for example, subject matter, running time, information on access (such as media content location information, typically a uniform location indicator or Uniform Resource Identifier (URI) so that the client device can locate the media content on the network) and access rights.

The media content itself may be stored on – and received by the media client device directly from - a content provider (which may be the original source or distributor of the content) but more typically content delivered over an IP network is stored at an intermediary and located within a content delivery network (CDN) comprising a distributed network of content servers.

A number of DTT broadcast content providers 116 participate in a broadcast group and have their media content metadata 114 aggregated by a DTT central collator (DTT CC) 120 for transmission to the STB 130. That is, metadata 114 from the partner broadcast Content Providers (CP) 116 is passed directly to the DTT Central Collator (DTT CC) 120, the DTT CC 120 then aggregates this data into a 'Fat CSI' feed 121 which is then disseminated to users and subscribers via DTT 124. This allows the STB 130 to generate an EPG which provides information relating to (and potentially allows the user access to) a more comprehensive range of media content than would be available from a single media content provider.

Data/metadata aggregation server (termed a CCO/MAS) 128 - connected to the IP network 134 – acts as a central resource for providing STB 130 with metadata relating to both media content broadcast over DTT and to media content multicast over IP networks (optionally, STB 130 may receive metadata relating to media content broadcast over DTT

directly, or via DTT CC 120). CCO/MAS 128 may be configured as separate interconnected units CCO 128-1 and MAS 128-2.

CCO/MAS server 128 effectively serves as a media content access platform and is controlled by a platform operator to provide a data / metadata aggregation service.

In particular, CCO/MAS server 128 accepts the following input metadata feeds:

- metadata feed 122 for the broadcast group from the DTT CC 120
- metadata feeds 126 from broadcast content providers CP 116 individually - this allows for broadcast content providers CP 116 to supply an enhanced metadata feed providing additional information relating to their media content over and above that typically supported by the DTT CC 120
- metadata feeds 127 from non-broadcast content providers CP 118 – this allows non-broadcast content providers 118 which are not included in the broadcast group to supply metadata in a similar way to broadcast content providers 116 despite not being connected to the DTT CC 120

These feeds are combined in an aggregated output metadata feed 131 from the CCO/MAS server 128 to the STB 130.

The CCO/MAS 128 may additionally process or filter the input metadata feeds 122, 126, 127 or the output metadata feed 131.

For example, the CCO/MAS 128 can determine which media content is to be made available to the STB 130 and consequently displayed to the user via the EPG. This is done in dependence on a content access profile 1016 which is passed to the STB 130 on start-up (for example, as part of an ISP configuration file that is initially sent to each individual STB 130 during its boot up procedure and then updated, for example regularly say on a daily basis). STB 130 may also pass data 1017 (for example relating to the output metadata feed 131) to the CCO/MAS 128.

In the present example, the CCO/MAS server 128 merely processes metadata rather than the media content itself (which is not routed via the CCO/MAS server 128); in alternative examples, media content is routed via the CCO/MAS server 128 which may process the media content (for example, buffering or optimising) before forwarding it to the STB 130.

In some alternatives, some or all of the processing of the metadata performed at the CCO/MAS server 128 is performed at the STB 130.

The system described in the examples relates to the provision of media data to a media device client. It will be appreciated that aspects are also applicable to the provision of other forms of data to a correspondingly suitable client device.

Electronic Programme Guide (EPG)

Figure 2 shows an example Electronic Programme Guide (EPG).

EPG 1010 is generated by the STB 130 on the basis of metadata supplied from the CCO/MAS server 128 and/or received over DTT and enables the user to navigate available media content.

EPG 1010 comprises a series of vertically stacked horizontal bars 100 representing a programme listing of media content arranged by transmission order according to 'channel', the position along the major axis of each channel bar indicating the transmission time and sequence of particular media content.

Channels 100 may be 'linear' in that what is shown is the specific order of media content transmission from a particular media content provider (a media content provider CP 116, 118 may provide one or more such 'channels'), or 'virtual' in showing media content in an alternative arrangement, for example one that is specific to a particular user or group of users, such as:

- a filtered subset of a particular channel output
- an assembly of content from multiple content providers
- selected from on-demand media content provided by the ISP or content provider and arranged, for example, to correspond in suitability according to the time-of-day

- pre-recorded content stored locally at the STB 130 (or on a connected storage device)

A vertical (red) timeline 102 intersects the bars to indicate the current time; transmission times to the right of timeline 102 are in the future, those to the left are in the past. As time progresses, timeline 102 remains central as the channel bars advance leftwards to indicate the media content currently being transmitted, the visible extent of the EPG 1010 therefore representing a window of media content potentially available at, before and after approximately the current time. In alternative embodiments, timeline 102 may move with respect to the programme listing – combination movements of timeline 102 and programme listing are also possible.

Navigation arrows 104 above the stacked channel bars indicate to the user the option to advance the display of the EPG 1010 right/left to show media content further in the future/past and thereby browse the EPG to access media content at times not immediately around the current time. The user may also switch or 'hop' between channels to change focus and in some examples advance the corresponding channel bar 100 separately and scroll the channel display to show further channels.

The items of media content are labelled to indicate in what capacity they are available, for example as in the following table:

Watch now	Indicates an item is available in the OnDemand catalogue and can be played immediately – i.e. clicking on the item will cause playback to begin. Items in this class include free content, ad-funded content and content that you have an entitlement to ('YouOwn').
Available now	Indicates an item that is available, but which the user would need to perform an action – e.g. going through a signup process – before being able to play.
Watch live	Indicates that the item is currently 'live' on this linear service.
Coming soon	Indicates the item is expected to be available in the OnDemand catalogue soon.
Play from library	The item is available from the Local Media Library.
Booked to record	This item is scheduled for acquisition by the Linear Acquisition component

Channels One, Two, and Three 100-3 are examples of linear digital terrestrial television (DTT) channels. Here media content with the following characteristics is shown:

- "recorded" - media content item 101 has been recorded and can be watched from the recording
- "play from library" – certain media content items that have already been shown 106 or not yet been shown 103 are indicated as being available from the Local Media Library
- "coming soon" - media content item 107 has been shown and is expected to be available in the OnDemand catalogue in the near future
- "watch now" - media content items which are free (potentially through being funded by advertisements). Item 113-1 is shown as occurring in the future but is available to watch now as it is a repeat of an item that was shown in the past
- "watch live" - media content item is currently 'live' (as a broadcast or stream)
- "Booked to record" - media content item 109 scheduled for recording or acquisition by the Linear Acquisition component
- "unavailable" - media content item 111 which occurs in the future and is not yet available (nor available from a recording or OnDemand).

Channel A 100-2 is an example of a Linear IP channel and shows media content of the following characteristics:

- "watch now" - media content item which is free (or funded by advertisements). Media content items that are repeats of items that have been shown in the past may be shown as "watch now" 113-2.
- "watch live" - media content item 105 is currently 'live'
- "Booked to record" - media content item 109 is scheduled for acquisition by the Linear Acquisition component

When a media content item on a linear DTT or linear IP channel which is currently being broadcast or streamed is selected for playback and a recording of the particular media content item has previously been (or is in the process of being) made, the user is offered the option of playback of the media content item from the recording in preference to the 'live' version. This provides the user an immediate way of effectively 'rewinding' currently 'live' content.

Channel B 100-1 is an example of a virtual channel (or "playlist") and shows media content of the following characteristics:

- "watch now" - media content item 108 is free (or funded by advertisements)
- "available now" - media content item 110 requires payment, signup or confirmation before it can be played
- "watch now - YouOwn" - media content item 112 is playable immediately, even though it may be a purchasable item to other users, as part of a content entitlement that is already owned by the user

When selected for playback, an item of media content on a virtual channel may begin playing from a part-way position as indicated by the timeline 102 or alternatively from the beginning.

EPG 1010 combines content and information from multiple sources, including live broadcasts, 'catch up' content, on demand content, pay-per view, 'virtual' channels and local (personal video recorder or PVR) recordings. Presenting content from different sources together on the EPG 1010 allows the user to 'channel hop' in a way familiar from broadcast terrestrial television.

Furthermore, EPG 1010 presents and plays back the media content to the user without necessarily indicating the media format of its origin; hence, from the user perspective the originating format becomes an irrelevance.

The EPG 1010 is customisable according to customisation parameters, for example:

- Location – e.g. region-specific news and weather. The location may be discoverable by, for example, the DTT signal the device receives or set by the user inputting a postcode or address
- ISP
- User subscriptions – to content in addition to the basic content
- PVR – recordings are linked into the EPG to indicate to the user that a certain item is locally stored on the device and therefore available to play now

These and other customisation parameters are used to generate 'closed user groups', restricting selected content is to certain groups of users.

In most embodiments EPG 1010 only presents information relating to media content which the user has – or potentially could – access. This philosophy extends to a search function, which is likewise self-limiting.

Figure 3 shows an example of how the EPG is generated.

As previously described, media content providers CP 116, 118 provide media content variously over the DTT network 124 and/or the IP network 134 to the media client device STB 130. The content providers 1000 are shown providing content via different delivery formats 1004. For example, CP1 1000-1 delivers content 1005, 1007 using delivery format DF1 1004-1 and DF2 1004-2, content 1007 itself being split up into parts. Content provider 1000 may provide more than one piece of content via each delivery format 1004. The metadata 3000 relating to the media content is sent to the CCO/MAS 128 which processes user data 1016 received from the STB 130 to determine what content metadata 3000 to pass on. The STB 130 receives a metadata feed from the CCO/MAS server 128

and renders a resulting EPG 1010 to present to the user a selection of the available media content arranged, for example, as 'channels' 1012 and according to transmission time and sequence with timeline 102 indicating the current time in respect of the media content 1014.

In general, a plurality of content providers CP 1000 may deliver media content over different delivery formats DF 1004. The EPG 1010 is to an extent delivery format agnostic in that it presents the various media content within a single unified menu.

The set of potential delivery formats 1004 includes delivery formats DF1, DF2 and DF3 (for example, DTT, IP and local storage), and each media content provider CP 1000 offers media content in at least one, possibly more than one, delivery format DF. Thus, for each delivery format DF1, DF2, DF3 there is potentially a plurality of media content providers CP1, CP2, CP3 (1000-1, 1000-2, 1000-3) providing media content (1005, 1006, 1007).

Metadata feeds 3000 relating to the various media content are provided by the media content providers 1000 to the CCO/MAS server 128 for processing before a resulting metadata feed is sent to the STB 130.

Processing of the output metadata feed may involve consideration of user media content access rights or entitlement. For example, a particular user may not have access rights to all the media content 1005, 1006, 1007 due to factors such as the user's location, subscriptions, ISP or other factors which are stored in user data file 1016. A copy of the user data file 1016 is regularly sent to the CCO/MAS server 128 which processes its output metadata feed to filter out whichever of media content 1005, 1006, 1007 the user does not have access to, or alternatively adds information to the output metadata feed on how the user could gain access to the media content. The process by which content access rights are applied is described in more detail below.

The processed metadata feed is then sent to the STB 130 which uses it to render the EPG 1010 on-screen.

EPG 1010 lists the different media content providers (and, where appropriate, related channels) in a series of rows 1012 irrespective of the delivery format, with the information regarding the associated media content 1014 adjoining in chronological order and with respect to a current time indicating line 102.

Content Rights Entitlement System (CREDS)

Figure 4 shows the Content Rights Entitlement System (CREDS). This is the process by which user media content access rights are taken into account.

Access rights are also referred to in terms of *entitlement*, or having permission to consume particular content bundled as part of a broader (typically subscription) subscription service. For example, User A subscribes to a broadband internet plan which may include access to a film or movie library. Accordingly, User A is referred to as having an *entitlement* to view a particular movie held by the library and can do this at no additional cost, signup or registration required.

CREDS may therefore be described as a system for indicating entitlement to content in a distributed media content provider environment. In principle, CREDS can also be extended to support providers of goods and services and/or to operate via a central search system.

As previously described, a plurality of media content providers CP1, CP2, CP3 (1000-1, 1000-2, 1000-3) provide media content (1005, 1006, 1007) in various delivery formats DF1, DF2, DF3 to media client device STB 130 with CCO/MAS server 128 providing a corresponding metadata feed to the STB 130 aggregated from the metadata feeds 3000 supplied by the media content providers 1000 and processed in dependence on user information.

User information is supplied to the CCO/MAS server 128 by means of a user data file 1016 regularly sent from the STB 130 (for example, each time the STB 130 boots and/or the user undergoes a log-in or authentication process).

Upon receipt of the user data file 1016 at the data collector 3020 the CCO/MAS

server 128 stores the user data for future use (to be updated on next receipt of a corresponding user data file 1016) in memory 3022.

User access rights are determined by processor 3026 comparing with data comparer 3024 user information derived from the user data file 1016 against an access control list 3023 or database which is updated according to information provided by the media content providers specifying user media access rights, for example whether particular items of media content are part of a particular package or subscription. The comparison ascertains which content - and to what extent - the user has access to, whether immediately or conditionally. Access control list (ACL) 3023 may be further modified in dependence on the input metadata feed 3000 from the content providers.

The CCO/MAS server 128 does not itself control access to specific media content items nor does it know what media content the user owns or has access to (other than general subscription identification information).

CCO/MAS server 128 outputs the resulting output metadata feed 3016, 3018 to the STB 130 via output component 3028. The output metadata feed comprises two components: one 3016 relating to content which is available, the other 3018 to content that could be made available dependent on further actions or events, such as:

- the user making a payment
- the user taking a subscription
- the expiration of a time period

Metadata relating to media content intended not to be accessible to the user even conditionally (for example, content deemed unavailable by virtue of the user's geographical region or ISP) is not passed to STB 130.

Figure 5 shows the Content Rights Entitlement System (CREDS) process in further detail, with particular focus on the categorisation of available media content in the resulting EPG.

As previously described, metadata feeds 3000 supplied by the media content providers (CP1, CP2, CP3) and user data 1016 (including, for example, subscription data) supplied by the STB 130 are received by the CCO/MAS server 128 and user media content access rights are determined by the CCO/MAS server 128 comparing the user data/subscriptions data with the requirements for entitlement according to an access control list 3023

CCO/MAS server 128 effectively sorts the media content (by means of the associated metadata) into different availability categories and displays the resulting media content information via the EPG 1010, potentially adding further availability category information. Possible availability categories include the following:

- "Watch now" 408 – Media content available immediately with no further action or event required, such as that broadcast live over DTT or available via a free 'catch-up' service such as iPlayer®. Information regarding such media content is passed directly to the user interface UI 420 or EPG 1010 (e.g. Figure 2, items 108, 113).
- "Available later" 410 – Media content not immediately available, for example because the content provider allows access to the media content via a 'catch up' facility only some time after the original broadcast. In this case, the time/date when the content will become available is (optionally) added 416 to the media content information and passed to the UI 420 (e.g. Figure 2, item 107).
- "Further action required" 412 – Media content that cannot be accessed immediately but could potentially be accessed after an action is performed by the user. Examples of such actions are paying a fee or signing up to an additional subscription. The required action is added to the media content information 418 and passed to the UI 420 (e.g. Figure 2, item 110).
- "Not available" 414 – This is content that the user does not – or not yet - have access to. This could be, for example, content available to other geographical regions or other ISP subscribers or because the content has not yet been transmitted. This content may however be added to the UI (e.g. Figure 2, item 111) for the purposes of advertising.

Where applicable, EPG 1010 displays which subscription plan each content item belongs to. This allows the user to determine which content belongs to a plan already subscribed to (hence which content can be played immediately at no further cost) without the user being separately aware of a particular entitlement; and which content requires to payment of additional fees in order to access.

This concept is extensible to other content that can either be purchased or consumed, and can further be applied to virtual media, for example the purchase of an e-book, or to show any content the user has entitlement to and to link to other media.

In alternatives, content access rights are determined - to a greater or lesser extent – at the media client device 130. For example, access to the media content (1005, 1006, 1007) provided by a particular content provider CP1, CP2, CP3 (1000-1, 1000-2, 1000-3) may be governed by media client device 130 querying the appropriate content provider 1000 directly and the access rights determined in dependence on media content entitlement information stored locally on the media client device 130. This process may be via an application provided by the content provider 1000 and running on the media client device 130 (utilising an appropriate application program interface or API, as described below).

Discovery and Playback

Figure 6 shows the processes involved when a user selects an item of media content for playback.

Upon the user selecting an item of media content 2000, for example by interacting using a remote control handset with the EPG 1010, the user request (comprising media content identification data 3000) is sent 2002 to the CCO/MAS server 128. CCO/MAS server 128 then determines 2006 whether and how the requested media content is to be provided to the user. The determination comprises two underlying considerations:

- the media formats in which the content is available 2007 – for example, whether the content is available over IPTV. 'On Demand' or over DTT
- the access rights pertaining to the media content 2009 – for example, whether user access to the content is 'free', 'subscription-based' or 'pay-per-view'

- and the resulting content acquisition and playback procedure depends on this determination. Various permutations of media format and access rights are possible, but general considerations are as follows:

- IPTV content - A request sent 2014 to the content provider for the media content results (subject to confirmation of subscription-based or pay-per-view access rights) in the requested media content being streamed to the device over an IP network
- Local recordings – If a search 2018 of local storage accessible by the client device 130 finds a local copy of the requested media content is available, this copy may be accessed in preference to accessing remote media content. This content is typically 'free' although may have a time-date expiration.
- DTT content –media content accessed via a (digital) television broadcast is received at the client device subject to appropriate tuning 2020 of the receiving circuitry to the corresponding channel (and subject to confirmation of subscription-based or pay-per-view access rights)
- Free content – is playable without payment, although may first require expiry of a prescribed time period (and/or a time period not to have been exceeded)
- Subscription-based content – A certificate or token is checked 2010 before (or alternatively after) a request is sent to the provider 2014 in order to determine, for example, whether the user has the requisite access right to the requested channel or has not exceeded certain usage limits (some content providers may allow only a certain number of media content accesses in a certain time period)
- Pay-per-view content – A payment is taken 2012 before (or alternatively after)

the request for the content is sent to the provider 2014.

In order to address the problem of discovery and playback of media content form numerous different media content providers, media content playback occurs within a main playback area - termed a 'universal space' (generic, default or universal player) and designed based on a web model to allow for easy changes to the look and feel in order to offer the user consistent functionality and aesthetics - where the output of all players from all content providers is displayed.

For example, if a suitable media player 2024 is provided by a particular media content provider, this player is shown nested within the 'universal space'; if a particular content provider does not provide a media player of its own, a default player 2022 is provided by the STB 130 (or, in some alternatives, by the CCO/MAS server 128) also inside the 'universal space' and providing at least three playback controls: play/pause, fast-forward and rewind.

The 'universal space' therefore provides a 'single click' experience for the user rather than relying on each different content provider having a separate player, each with its own characteristics. Selecting media content for playback does not therefore for example require the user to visit a website of the media content provider, rather the media content is arranged to be streamed or otherwise presented to the user from within the 'universal space'. Upon completion, the user is returned to the EPG.

By default, all players are specified to have certain common features, such as the following information indicators which display on the universal screen:

- seek or progress bar - appearing whenever the user starts, stops, pauses, fast-forwards, rewinds or otherwise interrupts playback, to indicate the relative position within the current media content item
- info screen - triggered by the user pressing an 'info' button (or similar), to display information about the current item of media content (optionally including links to related content)

Some features, such as navigation indicators for page up/down and channel up/down, change according to context, for example according to the media content source, such as when page up/down are configured to skip forward/backward a predefined time when viewing on-demand or PVR content. An indication of the media content source may be provided to the user to indicate the functionality available.

The universal space is also configured to provide links for the user's 'onward journey' such as related media content (whether from the media content provider of the current player or otherwise). The content provider can define specific details of the onward journey, such as whether the user is recommended media content outside their present subscription which would consequently require further payment or whether the user is permitted to access further content under the remit of the subscription without having to return to the particular subscribed-to content provider's portal.

Typically, a search function is provided, which allows the user to search for further content – this may be simply related to previously consumed content ('More like this') or a display of popular content. Navigation options are provided for returning to the main menu or to where the current content originated form.

To facilitate the latter the client device 130 passes to each new content provider accessed a reference indicating the previous media content item source and/or additional context. Alternatively, this information is stored at the client device 130.

In some examples, CCO/MAS server 128 searches the metadata from the content providers for further media content 2004 related to the media identified by the user in the media content identification data 3000. Such further or media content may also be displayed in the EPG as a recommendation.

Further aspects of media content playback are described, for example, in the sections below, particularly in respect of the assured delivery aspect.

Software Stack

Figure 7 is a schematic showing the software architecture of the media client device.

The software architecture is modular and may be described as a stack comprising a series of levels – for example, lowest 'Level 1' 4012, middle 'Level 2' 4014 and upper 'Level 3' 4016 (and so on) – each of increasingly higher device functionality, with successively higher levels being dependent on the functionality provided by lower levels and in turn providing functionality to higher levels. Communication between each level is handled by appropriate application program interfaces (APIs).

The top-down order of levels of the software stack is typically as follows:

- Platform applications and configuration parameters
- {developer APIs}
- Application players
- {system APIs}
- system services
- operating system kernel

User interaction with the device is handled by the higher levels in the software stack (commonly described as at an application or user interface level) than for example network communications or basic device operation (at a network or operating system / kernel level, respectively).

This arrangement also allows for seamless presentation of third party applications from a plurality of content / goods / services providers on a client device or STB 130 without the providers needing to be aware of the specific device characteristics and the system API 4020, only of the common developer API 4022 for the particular application player. This also provides the user with a consistent interaction experience; the effective 'sandboxing' of separate applications within platform-designated application players also improves stability and security.

The client device software is usually packaged into two images:

- Core device software (installed by the manufacturer or OEM 4006) – including the operating system, system services and application players (as specified by the platform operator)
- Platform software (supplied by the platform operator) – including the user interface and other applications in the form of non-natively executable, architecture-independent code

The client device 130 also accepts device configuration parameters – which can be set independently of both the core and platform software by any of the manufacturer, platform operator, ISP or user.

In effect, client device 130 is designed so that a basic level of client functionality (by way of certain application players) is incorporated by the manufacturer (or OEM) as part of the on-board system software (which allows for the client device to be tested for platform compliance by the OEM before shipping); further functionality is provided at the platform software level and configurable as required initially by the platform operator - and subsequently at the application level potentially also by content provider or ISP.

In order for the media client device 130 to be adaptable and to maintain compatibility with developing standards and offer the user improved functionality, updates to the software stack may be required. Ideally these updates are instigated remotely - for example, by the device manufacturer, the content providers, the ISP or a system administrator – and without requiring user intervention (their origin and security having been established by digital signature confirmation and encryption). Updates can be delivered broadcast over DTT or via the IP network.

Traditionally, only the device manufacturer would be expected to provide software updates to the software of a media client device such as a set-top box 130. However, such an arrangement may be problematic, not least because of conflicting interests between the various parties needing to interact with the media client device. For example, a software update made by the manufacturer may not be in the best interest of an ISP.

The compartmentalisation provided by the software stack allows for an alternative

software update scheme, where multiple levels of the software stack may be accessed and updated independently - and transparently to other parties - without requiring the update to be implemented by the client device manufacturer or the manufacturer having to implement specific APIs to facilitate updates provided by the various parties.

In the example of a client device 130 with a three-level software stack, the device manufacturer 4006 and a content provider CP 1000 can provide updates 4008 to respective levels 4012, 4016 of the stack without the risk of conflicting settings applied from different update sources resulting a critical update from one source being overwritten by the update from another. In practice, client device 130 stores a local copy of known working configuration to allow for roll-back in the event of update errors.

The functionality of the device may also be tailored to the user, depending, for example on the ISP or location. A media client device bought over the counter can therefore have vastly different functionality depending where it is in operation. This flexibility also means that individual manufactures do not need to envisage all possible functionality a content provider may need when building a device.

Generally, in order to mitigate conflicting configuration and software updates and to prevent accidental parameter overwrites, settings from multiple sources are combined according to a merging process whereby items such as configuration parameters are replaced, deleted or merged in accordance with defined permissions and processed in a pre-defined order (for example, platform operator.

ISP Discovery

Figures 8 and 9 show the ISP discovery process.

This process enables remote configuration and tailoring of media client device 130 properties according to the host ISP by means of the media client device 130 downloading an appropriate ISP-specific configuration or settings file 7014 corresponding to its host ISP 132 from an ISP configuration service ICS 7008. Settings file 7014 is used to provide, for example, ISP-specific features for the user interface or EPG and/or code for an ISP-specific media content player. A generic media client device 130 can therefore be customised as required, essentially decoupling the media content from the media format and client device hardware.

Media client device 130 runs this process at start-up and at intervals thereafter to check for software and configuration updates. The update intervals may be pre-set to occur regularly or triggered by specific events, for example expiry of a time period to allow for temporary configuration settings to be applied.

The ISP delivery process proceeds as follows:

S1. Media client device 130 sends a configuration request 7002 to the ISP Discovery Service (IDS) 7004 requesting ISP-specific device configuration settings (the address of the IDS is pre-loaded onto the media client device)

S2. IDS 7004 determines the IP address of media client device 130 and performs a database lookup against an Autonomous System Number (ASN) database 7006 to identify the corresponding ISP 132. ASN database 7006 receives regular identity updates from ISPs 132.

S3. IDS 7004 redirects the configuration request 7002 to ICS server 7008, optionally with an ISP identifier

S4. ICS server 7008 uses processor 7020 to consult ISP configuration lookup table 7018 in order to determine the corresponding settings file 7014 for use with the identified ISP and retrieve it from memory 7016

S5. The appropriate settings file 7014 is downloaded to media client device 130

The IDS 7004 and ICS server 7008 may be managed by the same party and/or comprise a single unit. In alternatives, the ISP-specific configuration file 7014 may be provided to the client device 130 by other means, for example directly from the IDS. The IDS and/or ICS services may in some embodiments be hosted by the data/metadata aggregation server CCO/MAS server 128.

In another alternative, an ICS server 7008 is associated with – and may be operated by – a particular ISP 132 and provide configuration settings files 7014 to connected media client devices 130 that are specific to that ISP 132. Multiple configuration settings files 7014 may be used to allow for configuration of media client devices 130 individually or as groups.

Where the geographical location of the media client device 130 can be established, settings file 7014 may be used to apply location-specific settings to the media client device 130. For example, certain DTT content, such as local weather forecasts, can be made available only in particular areas; configuration file 7014 can be used to specify which of a plurality of similar media content (all weather forecasts) is to be made preferentially accessible to the user of the media client device 130 at a particular location (the weather forecast for that particular location). This can be achieved, for example, by suitably modifying the EPG so that the provided link to a generically-labelled media content item ("weather") is to local weather media content item.

Similar tailoring to location may be achieved for on-demand media content. Regional and international customisations to the EPG interface may also be applied by this method. The ability to provide location-specific media content also allows for more nuanced subscription and pay-per-view monetisation. Further location-specific aspects are discussed below.

ISP discovery also allows for the generation of 'closed user groups', in which access to particular media content can be limited to a particular group of users. This is discussed in more detail below.

Geo-location

Figure 10 shows the geo-location process.

Geo-location refers to the determination of the geographical location of media client device 130, which can subsequently be used to apply location-specific settings and/or supply media client device 130 with location-specific (location-targeted) media content. The application of location-specific settings to the media client device 130 was discussed above in terms of the ISP discovery process and the downloading to and use by media client device 130 of an ISP-specific configuration file. This section discusses applying location-specific settings at the data/metadata aggregation server (CCO/MAS server 128).

The geo-location process proceeds as follows:

S1. The IP address of media client device 130 is determined. This may be achieved by use of an ISP Discovery Service (IDS), as previously described.

S2. The location of the media client device 130 is determined, for example via a database lookup against an Autonomous System Number (ASN) database as previously described in combination with location data provided by the identified ISP.

S3. Media client device location data 8002 is forwarded to data/metadata aggregation server (CCO/MAS server 128) which also receives media content metadata 3000 (including location-target identifiers) from media content providers. Both sets of data are stored in memory 3022.

S4. CCO/MAS server 128 uses a processor 3026 to compare in data comparer 3024 the media client device location data 8002 with the location-target identifiers of the media content metadata 3000 to determine which location-specific media content the media client device 130 is to be permitted to access.

S5. Metadata relating to the location-specific media content is output 3028 to the media client device 130 and displayed on the EPG.

In alternative examples, the location of the client device 130 may be determined from one or more DTT signals received at the client device 130, for example according to the strongest received signal or by a process of triangulation. This process may be performed at the client device 130 and/or at CCO/MAS server 128.

Geo-location aspects may be incorporated into other aspects of the media platform, for example the CREDS aspect.

Closed User Groups

Figure 11 shows the 'closed user groups' concept in more detail.

'Closed user groups' allow for access to particular media content to be restricted to specific groups of users based on access parameters provided in the media content metadata supplied by the media content providers.

Access may be granted to members of a particular closed user group, for example by allowing members of the group to search for the particular media content via an associated application or widget presented via the EPG. Members of a 'British Library' user group would therefore have access via a British Library application to British Library media content and/or have British Library media content generally accessible via the EPG. Alternatively, or in addition, access may be denied to non-members of the group.

As previously described, each media client device 130 has associated with it a user data file 1016 which contains information such as user media content subscriptions, (optionally) the location and other user or media client device aspects. Content provider 10004 can specify a set of user requirements 10006 that users 10000 (via their associated media client devices) have to meet in order to access a particular item of media content.

Data/metadata aggregation server (termed a CCO/MAS) 128 receives requirements 10006 and user data file 1016 at data collector 3020 and stores them in memory 3022 for comparison in data comparer 3024 with the use of a processor 3026 to determine which users have access to that particular item of media content 10020.

Permitted user list 10020 is output via the output component 3028 and metadata regarding the means of accessing the restricted media content is forwarded to the media client device 130 for adding to the UI or EPG 420 of the users.

'Closed user groups' aspects may be incorporated into other aspects of the media platform, for example the CREDS aspect.

Assured Delivery

Figure 12 shows the assured delivery process.

Media content delivered from a media content provider 1000 to a media client device 130 over an IP network may be subject to network latency or other packet delivery issues. This can become troublesome when attempting to deliver data-intensive media content, such as high-definition television (HDTV).

Typically, media content providers providing media content over IP networks make use of Content Delivery Networks (CDNs) 1100, third party distributed computer systems that cache copies of the media content at a plurality of points in the network so that a media content client can access a relatively local copy in preference to one directly from the media content provider.

An ISP 132 may offer (within service level agreements) to provide content from one or more CDNs at an assured rate of delivery or bitrate. Assured delivery selection is a means of choosing the optimal CDN when several options are available.

CDN selection may be chosen according to bitrate limitations or restrictions due to the physical connection of the media client device 130 to the IP network or according to a policy of the hosting ISP 132. For example, the media client 130 (or a specific media player) may be configured to use a particular CDN 1100 when connected to a particular ISP 132, but when connected to a different ISP 132 a different CDN 1100 may be required or may give better performance.

Detailed aspects of the assured delivery process include the following:

- Content provider CP 1000 distributes media content 5000 to a plurality of CDN 1100 and sends corresponding metadata 3000 to CCO/MAS server 128. The metadata 3000 also specifies a preferred, target or minimum required bitrate for the media content.

- ISP 132 determines the set of CDN 1100 for which the ISP 132 offers assured delivery and includes this information 5010 as a list of CDNs 1100 and assured bitrates in the ISP configuration file 7014 set to the client device 130.
- Client device 130 receives metadata 5008 relating to available media content from the CCO/MAS server 128 in the usual way
- The media client device 130 (or media player application) determines 5012 from the ISP configuration file 1016 and from any bitrate requirement in the media content metadata 5008 received from the CCO/MAS server 128 which if any CDN 1100 is suitable for accessing the media content 5000 at the required bitrate with assured delivery
- Upon the user selecting a particular item of media content for playback over IP media client 130 requests the requested item of media content 5000from the suitable CDN 1100
- If there is no suitable CDN 1100 for assured delivery, the media client device 130 requests the requested item of media content 5000 from a CDN 1100 that is reachable but which does not offer assured delivery
- Optionally, the media client 130 displays delivery rate information to the user via the EPG, for example, when assured delivery is available and whenever performance is adversely affected.

In some embodiments, the media client device 130 monitors the bitrate at which the CDN 1100 provides the media content and determine whether to report performance to the ISP 132 and/or whether to switch another possible CDN 1100 if required.

Alternatively, the list of suitable CDNs 1100 is provided by the ISP 132 to the CCO/MAS server 128 which then relays the information as metadata to the client device 130. In this case, a reference to the information is included in the ISP configuration file 1016.

In a further alternative, the CCO/MAS server 128 itself determines which of the CDN 1100 is to be used to supply the particular media content to the client device 130 using knowledge of the ISP passed to it by the media client device 130.

Further Aspects

The following 'Further Aspects' sections are preferably to be read in conjunction with the similarly-named previous sections.

Further EPG Aspects

The tables below summarise the sources of the metadata as required to satisfy the requirements mentioned above. In this presently described example, the client device (STB) 130 includes:

- a mechanism for caching Digital Terrestrial Television (DTT) Signal Intensity (SI) information (namely the EventRepository component); and
- a mechanism for caching metadata provided by the Metadata Aggregation Server (MAS)

For Linear DTT Channels:

		Device configured for DTT only	**Device configured for DTT and IP**		
Application process	**Required information**		**Temporary loss of IP connectivity**	**Normal operation**	**Temporary loss of DTT connectivity**
Rendering grid	List of DTT channels (inc. LCN)	DTT SI cache	DTT SI cache	DTT SI cache	DTT SI cache
	Service	DTT SI	Cached MAS	MAS	MAS

	(channel) information	cache	metadata (see note)		
	Event Start time and duration	DTT SI cache	DTT SI cache	DTT SI cache	DTT SI cache or fallback on MAS
Decorating grid items	Event Title(s) and Description	DTT SI cache	Cached MAS metadata or fallback on DTT SI	MAS	MAS
	Thumbnail image	Unavailable	Cached MAS metadata	MAS	MAS
	OnDemand availability	N/A	Cached MAS metadata	MAS	MAS
	Available from local library?	LocalMediaLibrary	LocalMediaLibrary	LocalMediaLibrary	LocalMediaLibrary
	Has this event been booked to record?	LinearAcquisition	LinearAcquisition	LinearAcquisition	LinearAcquisition

Note: It is possible that a new channel is discovered whilst the box has no Internet Protocol (IP) connection. In this case there would be no metadata for that service cached in the MAS and the UI would need to use DTT SI service information instead.

For Linear IP & Virtual Channels:

		Device configured for DTT and IP			Device configured for IP only
Application process	**Required information**	**Temporary loss of IP connectivity**	**Normal operation**	**Temporary loss of DTT connectivity**	
Rending grid	List of linear IP channels (inc. LCN)	IP channel list*	IP channel list*	IP channel list*	IP channel list*
	Service (channel) information	Cached MAS metadata	MAS	MAS	MAS
	Event Start time and duration	Cached MAS metadata	MAS	MAS	MAS
Decorating grid items	Event Title(s) and Description	Cached MAS metadata	MAS	MAS	MAS
	Thumbnail image	Cached MAS metadata	MAS	MAS	MAS
	OnDemand availability	Cached MAS metadata	MAS	MAS	MAS
	Available from local library?	LocalMediaLibrary	LocalMediaLibrary	LocalMediaLibrary	LocalMediaLibrary
	Has this event been booked to record?**	LinearAcquisition	Linear Acquisition	Linear Acquisition	Linear Acquisition

* see IP channels specification outline below.
** Linear IP channels only as events on virtual channels cannot be recorded

IP Channels overview

The following description gives a high level overview of the IP Channels architecture. It describes the key components involved in IP channels and also how these components

interact with each other. It explains how Metadata and content gets from the Content provider to the Set-top-box (STB). It also describes the stages a new Content provider would go though in order to be able to disseminate their content to consumers.

The key components involved in IP Channels

The IP Channels architecture has five major components. The Content Provider (CP), the Internet Service Provider (ISP), the DTT Central collator (DTT CC), the Data Aggregation Server (CCO) Metadata Aggregation Server (MAS) and the Set Top Box (STB).

The Content provider (CP) – The CP acquires content from content producers, the CP takes responsibility for encoding, encrypting and ensuring Digital Rights Management (DRM) compliance (where applicable) and transporting the content to its partner ISP(s) when appropriate. There exist two types of CP (Broadcast CP and Non-Broadcast CP). Broadcast CP(s) typically provide free or 'non-premium' content via DTT; premium (paid-for) content is passed to partner ISP(s) for dissemination over an IP network. Non-Broadcast CP(s) pass content to partner ISP(s) for dissemination over the IP network – although some also align with DTT partners for dissemination over DTT.

The ISP – The ISP(s) takes 'premium' content from the CP(s) and disseminates it over its IP network. CP(s) and ISP(s) make independent deals for the acquisition and delivery of content. The data aggregator (e.g. YouView) does not play any part in these arrangements and stores no content itself. Each ISP is assigned a range of channel numbers it can use by the content handler. The ISP regulates which channels different subscribers have access to effectively creating a walled-garden offering. The ISP sends each STB a subscriber-profile specific config file when it boots up and thereafter on a daily basis.

The DTT Central Collator (DTT CC) – As its name suggests the DTT CC takes the broadcast metadata from the broadcast content providers and amalgamates it into the 'Freesat Channel Sate Information' (Fat CSI) feed for dissemination over DTT.

The CCO Metadata Aggregation Server (CCO MAS) - The CCO MAS accepts enhanced metadata feeds from all the broadcast and non-broadcast CP partners, it aggregates this data and provides it to the STB Metadata broker, this may be done via IP.

The STB – The STB has the ability to concurrently receive 'free' TV channels over DTT and 'premium' content over the ISP's IP network. Giving the ability, for example, of recording one piece of content while watching another. The STB may house several components such as the Metadata broker, Service repository, Event repository, Config manager, media broker etc. The STB receives two 'IP Channel config' files on boot up from the CCO and the ISP, the STB combines the channel data in these two files to produce the EPG. These files can be updated daily after initial boot up.

The process a new content provider undergoes to get content to consumers

One example of a process that a new Content Provider (CP) 1000 follows when they want to get their content to consumers is broken into several stages, shown in Figure 13.

1. The CP 1000 agrees an ISP transit agreement with an existing ISP partner 132.
2. The CP 1000 applies to the CCO 128 for an allocation of unique Channel numbers to be used for their content.
3. Once these Channel numbers have been allocated, the CP 1000 then uses a Business to Business (B2B) 142 interface to provide enhanced metadata 3000 for their services and channels to the CCO MAS 128. The B2B interface is the interface between content providers and the platform, or between ISPs and the platform. Further details relating to the B2B are provided below.
4. The CP 1000 also sends schedule enhanced metadata (events) 3000 to CCO 128 via the B2B interface 142.
5. The CP 1000 provides metadata 3000 relating to events to the ISP 132.
6. The ISP 132 creates or updates an "ISP IP Channels" config file 7014 from the

metadata 3000 supplied by the CP 1000.

7. CCO 128 creates or updates a "CCO IP Channels" config file 150 from metadata 3000 supplied by the CP 1000.
8. The ISP and CCO config files 7014, 150 are sent to the STP 130 via a Business to Consumer (B2C) interface 152. The B2C interface is the interface between the platform and the client device 130. Further details relating to the B2C are provided below.

Once a day the STB 130 is sent both an updated CCO IP Channels configuration file 150 and an updated ISP IP Channels configuration file 7014. Once these configuration files are received, the STB 130 amalgamates the files and renders the EPG displaying the range of channels that has been purchased. When a channel is selected the default player or proprietary CP player is launched and the viewer watches the content.

Schedule ingest and on-demand linking

High-level architecture

Ingest of 'master' schedule. This is shown schematically in Figure 14 and described below.

1. The *Schedule* Fragments 154 are sourced from the Fat CSI feed 156.
2. Each of these *Schedule* Fragments 154 reference a *ServiceInformation* Fragment 158, also sourced from the Fat CSI 156. This automatically keeps the CCO reference metadata up-to-date with the latest service line-up as new services are added, renamed or removed.
3. There is one *ServiceInformation* Fragment 158 per regional variant of a service in the Fat CSI feed 156. The Digital Video Broadcasting (DVB) service locator ('DVB triplet') is conveyed in the ServiceInformation/ServiceURL element and is different for each regional variant of a linear broadcast channel.
4. The linear Programme Content Reference Identifier (CRID) is specified in <Program crid="...">.
5. The DVB Event Locator is carried in <ProgramURL>.
6. The linear Programme CRID, Series CRID(s) and Recommendation CRID(s) are carried in <OtherIdentifier>.
7. Title and synopsis (medium) are carried in <InstanceDescription>.
8. The airing attributes are carried in <InstanceDescription> and <AVAttributes>.

Schedule linkage metadata

The main use cases for this are:

1. Decorating the linear EPG with 'catch-up' on-demand availability. A user can go from an event in the EPG to an on-demand playback experience.
2. Displaying the canonical linear slot details in the on-demand catalogue. When the user displays 'more info' for an item in the on-demand catalogue, the original broadcast channel name and broadcast time are displayed.

The following is provided by Content Partners who are broadcasters:

1. A separate set of *ServiceInformation* Fragments 160 are published by Content Partners as part of their B2B metadata contribution feeds. These are at the same level of granularity as those derived from the Fat CSI feed 156.
   - The value of ServiceInformation/ServiceURL can be used to establish equivalence between *ServiceInformation* Fragments 160 received from different parties.
2. Content Partners continue to publish their *ProgramInformation* 162, *GroupInformation* 164 Fragments with enhanced metadata (as per revision 1.0 of the specification).

3. Content Partners continue to publish *OnDemandProgram* Fragments 166, but the canonical broadcast is not signalled in this Fragment.
4. Content Partners provide a new *BroadcastEvent* Fragment 168 to link On-demand Publications to events in the master schedule derived from the Fat CSI feed 156.
    - The *BroadcastEvent* Fragment 168 is minimally specified. It does contain instance description metadata such as title and synopsis. The definitive source of schedule billing metadata is the 'master' schedule.
    - It is recommended that a separate *BroadcastEvent* Fragment 168 is published per regional variant of a linear channel. This ensures that all regional variants are linked.
    - Separate *BroadcastEvent* Fragments 168 are published for each repeat showing of the programme in the linear schedule.
    - The programId CRID of the enhanced metadata ProgramInformation Fragment 162 shall be conveyed in the crid attribute of the BroadcastEvent/Program element.
    - The instance metadata identifier conveyed in InstanceMetadataId shall comply with the specification below.
    - The DVB Event Locator carried in Fat CSI shall be conveyed in BroadcastEvent/ProgramURL.
    - Where available, the linear Programme CRID is conveyed in {(BroadcastEvent/InstanceDescription/OtherIdentifier}} with the authority value pcrid.dmol.co.uk for Freeview or pcrid.freesat.co.uk for Freeview. Only one such Programme CRID may be conveyed in any given *BroadcastEvent* Fragment.
5. One of the *BroadcastEvent* Fragments 168 may declare itself as being 'canonical'. If no *BroadcastEvent* Fragment 168 declares itself as 'canonical', the Mater Integrated Program Schedule (MIPS) picks the one with a time slot in the most recent past irrespective of which linear service it is related to.
6. If more than one *BroadcastEvent* Fragment 168 declares itself as 'canonical', MIPS picks the one with a time slot in the most recent past irrespective of which linear service it is related to.
7. The MIPS ingest attempts to match a *BroadcastEvent* 168 to a <ScheduleEvent> in the master schedule ingested from the Fat CSI feed using the following ordered sequence of strategies:
    - If there is a Program CRID and an Event Locator present in the *BroadcastEvent* Fragment 168, both of these must match the event in the master schedule.
    - If there is only an Event Locator present in the *BroadcastEvent* Fragment 168, this identifier only is used and the scope of the search is limited to seven days into the future and fourteen days into the past. (This is because the DVB event_id is reused periodically.) This caters for linear broadcast services that do not transmit a Program CRID in the DVB Event Information Table.
    - If there is a start time and duration present in the *BroadcastEvent* Fragment 168, the serviceIdRef linkage is followed to the *ServiceInformation* Fragment to determine the DVB Service Locator (ServiceInformation/ServiceURL) and this is cross-referenced with the DVB Service Locator of the service derived from Fat CSI to limit the scope the matching to a particular DVB service. The start time and duration is then used to narrow down the match to a particular event in the 'master' schedule.
    - If there is still no match, or if no *BroadcastEvent* Fragment 168 has been supplied by the Content Partner, there is a future option for MIPS to look at the titling information in the enhanced metadata supplied and do 'fuzzy'

match with the 'master' schedule. This is quite hard to do in practice, however, because of the risk of false matches.

Practical ingest of 'master' schedule from STAGIS (an automated EPG data aggregation system from eventIS®)

It is proposed that Fat CSI schedule metadata be plumbed into an eventIS® STAGIS system and published by this into CCO MIPS. This can be achieved in at least one of the two following ways:

a) STAGIS 'quick win' solution

This system is shown schematically in Figure 15. The existing implementation of this system has a number of shortcomings:

1. STAGIS does not support the Business to Business (B2B) web service interface. It drops off *Schedule* Fragment files in a local directory or remote FTP drop-off account.
2. STAGIS does not support a protocol of fixed *Schedule* Fragment blocks. Each schedule file contains a 'sliding window' snapshot of events on one DVB service for a configurable period of time (*x* minutes into the past, *y* minutes into the future). One *Schedule* Fragment file is dropped every *z* minutes.
    - This means that MIPS cannot use the start/end time of the schedule block as the proxy fragment identifier. Instead, the event locator and (optional) Programme CRID could be used to track the life-cycle of individual DVB events and their mapping to Broadcast Publication Records. One simple approach to ingest would be to inspect the sliding window stated in each new *Schedule* Fragment and replace all Broadcast Publication Records in that window with the events shown in the new *Schedule* Fragment.
3. The TV-Anytime profile supported by STAGIS is different from that specified in the revision 1.0 B2B metadata contribution specification.
    - The descriptive metadata is provided in *ProgramInformation* Fragments rather than the <ScheduleEvent> element. STAGIS is really designed for scenarios where all the enhanced metadata is provided in normalised *ProgramInformation* Fragments. It does not currently accommodate the possibility of events having an instance-specific title and/or synopsis in the linear EPG, something that is a characteristic of the Fat CSI feed. This is a problem that eventIS is prepared to fix.
    - In the current deployment of STAGIS, every <ScheduleEvent> has a corresponding <ProgramInformation> Fragment (one-to-one mapping).
    - MIPS need to 'sew' these two entities together to form a Broadcast Publication Record.
4. STAGIS is not currently able to publish TV-Anytime *ServiceInformation* Fragments at all, so this reference data needs to be managed manually by MIPS in the short term.

b) STAGIS 'longer term' solution

A custom STAGIS output plug-in for the system overcomes the above shortcomings and brings the STAGIS solution into line with the B2B metadata contribution specification.

Schedule ingest for IP channels:

- The solution for IP channels is slightly different in that the Content Partner submits Schedule Fragments alongside all the other fragment types.
- These schedules can be supplied according to the protocol already defined in the revision 1.0 B2B contribution specification.
- The fixed schedule block protocol can be implemented.

The TV-Anytime profile for Schedule Fragment is adhered to.

IP channels – Solution overview

This section provides an overview of how the consumer device discovers any IP channels that are available to it and present them to the viewer.

Context

IP Channel Availability

The availability of an IP channel may be classified as follows:

Universal availability

The channel is published by the channel provider with the intention that it can be accessed by any device on any ISP network. This does not require a commercial arrangement between the channel provider and any ISP.

Note: In the short-term there may be technical limitations in a particular ISP network that prevent such a service being accessible by devices in that network, e.g. multicast not enabled.

Limited availability

The channel is published by the channel provider such that is can only be accessed by devices on a specific ISP network. This is assumed to be achieved through a commercial arrangement between the channel provider and the ISP.

IP Channel Delivery

The delivery of an IP channel may be classified as follows:

Linear IP channel

This is a live stream which the viewer should find indistinguishable from a standard linear broadcast channel. It may be delivered to the device via multicast or unicast delivery.

Virtual IP channel

This is essentially a playlist of on-demand programmes, presented to the viewer as if they were programmes in a linear channel schedule. However, when a virtual IP channel is selected to view the notionally 'present' programme will commence playback from the start, rather than from the apparent intersection of the current time with the schedule. This is shown in Figure 17. The 'Virtual IP Channel' 196 has been populated with programmes 198 as if a linear channel. The 'Now' line 102 intersects the programme 'Top Gear' 202 part of the way through, but playback will commence from the start, as shown by arrow 204.

System Overview

IP Channel registration with the platform

A content provider wishing to make an IP channel of any kind accessible needs to register this channel with the platform. This is shown in Figure 18. This results in:

1. An entry to be added to the Service Line-up 206 within the CCO 128-1.
2. A Logical Channel Number (LCN) to be assigned for the channel and stored in the LCN Allocation 210 within the CCO 128-1.

As part of this the content provider 1000 needs to indicate if the IP channel has universal 212 or limited 214 availability.

If the channel has universal availability 212 it is added to the Universal Availability IP Channels List 218.

If the content provider 1000 has a carriage agreement with an ISP 132 for a given channel, that channel is non-universally available. Figure 18 shows an example where the content provider 1000 must supply service location metadata for the channel to the ISP 132. In order to be listed as an IP channel, service description metadata must be sent to the CCO 128-1 and this is typically sent on behalf of the content provider 1000 by the ISP 132 using the B2B metadata contribution interface 142.

If the content provider 1000 wants to provide a universally available channel 212 it needs to provide service description metadata and service location metadata to the CCO 128-1 via the B2B metadata contribution interface 142.

Logical Channel Number assignment

As described above, the LCN for an IP channel is assigned by the platform.
To allow IP channels to exist in a unified channel list with linear broadcast channels, LCN assignment come from a managed range.

For IP channels with universal availability 212 the assigned LCN needs to be unique within the scope of the platform.

For IP channels with limited availability 214, the assigned LCN needs to be unique within the scope of the relevant ISP 132, i.e. the same LCN could be allocated to different IP channels associated with different ISPs.

Publication of service and schedule metadata for an IP channel

Service and schedule metadata for the IP channel are aggregated by the CCO 128-1 via the B2B metadata contribution interface 142 and published to devices 130 via the B2C metadata interface 152.

For universal availability IP channels 212, the channel provider 1000 (or appointed agent) makes schedule metadata directly available to the MAS 128-2.
For limited availability IP channels 214, either the ISP 132 makes schedule metadata available to the MAS 128-2 on behalf of the channel provider 1000, or direct publishing by the channel provider 1000 occurs.

IP channel discovery by the consumer device

As part of normal operation the consumer device 130 periodically (typically daily) retrieves both the generic platform and relevant ISP configurations (lines 228 in Figure 18).

The platform configuration identifies the location of the Universal Availability IP Channels List 216, hosted by the platform.

The ISP configuration identifies the location of the Limited Availability IP Channels List 230, hosted by the ISP 132.

These files include the location for each IP channel listed. This means that the ISP 132 retains direct control over the location of limited availability IP channels 214.

The Metadata Broker component 232 retrieves both of these channel lists and merges them to generate a unified IP channel list 234 on the device 130.

At this point the combined list only contains a service ID and service locator 236 for each channel. The Metadata Broker 232 then queries the MAS 128-2 via the B2C interface 152 to retrieve service description metadata for each channel which includes the name of the IP channel, logo, Uniform Resource Locators (URLs) and its LCN (shown by line 240). The service ID is used as the basis for this look-up.

Listing IP channels in the platform UI

The Metadata Broker 232 exposes the unified IP channel list 236 and associated metadata to higher-level applications – such as the platform UI 242 – over the System API 244 (Figure 18).

It is the responsibility of the platform UI 242 to present information about IP channels in an appropriate manner (e.g. as an EPG grid) including interleaving with information about linear broadcast channels (obtained from the Service Repository 246).

Viewing an IP channel
Linear IP channel

To ensure consistency and to minimise channel change times when channel surfing, linear IP channels are presented for viewing by the platform UI application.

The service locator for a linear IP channel is made available to the Metadata Broker

as part of the relevant IP channel list (from platform or ISP). This service locator could be a direct reference to the location of an IP channel. But preferably it provides the location of a Service Description Protocol (SDP) file. Regardless, the service locator can be passed directly by the platform UI application into the Media Router component to commence presentation of the linear IP channel.

Encrypted IP channels may need the assistance of a content-provider-specific application to manage subscription details and obtain content licences when the channel is first viewed. When an encrypted channel cannot be played, the platform UI application launches such a 'helper' application provided by the channel provider. The helper application can assist the viewer and aid them in accessing the channel, e.g. obtaining a subscription.

The location of the helper application is provided as part of the service metadata.

Virtual IP channel

The service locator is not relevant for a virtual IP channel. Instead the behaviour on selection of a virtual IP channel is governed by the platform UI application.

The behaviour is as described above, with the programme in the schedule intersected by the current time being played from the start in an on-demand manner using any of the techniques defined in the IP Delivery specification.

Linear IP channel delivery

Retransmission

Clients are required to support the use of a retransmission server for Reliable Transport Protocol (RTP) delivery as defined in [ETSI TS 102 034 v1.4.1]. Use of this mechanism is optional for channel providers.

Fast Channel Change (FCC)

A solution for fast channel change based on the use of a retransmission server is defined in DVB-IPTV handbook [DVB-IPTV FCC].

Trick modes

When watching IP multicast channels and watching recordings made from them, the same trick mode functionality as is available for broadcast channels is provided.

Fallback to unicast

A mechanism for fall back to unicast delivery is provided to support the use of multicast for universally-available IP channels. This is preferably done by referencing the unicast stream from within the SDP file and defining requirements for the media player component of the device.

Unicast delivery

Not all ISP networks are fully multicast enabled and even where they are access to multicast capability may require a commercial agreement to be in place. Hence, some linear IP channels may need to rely on unicast delivery to reach some or all of their audience.

Unicast delivery uses the existing mechanisms described herein. Hypertext Transfer Protocol (HTTP) adaptive streaming is preferable.

Content protection

Content protection for multicast IP channels can use both 'Marlin Broadband' and 'Marlin MS3', or any other type of DRM procedure.

Prioritisation between these options and the need for enhancements to MS3 is driven by a commitment to exploit by channel providers.

Marlin Broadband

IP linear channels are normally presented directly by the main UI. Associated with an IP channel or a set of IP channels is a 'helper application' whose purpose is to handle cases where the device does not have a licence to decrypt the channel's content.

The first time a user visits a DRM-protected IP channel, the helper application is invoked. The helper application may immediately initiate a licence acquisition for the channel if it has sufficient information to do so, for example from the ISP configuration. If not, it may prompt for an account number or user name and/or a PIN, for example if the user has additional charges to pay. Assuming the licence acquisition is successful, the content will then play.

The application can pass any number of messages to the DRM system and can make use of action tokens which themselves perform a number of tasks. This allows the application to set up complex node topologies within the Marlin system and to acquire licences for a number of IP channels at the same time.

The helper application will not be invoked on subsequent visits to the channel provided the licence remains valid.

In order to support rolling subscriptions, a mechanism is provided for the helper application to register a licence update server for a set of IP channels so that licences can be refreshed and subscriptions renewed automatically. This mechanism can also be used to allow the top level content keys to be changed periodically.

When registering the update server, the server URL can include any tokens that the channel provider needs in order to validate the licence renewal requests. The tokens can contain private encrypted information identifying the user if necessary. The device assumes that the response from the URL is a Marlin action token and processes it accordingly.

Content IDs in Broadband Transport Stream (BBTS)-encrypted streams can be changed periodically.

Marlin simple secure streaming (MS3)

By referencing an IP channel's content using an MS3 compound Uniform Resource Identifier (URI), MS3-protected channels can be used without needing any major architectural changes in the client. However, the device is only able to present the channel for the period during which the content key (or keys) used in the stream is one that was present in the initial Secure Stream Access Statement (SAS) received from the server. If a channel provider needs to change the top level content key on a regular basis, this places a limit on the period for which uninterrupted play is possible. However, it is possible to include multiple keys in the SAS thus extending the period.

A new MS3 SAS could be obtained during playback. This involves choosing a random time within the expected initial key lifetime at which to request a new SAS.

When using MS3, a fresh Stream Access Statement (the MS3 equivalent of a licence) must be acquired each time a new streaming session begins. If the 'authenticator' feature of MS3 is not required, the MS3 SAS acquisition can proceed in parallel with a multicast join or content buffering operation and so does not add significantly to the channel change time. Note: the MS3 authenticator feature is intended primarily for obtaining CDN access tokens and would not apply for multicast channels.

The device makes a request to the MS3 server quoting a static channel identifier. The channel provider's MS3 server needs to return an SAS for the channel covering the content identifiers appropriate for the channel for a suitable period.

A mechanism is provided to allow a user identifier to be substituted into the MS3 URL in order for the MS3 server to validate SAS requests. If the device does not already have such an identifier, the IP channel's 'helper application' will be invoked to perform the necessary registration and provide it. The helper application is also invoked in the event that the MS3 SAS request fails, or the content identifier in the stream does not match one of

the content identifiers in the SAS.

An option could be added to allow the user identifier to be provided through the ISP configuration.

Recording and clash management

The device is capable of recording programmes from a linear IP channel, extending the existing mechanism for recording linear broadcast channels. The viewer is able to record programmes from a service without being aware of the distribution mechanism for that service.

Clash management

This means that a booking-time conflict arises if at the time of making a Booking the device predicts that it will have insufficient system resource available to record the requested programme.

For the resolution of recording time conflicts, an in-progress recording of equal or higher priority will not be abandoned to allow a new recording to begin.

Bookings for recording an IP channel are event based i.e. a schedule event ID is passed to the acquisition component. Recordings from an IP channel are timer triggered, with a start and stop time derived from the channel's schedule.

More accurate recordings could be attained by triggering acquisition using Event Information Table present / following (EIT p/f) information (as with linear broadcast recordings). EIT p/f signalling could be embedded within the IP channel stream or equivalent signalling could be conveyed in a separate stream, with the latter being more suited to allowing the device to receive the signalling for one or more channels before starting to stream the content itself.

Concurrency of acquisition

The device supports concurrent acquisitions from two separate channels regardless of the delivery mechanism used for those channels.

In reality, IP capacity constraints may make it difficult to support multiple concurrent IP channel acquisitions. The ISP configuration states the maximum number of channels that can be simultaneously delivered. In the case where a programme cannot be recorded due to the IP capacity constraints the main UI will display appropriate messaging to inform the viewer.

Content protection for recorded content

When a recording is made from an IP channel, the stored data is the original encrypted stream. To play back such a stream therefore requires help from the DRM system and the way this works depends on whether Marlin Broadband or MS3 is used.

Marlin Broadband

As described above, in an example where Marlin Broadband is used, there is a licence update mechanism which ensures that there is a valid licence available on the box at the time of a recording, provided that:

- the user has previously visited the channel, and
- their subscription remains valid.

When making a recording from an IP channel, the device checks the content ID referenced in the recorded content and associates the recorded content with any previously stored licence so that the licence remains on the device until the content is deleted. The device only observes the content ID present at the start and end of the recording so any recording long enough to span more than one content ID change may include content for which a licence is not retained on the device.

At the time of playback, a recording made in this manner will play straight away even if

the device is not connected to the Internet, provided that the licence conditions (including any dependencies on subscriptions) are met at the time of playback.

There are circumstances in which the device does have a content licence at the time the recording is made. It is also possible for a stored licence to expire (or to be dependent on a subscription which has itself expired). In such cases, attempting to play back the recording will result in an error which is handled by invoking the IP channel's helper application. The helper application may be able to obtain a new licence to allow the recording to play.

Marlin MS3

In one example, when Marlin MS3 is used, an MS3 SAS must be acquired at the point a recording is played back. If the 'authenticator' facility is used in the MS3 compound Uniform Resource Identifier (URI) for the channel, an SAS is also required at the time of recording. If not, the recording can be acquired using the content URL directly.

In one example, channel providers must not set the 'do not store' bit in the SAS for IP channels from which recordings are permitted. Devices are not able to successfully record content for which an SAS is required at record time and the 'do not store' bit is set.

When playing back a recording, the device uses the same mechanism for obtaining the SAS as is defined for viewing the IP channel directly with the addition that the time and date of the recording is included in the request to the MS3 server. The channel provider is required to implement an MS3 server that can return an SAS containing the content key or keys appropriate to the time the recording was made.

If the request to the MS3 server fails, the helper application is invoked. Some possible causes of failure include a lapsed subscription, server error and deliberate denial by the channel provider.

Usage logging

The consumer device provides a usage capture and backhaul capability for IP Channels equivalent to that provided for linear broadcast channels.

Diagnostics

The consumer device provides a local diagnostics capability for IP Channels that is equivalent to that provided for linear broadcast channels.

If a consumer device supports Remote Diagnostics it provides a capability for IP Channels equivalent to that provided for linear broadcast channels.

Figure 19 is an example screen shot of what the EPG would present to the user. The current time is shown by a line 102, and the programmes currently being broadcast are those that intersect this line. The user can browse backwards (bottom left) 250 and forwards (bottom right) 252 in time to browse and select programmes that are not live.

Figure 20 shows a 'Miniguide' 254. This is a smaller version of the EPG shown in Figure 19; so the user can view the EPG without disrupting their viewing experience. Included in this view, or any other, may be recommendations 256 for the user based on the currently playing or selected content. The screen shots at the bottom of this figure show how the user can browse through channels 258 and over different time periods 260.

Figure 21 shows several other views the EPG may use to display information to the user. The top left view is a 'single carousel' 262; this would mainly be used for showcasing smaller amounts of content, for example, the recommendations from content providers. The bottom left view is a 'double carousel' 266; this would mainly be used to browse the depth and breadth of content in On Demand categories and sub-categories. The top right view is a 'rollup' 264; this would mainly be used to show a group of linked content, such as a television show series. The bottom right view is an 'Action panel' 268. The Action Panel 268 is primarily used to display more information to the user about the piece of content they have selected or are currently watching. In addition it is a bridge to related content across the interface, allowing the user to see programmes that are 'More Like This' (related), and 'More Episodes' of the selected piece of content.

Further Discovery and Playback Aspects

Scope

The system provides On Demand content offered from multiple Content Providers. Playback of this On Demand content requires the usage of an On Demand player 270. Figure 22 shows where On Demand content could be accessed or referenced from within the core system user interface and the touch-points for On Demand players.

In the following section, aspects of the content provider players are described. These aspects create an enhanced customer experience of playback and management of on demand content (e.g. downloads).

In certain examples, the device and system provide the following functionality:

- Universality –The system is able to support many Content Provider content providers and their player applications.
- Scalability – scale of the platform is enhanced by allowing a number of Content Providers, ISPs and manufacturers to support and facilitate the system. An open environment for content and service providers is provided, including a fair and non discriminatory policies and low barriers to entry that increases the number of content providers, ISPs and manufacturers that support and facilitate the system.
- Quality – A customer experience that is simple and competitive with other TV platforms is provided. A quality customer experience, through TV-quality standards, principles of usability, and availability of core accessibility features is also provided.
- Flexibility –A framework that is flexible enough to respond to competitive and technological developments is provided.
- Innovation – A range of content and service business models, including free and pay are enabled.

Detail of the means of how it provides this functionality is given below.

Key Principles

As a result, the Content Provider On Demand players provide the following:

Principle 1 - Safety

As the system is intended for the wide market including the family home, creating a safe environment for young and old alike is an important part of the system. Content that is inappropriate to some or involves a purchase to be made is clearly demarcated and steps are in place to protect certain viewers from these cases.

Principle 2 - Accessibility

A focus is to provide an accessible TV experience. To ensure this is the case the system is adapted to ensuring disabled audiences are able to access content and services easily and as they want to, rather than offering one-size-fits-all solutions.

Principle 3 - Reflect the viewer's previous experience

Most viewers will already have some form of experience that has influenced or describes how they expect content players to work. This may come from real world experiences/examples such as DVD players, similar computer related services or existing set-top boxes. Deviating too far from viewers expectations may result in a difficult and unpleasant experience.

Principle 4 - Familiarity and Consistency

In line with viewer's previous experiences, the system should feel familiar throughout the platform. Terminology, core interface components and navigation all follow a familiar model, allowing standard usability and functionality. Consistency in the interface allows

viewers to transfer their knowledge and skills from one player or application to another.

Principle 5 - Simplicity

Viewers expect to be able to perform tasks in a streamlined way with the fundamental components needed to complete them clearly apparent and obvious. Key functions that are expected by viewers are clearly available and not hidden in sub menus or informational prompts that may be not be apparent to a viewer. Although there may be further optional details (e.g. buttons or calls to action) associated with a given task, the basic components do not have to compete with these additional details for the viewer's attention to enable the viewer to complete their task easily and without confusion or complication.

Principle 6 – Coherent

Key functions and interactions exhibit behaviour similar and coherent to that which the viewer would expect and do not cause unexpected results, mislead or misdirect them. The viewer ideally feels in control and able to navigate to and away from desired content quickly and confidently, they are not taken down journeys or paths where they become lost and frustrated.

Principle 7 - Feedback

Feedback is seen as more than messages and alerts that appear when something bad happens. Instead, it involves keeping viewers informed and involved in what's happening with the application. When a viewer initiates an action some form of feedback informs the viewer that the action has been received and the application is reacting appropriately.

Principle 8 - Communication

Viewers are always presented with enough information to make an informed decision enabling them to be confident and active in exploring menus and content, without being surprised by unexpected purchase prompts or otherwise.

Principle 9 - Differentiation

The system respects the right for content providers to create their own brand experiences.

Principle 10 – Security and Stability

Viewers are able to use the Content Provider player without having to worry about their security and the players deliver a stable and reliable experience.

Principle 11 – Quality

The players are of a sufficient standard/level of quality and not engage in excessive spamming or cross-selling which may negatively impact the viewer experience.

In summary, a small and core set of rules are required to protect viewers but there must be flexibility within this, providing options for content providers to differentiate their experiences. Furthermore, to ensure the right level of user experience consistency there are strong guidelines in place to complement the mandated rules.

Key Constraints

Content Provider On Demand players are constrained by factors covering both technical and functional aspects.

The following constrain how closely the Content Provider player can reflect a viewer's preferences:

- The sharing of viewer device settings and preferences

The following constrain some options for user interface design and content display:

- The technical capabilities of devices and the resources which Content Provider players can use.

The following constrain the interaction and integration of the Content Provider player with the system platform:

- The level of functionality and data accessible via the system APIs.

Overview of Content Provider Player Structure

The Content Provider player experience consists of a number of distinct functionality, process and design elements as shown in Figure 23. These elements and their associated business rules are addressed individually below. Each section refers to the corresponding label on Figure 23.

A. Legal and Regulatory

The system adheres to all regulatory and legal requirements. Content Provider players also must be aware of the regulatory bodies, comply with their rules and follow their guidelines, for example in the following areas:

- Player compliance with the Office of Communications (OFCOM) and the Association for Television On Demand (ATVOD).
- Content Provider players not containing false, fraudulent or misleading information.
- All viewer data is stored and managed securely and in agreement with Data Protection Guidelines
- Documentation required for use of protected Content Provider material (trademarks, copyrights or otherwise proprietary content).

B. TV Quality Principles

The system ensures customer expectations of a Play Now quality experience are met for On Demand content when Play Now messaging is displayed.

- B1 – Content Providers must meet Play Now requirements in order to qualify for Play Now iconography to be displayed on their content.

Note: As per the Schedule, all long form professionally produced On Demand content presented within a player must be compliant with the TV quality principles.

C. Security, reliability and stability

The security and reliability of the platform is essential due to the associated privacy risks and also the negative user experience should the system crash because of unstable Content Provider players.

- C1 – Content Providers must not jeopardise the technical integrity and security of the platform and must only use published APIs that they have permission to access.

The system maintains the privacy and the security of viewer's information at all times. Although the Content Provider player is responsible for all communications and data connections when a viewer is within that experience, the same precautions and protection of viewer data apply.

D. Compliance & Governance

To ensure adherence with business rules and guidelines, the system governor requires all Content Provider players to be assessed and approved prior to inclusion on the platform.

- D1 – Content Providers must submit their players for approval and are required to be tested for technical compliance and stability on the platform.

Content Providers may choose to update their Content Provider players post this initial approval. The system governor operates a post-approval governance process to ensure continued adherence to the business rules and guidelines.

- D2 – Content Providers must adhere to the system Content Provider Player Update Guidelines which covers scenarios when CPs change their Players significantly. (see Appendix 1)

E. Compatibility

The User Interface (UI) is used on all devices and any piece of On Demand content presented in the UI is played back in a Content Provider Content Provider player. In addition Content Provider Content Provider players are accessed independently via the "Players" area of main UI.

- E1 – On Demand Players used to play any assets presented in the UI must work on all devices.

Devices are compatible and may be used with different television sets including those which have a traditional (4:3) aspect ratio rather than the newer widescreen (16:9) aspect ratio and Content Providers should tailor their Content Provider player to enhance the experience across display devices.

F.

G. Adult Content

In one example, when a viewer initially sets up their box they set a PIN which will be used to protect access to certain content when parental controls are enabled, however it is important that there is an extra additional layer of security to protect children from Adult content and that the Content Providers are responsible for this authentication.

- G1 – The PIN must not be used as an authorisation mechanism for financial transactions or to access Adult content.

H. Parental Controls

The system offers parental controls functionality and when enabled, any attempted access to relevant content within the system will require the presentation of parental control challenges prior to playback of the content in order to honour and satisfy these controls.

I. Pricing, Payment and Purchasing

In one example, the system enables content providers to offer paid content (e.g. via subscriptions or on a pay per view basis) and the UI may mix free with paid content in its content discovery journeys, however actual payment transactions take place within the Content Provider player. Due to this mixture of paid content with free content within the UI it is important that upon selecting content and entering the player (or selecting content within the Content Provider player) viewers understand where payment is required for content, what this payment amount will be and furthermore, that they are required to confirm and provide their permission for all purchases and payments.

- I1 – Content Providers must ensure accurate pricing is displayed for all pay content.
- I2 – For all purchases a confirmation must be presented requiring the viewer to confirm the desire to purchase content, as a safe-guard to prevent customers from accidentally purchasing content or making unintended payments.

J.

K. Error Messaging

The UI displays error messages to the viewer for connectivity issues, booking failures (PVR), acquisition failures (PVR), accessibility issues and parental guidance. There are, however, player-specific issues including: problems accessing the pay Content Provider platform, account and billing issues, Content Provider errors and geographic blocking of access to content.

- K1 – Content Providers must provide error messaging for errors related to content or player issues
- K2 – Error message styles follow the general styleguide and all error messages include a specific error code and content providers use their unique error message prefix with the error code.

- Where possible Content Providers use the system Error API with their error messages.
- If multiple error messages are surfaced by the player these are presented in order of priority, criticality and importance.
- Content Providers provide basic troubleshooting in their error messages or through Content Provider help functionality. Content Providers also provide contact details in error messages or contextual help if desired.

For the avoidance of doubt, non-player errors are handled by the Main UI.

Content Providers are provided with their unique error message prefix as part of the Onboarding process.

L. Universal Remote Control Unit (RCU) Button Behaviour

There are a number of RCU buttons which need to have consistent and mandated behaviour/actions throughout the system and which Content Provider players will not be able to change as they have protected functions, these comprise of the Power, Main Menu, Guide, Volume Up, Volume Down and Mute remote control buttons.

In addition to these protected functions there are a number of other non-playback specific universal RCU button behaviours, particularly the Close button which viewers will expect to trigger an exit from the Content Provider player.

- L1 – The Close remote control button must always close (exit) the player except when the viewer may lose an entitlement as a result of exiting, whereby a single exit warning/confirmation message must be shown to the viewer before exiting the player but if the viewer confirms must then close (exit) the player

A viewer may launch a piece of On Demand content or the player itself from within the UI and subsequently decide that they want to return to the UI. Similarly if they are at a deep level of the player hierarchy they may want to move backwards throughout the player screens to the top level in an effort to exit from the player.

- L2 – The Back remote control button must always take the viewer back one step in the history of the player or exit from the player if there is no player history.
  Exceptions to this include Payment and PIN flows, where the whole flow is skipped as a single step.
  Note: This rule assumes that the Back button behaves as 'Close' when it reaches the end of the history in a Content Provider player.

Within the main UI, the help information is accessed either via the help category on the main menu or by pressing the help button on the remote control. Viewers will therefore become accustomed to using this button to access help from wherever they are when using the system.

- L3 – The Help remote control button must always link to help functionality. The type of help presented when the Help button is pressed within the player is at the discretion of the Content Provider and may be the system help or Content provider help.

Since the Content Provider can choose to direct the help button to display their custom help when the viewer is within their player then this may be a different experience than the viewer would expect.

- Any Content Provider player help includes signposting and a link back to the main help e.g. "If you were not able to find an answer to your question please try the YouView general help accessed via...(link button)."

Within the main UI the viewer are able to zoom in and out of the menus by pressing the zoom button on the remote control. Viewers will therefore become accustomed to using this button to access zoom functionality from wherever they are when using the system.

- L4 – The Zoom button must always toggle on/off zoom functionality (if zoom functionality is available).
- If zoom functionality is not available then the 'not available' feedback message icon is displayed when the viewer presses the zoom button.

The info (action) panel is a key component of the experience which viewers regularly interact with. It is accessed by pressing the i (info) button on the remote control and viewers will therefore come to expect that pressing this button will bring up an action panel containing further information relating to the selected content or item.

- L5 – The i (info) button must toggle on/off the appearance of an action panel showing more information related to the selected content or item. If any action panel related overlays have been launched then these are also closed when the viewer toggles off the action panel.

Where technically possible, pressing the blue button brings up Search functionality within the UI and it would be beneficial if this behaviour extended to Content Provider players.

- The blue button is used to launch search functionality to search within the Content Provider player (and/or if possible the ecosystem)

The Channel Up and Channel Down buttons are used to change channels within the system however this behaviour may not be relevant to Content Provider players. Conversely, some providers may wish to provide paging functionality but are limited in this because Page Up and Page Down buttons are not part of the mandatory set of RCU buttons.

- In one example, to maintain consistency of behaviours across Content Provider players, the Channel Up and Channel Down buttons are used to act as Page Up and Page Down buttons where applicable.

Devices are offered by a range of manufacturers and ISPs on a vertical and horizontal basis. Whilst there are a set of mandatory RCU buttons which need to be included as standard for any device, there are also a number of optional/additional buttons which partners may choose to include on their remote controls to provide advanced functionality e.g. Page Up/Down.

- Some devices have remote controls with Page Up/Down and Skip buttons and the other optional RCU buttons. All Content Provider players therefore provide a response (e.g. "Not available" feedback message) to button presses of these optional remote control buttons.

Playback

The main focus of a Content Provider player is around playback of On Demand content. Playback of On Demand content can be launched from a number of points within the UI, as illustrated in Figure 22. Playback of On Demand content can also be launched from within the Content Provider Player and follows a playback flow as illustrated in Figure 24 and parts M-P in Figure 23. This comprises of 'Entry Point' 290, 'Pre-Playback Behaviour' 292, 'Playback' 294, 'Interrupted Exit' 296 and 'End of Play' 298. 'The dotted line around 'Interrupted Exit' 296 indicates that this stage may not occur.

The following sections define the main aspects of each of the playback stages/behaviours and an overview of how these form the end to end journey.

As specified above and in Figure 22, there are a number of Entry points to On Demand players within the UI:

Entry Point	Description
1. Backwards EPG & Backwards Miniguide (e.g. Catch up)	The viewer navigates backwards in the Guide / Miniguide and selects an available OD piece of content.
2. OD Placeholder Channels	The viewer navigates to the placeholder channel either via the Guide / Miniguide, direct channel number entry or the channel up/ down buttons, and selects a piece / list of

	content.
3. Browse OD	The viewer selects a piece of content from an aggregated browse list within the OD area.
4. Search	The viewer carries out a search and selects a piece / list of content from the search results.
5. Players Area	The viewer selects a Content Provider player from the "Players" area, transitions to that player and selects a piece / list of content from within that player.
6. ISP Area	The viewer selects the ISP area via the main menu or by pressing the ISP button on the remote control, and then selects a piece of content or playlist within the ISP area/player.
7. More Like This / More Episodes	The viewer selects a piece of content within the More Like This or More Episodes area of the Action Panel.
8. Highlights	The viewer selects a piece of content within any Highlights section.
9. Recently Watched / Purchased OD	The viewer selects a piece of OD content from the list of recently watched / purchased items, this is located in the OD area, but may also be in the 'My Stuff' area
10. Red Button	The viewer selects a piece of OD content via the Red Button.

Each of the UI areas for these entry points may have different styles, or interactions and therefore the Content Providers may choose to tailor the subsequent player experience based on the entry point.

Content Provider applications are provided with information on where the player was launched from within the main UI to allow their player to be tailored accordingly.

M. Pre-playback Behaviour

Entry behaviour concerns the stage prior to content playback, consisting of the interstitials or other elements which can be presented to the viewer following selection of content (or a player) in one of the entry points.

Whilst it is preferable for there to be a seamless and immediate journey from the selection of the piece of content to full screen playback (particularly when content is launched from the Backwards EPG) the launching of content may require additional elements to be included between selection and playback e.g. for the purposes of parental controls, to provide additional information, cross promotion (add to a playlist, bookmark related content) or user interaction (e.g. PIN entry, Payment confirmation).

In fact, each content item may have associated relevant interstitial requirements due to the nature of the asset and the context in which it is launched as Content Providers need to fulfil any obligations related to parental guidance, payments, CA or otherwise. As a principle, the system requires that there is a smooth journey as directly as possible from the viewer selecting an item to playback and the viewer watching the content.

Although the presentation of interstitial elements is allowed, whenever content is selected there must be a clearly visible route to the play experience and the viewer must never feel that they have, or are deviated/prevented from this playback path.

- M1 – With the exception of mandatory steps such as PIN protection or payment, when the viewer selects to play an item of content then playback starts without requiring any further action by the viewer.
- M2 – With any interactive interstitials (e.g. promotional screen functionality similar to a DVD menu) the viewer must be able to press the Play or OK buttons once and go straight to the playback path of the content item they have just previously selected in the Core UI. In addition it must be clear the viewer is still on the way to their selected content and that the selected content will start automatically if no action is taken.

- M3 – During interactive calls to action, video or other movement on screen (e.g. a countdown) must be shown to reassure the viewer that the experience has not stalled or crashed.
- M4 – For any interactive call to action, the viewer must be able to exit and back out of the call to action or interactive experience and be returned to theplaybackpath.

Playback Behaviour

Playback is concerned both with the content playback experience and also the wider user experience of the Content Provider player.

In one example, the playback experience is made up of 4 components:

- Playback Controls
- Feedback Messaging
- Playback Bar
- Action Panel

M.1 Playback Controls (RCU Buttons)

Since playback controls are used for and apply to playback of PVR recordings then viewers will become familiar with and expect specific actions/behaviours in relation to the playback control buttons. Similar interactions as the system playback controls therefore need to apply for Content Provider players.

- N1.1 – The Content Provider player must adhere to the system playback control guidelines (see Appendix 1 for full guidelines)

An overview of one example of the system's playback control guidelines can be seen in the table below. The full playback control guidelines can be found in Appendix 1 section A.1.

	Content Playing	**Content Paused**	**Content FFwding**	**Content Rwding**
Play	None (Continue Playback)	Resume content playback	Resume content playback	Resume content playback
Pause	Pause content playback	Resume content playback	Pause	Pause
Stop	Pause content playback and display exit confirmation message ("Press Stop again to exit or press Play to resume playback") If the viewer confirms then exit from the player back to the entry point.	Continue to pause content playback and display exit confirmation message ("Press Stop again to exit or press Play to resume playback") If the viewer confirms then exit from the player back to the entry point.	Resume content playback	Resume content playback

	Content Playing	Content Paused	Content FFwding	Content Rwding
Fast Forward	Fast forward content	Fast forward content	Step through (Increase) content fast forward speeds. Once at maximum fast forward speed then continue to fast forward at maximum speed.	Fast forward content
Rewind	Rewind content	Rewind content	Rewind content	Step through (Increase) content rewind speeds. Once at maximum rewinding speed then continue to rewind at maximum speed.
Skip	Skip (to next/previous item in a playlist or a specified amount of time) and resume content playback	Skip (to next/previous item in a playlist or a specified amount of time) and resume content playback	Skip (to next/previous item in a playlist or a specified amount of time) and resume content playback	Skip (to next/previous item in a playlist or a specified amount of time) and resume content playback

- The system enables resume functionality and CPs are strongly encouraged to support and implement it also. However, since all players may not provide resume functionality it is important that when pressing the Stop button during playback the viewer is required to confirm that they want to exit from the content as they may lose their position within it.

Whilst the Record button is one of the standard playback controls, it is not commonly used with On Demand content. However, as the integration of linear and On Demand content progresses viewers may begin to expect integrated behaviour and functionality.

- The Record button allows the viewer to save the on demand content in their recordings or to set a recording for the related linear programme or series.

There are some additional non-standard playback controls which are included in the system for accessibility purposes, to allow viewers to turn the accessibility features of the content on and off as required.

- N1.2 – If Subtitles are available for the content, the Subtitles button must always toggle subtitles on and off for the content
- N1.3 – If Audio Description is available for the content then the Audio Description button must always either:

- Toggle audio description on and off for the content

OR

- Direct the viewer to and from the audio described version of any content

- If Subtitles or Audio Description are not available for the content then a message explaining that they are not available is provided to the viewer when they press the relevant buttons.

M.2 Feedback Messaging

Within the system, remote control actions and playback behaviours are displayed as feedback messages (icons). This is to ensure the viewer is provided with confirmation of the interaction and that they understand the playback state/current action of the content.

- N2.1 – In one example, feedback messages/icons must be displayed for the following scenarios:
  - Play
  - Pause
  - Rewind
  - Fast forward
  - Skip
  - Stop
  - Loading (Initial and mid-stream content loading)
- N2.2 – Feedback messages/icons must appear immediately when a viewer presses a relevant button on the remote control, must be presented in the position stated in the Style Guidelines and as the top layer over any other onscreen content in order to provide the viewer with visible positive confirmation of their action.
- N2.3 – A "Not Available" feedback message/icon must be displayed when the viewer presses a Fast Forward or Skip button and advert forwarding/skipping is being prevented, in order to ensure the viewer knows the signal has been sent from the remote but that the function is currently unavailable.

- To maintain consistency with the UI, Content Provider players use the same feedback messages (and the associated iconography) as the system reference, that all feedback messages fade out or disappear after being on screen for 2 seconds to maintain a full screen experience and that the playback bar appears in tandem with the feedback messages.
- For button presses which do not have an associated action a "Not Available" feedback message is displayed so the viewer knows the button press has been registered. A further message to explain the reason could be displayed (e.g. "Digital text is not available during playback" for the Text button).

M.3 Playback Bar

The playback bar provides the viewer with the key playback information relating to the content being watched.

Elements

- N3.1 – In one example, all playback bars must contain the following elements:
  - A progress bar with clear visual differentiation between:
    - The amount of content which has elapsed
    - The amount of content which is remaining
  - A playhead or clear visual representation which shows at which point along the progress bar timeline the viewer is currently
  - One of the following combinations of time fields:
    - Total Duration and Elapsed Time
    - Total Duration and Remaining Time
    - Elapsed Time and Remaining Time
    - Total Duration, Elapsed Time and Remaining Time

For the avoidance of doubt, the progress bar and time fields can relate to only the main asset being played (e.g. not include the time for advertisements) or to all of the assets in the playlist (including advertisements).

- If the content contains adverts or non skippable items then the progress bar indicates with clear visual representation where these will be displayed.

Positioning

- N3.2 – In one example, the playback bar must always be positioned in a horizontal orientation in the bottom third of the screen.
- N3.3 –In one example, the viewer must always be able to see the majority of the underlying content when the playback bar and feedback messages are on screen.
- The playback bar is centred justified and positioned as much as possible to avoid obscuring subtitles, although it is recognised that completely avoiding obstruction may be impossible.

Appearance

- N3.4 – If skip buttons/skip functionality is being used to skip an amount of time within an asset then the playback bar must appear immediately when the viewer presses a Skip button or is using the skip functionality.
  - To maintain consistency with the main UI, in one example the playback bar always appears when the viewer presses the Play, Pause, Fast Forward or Rewind button and remain on screen whilst the viewer is Fast Forwarding or Rewinding.
  - In one example, the playback bar fades out 4 seconds after playback of content resumes or content is paused in order to maintain the full screen experience. When playing trailers, informational or other short form content, this does not apply.
  - If skip buttons/functionality is being used to skip between assets in a playlist there is an immediate visual indication that a new asset has begun playing and the playback bar appears immediately when the viewer presses the Skip button or is using the skip functionality.

M.4 Action Panel

Central to the viewing experience is the use of an action (info) panel which is used to provide additional information regarding the selected content in addition to further onward journeys. The action panel can be called from any content within the main user interface e.g. Search, EPG etc. via pressing the i (info) button, it is therefore a core part of the platform, acting as a hub which can direct and enhance access to content and players.

As this is so prominent and ubiquitous throughout the UI then viewers will come to expect certain standard features and interactions to apply to all action panels and a level of standardisation and consistency is required so viewers are not deterred from using the i (info) button and accessing action panels.

Interaction

- N4.1 – Interstitials must not be displayed prior to the action panel appearing nor upon closure of the action panel.
  - For consistency with the UI experience, the play and pause buttons continue to control the underlying content when the action panel is on screen.

Elements

- N4.2 – One example of the information concerning the current playback content that must be shown within the action panel is:
  - Title
  - Duration (Time)

- Synopsis
- N4.3 – For rated content, Guidance ratings/text and BBFC rating must be shown as part of the action panel information.
- N4.4 – If the content is HD, Audio Described or includes Subtitles or Sign Language then these content attributes or related iconography (e.g. S in a circle for Subtitles) must be shown as part of the action panel information.
  - If the content availability is limited (e.g. Content expired) then the availability window (expiry date or rental length) is also displayed within the action panel information.
  - If the action panel contains additional content links which have associated positive incremental cost then this incremental cost for the browsed content is displayed.

Positioning

- N4.5 – During playback the viewer must still be able to see the playback content when the action panel is onscreen. In one example, the action panel must therefore either:
  - Take up no more than 60% of the screen area

  OR
  - Take up the full screen and contain a mini playback window (of a similar size to the mini playback window in the Guide area within the main UI).

N. Interrupted Exit (inc. Exit Messages)

An interrupted exit will occur either because the viewer has decided to change their focus on the content by pressing a remote control button or because an error message has been presented and acted upon.

These interrupted exit scenarios are shown in Figure 25. Interrupted exits may be caused by 'Protected Buttons' 300 which force an action on the Content Provider player, by 'Other Buttons' 302 which have associated player exit functionality or by 'Error message actions' 304 whereby the viewer chooses to execute an action included in an error message which takes the viewer into the main UI and may exit from the player.

Note: When a viewer exits the player via pressing the Power button then when they subsequently turn the device back on they are taken to the last linear channel watched not back into the Content Provider Player.

A viewer may accidentally exit from a player via one of the interrupted exits (or otherwise) which could cause the viewer to lose access to their content (e.g. single play paid content).

- O1 – A warning message must be shown to viewers before exiting the player if the viewer will lose an entitlement (e.g. access to purchased content) as a result.
  Note: If this is not the case then the Content Provider may choose to display a single message to warn the customer that they are exiting the player and require the viewer to confirm that they want to exit, however this is not required.

It is important that a viewer is always able to close a Content Provider player and that when the Content Provider player receives an exit command (e.g. RCU button press) it does so with minimal delay, as otherwise the viewer may assume that the device is not sufficiently responsive.

- O2 – To ensure a smooth user experience for exiting from Content Provider players then the player must close within a maximum of 3 seconds after it has received the closing command (e.g. if no warning/confirmation message is displayed or the viewer confirms that they want to exit).

If the player has not closed after 3 seconds, the system may shut down the application to cover the possibility of the Content Provider player hanging or otherwise not closing properly

For the avoidance of doubt, if the viewer confirms via the warning/confirmation message

that they do not want to exit then the player does not close for that instance.

With linear TV or recorded content, when a viewer presses the Guide or Main Menu button, the content being played back is minimised into a 'mini TV window/Picture in Picture' to ensure that the viewer's content viewing is not interrupted when investigating other content discovery journeys.

Similarly, within the main menu, if a viewer is watching linear TV and a TV advertisement is being played then when the viewer presses the Guide or 'Main Menu' button this playback continues uninterrupted within the TV window.

- O3 – When a viewer selects to bring up the main menu or Guide then playback of the content item/advertisement must continue and a Content Provider cannot interrupt (e.g. pause) or adjust (e.g. insert additional advertisements) this playback experience in any way as a consequence.

O. End of Play

End of play is the state which occurs once the viewer gets to the end of a piece of content (or the subsequent end of the post-content ads, idents and stings).

At the end of play it is important that the system enables onward journeys for content in order to assist the viewer to continue their viewing session and avoid a disjointed user experience.

Content Provider players may present an end of play screen to viewers at the end of playback for On Demand content in order to enable onward journeys and a smooth transition from end of playback of content either back into the main UI, onto the Content Provider player homepage or on to further content playback.

- P1 – When playback of an asset or playlist comes to an end either:
  - An End of Play screen must be displayed and this must not be a black, blank or completely inactive screen and, in one example must take the form of one of the following
    - A full-screen overlay
    - A partial screen overlay
    - Display of the Action panel

  Or
  - The viewer must be taken back to the point where the content was launched from within the Player or main UI.

For the avoidance of doubt, Content providers may choose the background image (e.g. first frame, last frame, programme image etc.) which remains in the player window during this End of Play screen display. Content providers may develop any number of customised End of Play displays for their content (e.g. to show sponsorship brand or sponsorship graphics). Partial-screen overlays may be displayed as 'credit push' or 'credit squeeze' during end credits or outtakes of a show or film, or similar. Content providers may include additional functions e.g. ratings.

- P2 – An End of Play screen must include at minimum:
  - Options to:
    - "Return to where the content was launched from" (or similar)
    - Play again

- In one example, the End of Play screen also includes:
  - Title of the content which was just watched
  - If applicable, Series and Episode numbers of the content which was just watched
  - Details on the Expiry window/Rental length/Remaining time
  - Options to:
    - Watch next episode
    - Select onward journey to more CP content (e.g. More Like This)
  - To smooth the user experience particularly for any viewers who are confused by the end of play options, 5 minutes after end of play the viewer is

automatically returned to the point where the content was launched from within the Player or Main UI.

- P3 – The "Return to where the content was launched from" option must be the first and selected by default call to action within an End of Play screen.
  - For the avoidance of doubt, if the viewer has launched the content from a Content Provider Player page (e.g. homepage, a category page or most popular page) then they are taken back to that page when choosing the "Return to where the content was launched from" option.
- P4 – Only End of Play visuals is shown at End of Play (the complete end of asset playback plus any post-roll ads, channel idents or stings). With the exception of a playlist which the viewer chose or selected to play, other content must not be auto-played at or after End of Play and similarly there must not be any auto-entry to other interactive content at or after End of Play.

P. Overview of Related Product Features

The table below defines examples of Product Features (PFs) that underpin the implementation of Content Provider On Demand players:

PF#	**Feature Description**
PF042	If a viewer exits a piece of recorded / streamed / downloaded content, they are able to return to it at a later time and resume viewing from their last position.
PF057	The platform excludes adult content from search results.
PF058	Retrieve the pricing for a given item when a user 'hovers' over it for 2 seconds, and display the price to the user. As this pricing is retrieved from the Content Provider, it accurately reflects the active subscription. (Requires the viewer to visit the CP player once before pricing becomes active)
PF062	Displays Freeview+ Green Button prompts from broadcasters, to enable booking of DVR recordings directly from trailers.
PF091	The viewer is able to pause, play, and skip through On Demand content.
PF092	Support Adaptive Bitrate to allow changing down to lower bitrates when content playback is going to be interrupted by bandwidth by reduced
PF093	Supports distribution of On-Demand audio content, e.g. Radio - audio content can be enhanced with flash content by CPs
PF094	Content Providers can prevent playback control usage during playback, should they choose to, in order to prevent ad-skipping
PF095	Supports "Play Later" content, where sufficient content is downloaded prior to playback to support delivery in Over The Top environments
PF096	Play content with minimal buffering before starting, where the device/Content Provider have determined that the content is being delivered
PF098	When a user is watching content and an error is encountered, the device identifies the cause of the error and display an appropriate error message to the user
PF119	The device must always surface system alerts over any other item being displayed on screen, including both the UI and Content Provider applications (e.g. VOD players).
PF127	Viewer attributes and preferences, and some device configuration settings are stored in a local repository. This captures information in accordance with relevant data protection guidelines and be implemented in a way that supports tiered levels of access.

PF134	Users with a Standard definition TV is allowed to choose when viewing content how they would like to format the picture
PF137	Supports the use of parental controls on the platform to prevent minors accessing content that is not suitable for them.
PF144	The device surfaces standard error codes in response to identified problems;
PF157	It is possible to enter text into fields on screen using multi-tap on the remote control
PF168	The system supports standard accessibility services for On Demand content and make them easily available for users that require them
PF173	Using the Zoom button on the remote control, users are able to Zoom portions of the interface to make navigation easier
PF174	The device supports different colour schemes and background opacities to improve accessibility
PF182	Each device has a unique identifier to identify usage patterns and data.
PF185	Applications can be granted various levels of access to the system, based on their type.
PF194	Collects usage data for On-Demand content with per-box control over collection and submission
PF201	Allows Content Providers to develop and operate applications that use a range of monetisation models (e.g. payments charged to an existing account, eWallets, credit cards, existing billing relationships), within design guidelines to help consistency of experience across applications on the platform.
PF230	Content Providers can own the playback experience from a stand-alone player, i.e. A separate Flash Player
PF312	Content Provider players support an API to provide usage data for content being watched on their players back to device.
PF313	Applications have the ability through an API to claim the use of remote keys and request changes to their key set.
PF314	Applications have the ability to listen for changes to the main UI settings

Details relating to the Structure and Ordering of Content across the User Interface

Clear and Logical

- The UI provides a simple and easy to use interface for searching, browsing and finding content.
- The UI facilitates users to get to content that interests them quickly, in order to reduce frustration / boredom.
- Users get what they expect to see and where they expect to find it – this may mean content is duplicated over different views / genre categories.

Exciting and Fresh

The system provides users a surprising interface where they are not only shown the same popular items every time they browse. Different views provide different content wherever possible.

Quick and Simple

- Content presentation is structured so that there is minimal impact on device responsiveness e.g. content is not duplicated too often across the platform.
- Wherever possible, presentation and ordering of content minimises the number of key presses required by a user to find valuable content.

- Users are not shown content that would necessitate migrating their ISP in order to watch that content – this is to reduce dead-end browse journeys for users. If ISPs wish to offer services to people that do not have their broadband services, then this can be shown to all customers.
- The user interface uses the best in class Accessibility methods ongoing.

Appropriate

- In one example, content display of Adult content must reflect Adult security settings set by the user.

The Main Menu

The Main Menu is accessed when the user presses the Main Menu button on the remote control.

Description of Main Menu Items

One possible order of items in the main menu is shown in Figure 26. The items in grey (Settings 310 and Help 312) are initially off-screen. The initial landing point is 'Guide' 306 as indicated by being highlighted.

In one example, the UI design means that only five items are visible on screen initially, but this seven item menu carousels around a fixed focus in the centre of the screen, so all items will be surfaced rapidly. The landing point of the Main Menu is 'Guide' 306 for launch, to get users straight to linear content if they wish. The order of main menu items is fully configurable by the Platform.

There is an ISP item 308 on the initial main menu screen if the device is connected to an affiliated Internet Service Provider. If the device is not connected to an affiliate ISP then the ISP item 308 on the Main Menu shall not be available, and 'Settings' 310 (for example) will instead be visible on the initial screen.

This horizontal menu on the lower third of the screen overlays underlying content e.g. linear, OD. There is also a transparent header on the screen, in which branding and the time is displayed.

- Search: This provides customers with a universal search function, so that they can access content from across the entire platform from one place. This area is discussed below.
- My View: This section is predominantly storage and management of content that is stored locally on the device e.g. Recordings.
- Guide (landing point): In one example, this area allows the customer to see at least 7 days of future linear content by Channel, and 7 days of Catch-up by Channel in an EPG grid format. This area does not include Catch-Up older than 7 days, or future content >7 days in the future.
- On Demand: This area contains the OD Player list and also OD content (including "Catch-Up" content) across all OD providers that meet the system's TV Quality requirements and provide aggregated metadata. This OD content is only streamed to the device. OD providers are subject to Governance Rules as outlined in [SHA], and OD portals / OD players abide by the OD Player Style Reference Guide and OD Player Business Rules.
- ISP: This area provides information on the internet services provided by the customer's own ISP, if that ISP is affiliated to the system – non-affiliated ISPs do not have an ISP item on the Main Menu. In one example, the logo displayed is the ISP parent brand (e.g. BT) not the content brand (e.g. BT Vision).
- Settings: This area displays actionable and "for customer information" settings that are owned by the system governor and the device manufacturer.
- Help: This area contains some help videos and local diagnostics. Help videos are streamed to the device.

Ordering of Content in My View

My View contains recordings, scheduled recordings/ reminders and recently played items.

Recordings

Recordings with the same title (as listed in the EPG as the primary title) or broadcast Content Reference Identifier (CRID) (if no enhanced metadata is available) are rolled up within a stack. In one example, these stacks do not include content from more than one channel.

In one example, individual and stacked recordings are ordered by the exact time stamp of acquisition (of the most recent item in the roll-up in the case of stacked items) in reverse chronological order. This ordering is actioned by the device. Newest recordings (and any recordings that are currently being acquired) are shown at the top of the list.

This area displays customer-initiated recordings in a carousel, so if the user moves upwards from the most recent recordings they can easily access older content to watch or delete as required.

Scheduled Recordings and Reminders

Scheduled recordings and reminders with the same title on the same channel (e.g. series recordings or multiple reminders) are rolled up within a stack.

Individual and series recordings and reminders are ordered by the exact time stamp of the future booking (of the most imminent future booking in the roll-up in the case of series recordings / reminders) in chronological order. This ordering is actioned by the device. The next recordings / reminders are shown at the top of the list, and this list carousels.

Recently Played

"Recently Played" is, for example, the last 20 OD content items (either individual or roll-ups) that the user selected within the core UI and/or 3rd party players.

The customer can then play back the OD content items from the beginning. It is recommended that CPs also offer customers the ability to be able to play the content from the point of last playback or from any prescribed position (e.g. 10 mins in). The Recently Played list persists, even if the device is put on standby or switched off. Items are able to be deleted from this list by the user. Adult content is excluded from this list. Recently played assets are listed in reverse chronological order by time of last playback.

When recently played assets have expired in the Recently Played area, they are shown but will not be playable. The Action Panel for these expired assets are shown to the user if available, so that users can access 'More Like This' (MLT) and 'More Episodes' (ME) recommendations.

Ordering of Channels in the Guide Section

This area allows the customer to see at least 7 days of future linear content by Channel, and 7 days of Catch-up by Channel in an EPG grid format. This area does not include Catch-Up older than 7 days, or future content >7 days in the future. The EPG channels are listed in the Digital television Multiplexing Operators Limited (DMOL) order for Freeview or Freesat devices.

Areas in the On Demand Section

In one example, the On Demand area is as shown in Figure 27, with "Players" 316 as the landing point. The ordering of items in the OD menu is fully configurable by the platform.

Music Videos

Hovering on this item displays to the user a number of highlighted Radio OD content selected from all of the Music Video OD content across the platform. This is a valuable

view of the most important content that CPs want to promote to their customers – beyond being "Most Popular", in a preferred example, this is content that has not yet gained popularity / warrants promotion.

Highlights are listed in a randomised order, to ensure that this area abides by Fair, Reasonable and Non-Discriminatory (FRND) guidelines.

In one example, when the user clicks on "Music Videos" 314 (Figure 27) the order of items in the Music Video OD menu is as follows with "Most Popular" 320 as the landing point as shown in Figure 28.

The views and genres in Figure 28 are described in detail below:

- All Videos: Unlike Film genre categories, Music Video categories may not be as familiar to users. As such, an "All Videos" menu item is included in this section. By default, this section is ordered by A to Z – the field(s) used for this alphabetical ordering may be by Artist Name or by song title.
- Latest Videos: This view shows the 50 Latest Music Videos ordered by Latest by default and on hover the user sees a selection of the very latest content i.e. based on original UK release date. It is valuable to have a "Latest" category for this content type, because generally Music Videos are not associated with a linear schedule, so fresh new videos cannot surface in this way. The user can toggle to show the content viewed by A to Z or by Popularity. This list carousels.
- Most Popular (landing point): This view shows, for example, the 50 Most Popular Music Videos ordered by Popularity by default and on hover the user sees a selection of the most popular content. The user can toggle to show the content viewed by A to Z or by Latest. This list carousels.

Beyond these views of content, there is also Music Video OD Genre Categories. All genre categories order content by Popularity by default. The user can toggle to show the content in sub-categories by A to Z or by Latest. All lists of content carousel, and because of the large volume of content in each category the double carousel is used within each genre category.

Film

Hovering on this item displays to the user a number of highlighted Film OD content selected from all Film OD content across the platform (including films that were originally broadcast). This is a view of the most important content that CPs want to promote to users.

Highlights are listed in a randomised order, to ensure that this area abides by FRND guidelines.

In one example, when the user clicks on "Film" the order of items in the Film OD menu is as shown in Figure 29, with "Most Popular" 322 as the landing point:

The views and genres are described in detail below: