identifying programs on channels that correspond to each subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are identified to be the selected subcategory;

wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

12. A system comprising:

a processor configured to be coupled to a display device, said processor,

configured to control the system to tune to a first channel in a multiple channel broadcasting system to provide a broadcast of a first program on the display device;

configured to control the system to generate an electronic program guide identifying channels and programming of channels in the broadcasting system;

configured to control the system to translate the display of the broadcast of the first program to a smaller broadcast window on the display device, said translation superimposing at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the display device; and

configured to control the system to display the electronic program guide along with the broadcast on the display device, such that no portion of the broadcast is covered by the electronic program guide.

13. The system as set forth in claim 12, wherein the processor is further configured to control the system to generate a display information packet containing a description of said first program.

14. The system as set forth in claim 12, wherein the processor is further configured to control the system to generate an electronic category guide containing a plurality of programming categories.

15. The system as set forth in claim 12, wherein the processor is further configured to:

control the system to display a first display information packet containing a description of said first program;

configured to control the system to display a system pointer;

configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

configured to control the system to replace the display of the first display information packet with a display of a second information packet containing a description of the second program.

16. The system as set forth in claim 15, wherein the processor is further configured to generate an on-screen guide in a second mode for a user to select channels to view said processor configured to:

control the system to display a first display information packet containing a description of said first program;

configured to control the system to display a system pointer;

configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

configured to control the system to tune said broadcasting system to said second program and displaying a second display information packet containing a description of said second program.

17. The system as set forth in claim 15, wherein the processor is further configured to:

control the system to display a first status indication on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

display a second status indication on said electronic program guide that indicates to said user a status of said system pointer.

18. The system as set forth in claim 12, wherein the processor is further configured to:

control the system to display an electronic category guide; and

configured to control the system to display a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

19. The system as set forth in claim 12, wherein said user selects one of a plurality of categories, the processor further configured to display electronic subcategory guide in response to the selection by:

displaying said selected category;

displaying a subcategory guide identifying a plurality of subcategories;

identifying programs on channels that correspond to each subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are identified to be the selected subcategory;

wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

20. A system for generating an on-screen guide, comprising:

an electronic program guide displaying on a display device, said electronic program guide configured to operate in a first mode to identify channels and programming in a multiple channel broadcasting system;

a broadcast of a first program displayed on the display device; and

a controller that translates the broadcast from a first size to a smaller second size when the electronic program guide is displayed by superimposing at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the screen.

21. The system as set forth in claim 20, further comprising a display information packet containing a description of the first program, the

display information packet displayed along with the electronic program guide.

22. The system as set forth in claim 21, wherein said display information packet is selectively replaced by an electronic category guide containing a plurality of programming categories.

23. The system as set forth in claim 20, further comprising:

a display information packet configured to contain a description of said first program;

a system pointer configured to be manipulated in response to input by said user to point to an area associated with a second program in said electronic program guide, said controller further configured to, in response to said manipulation of said pointer, keep said broadcasting system tuned to said first channel thereby allowing said user to view the contents of said area associated with said second program while viewing said broadcast of said first program on said screen.

24. The system as set forth in claim 23, further comprising an electronic category guide, comprising:

a plurality of categories;

an identification of programs on channels that correspond to each category of said plurality of categories;

a highlighting of said programs on said program guide that are identified to be the selected category.

25. The system as set forth in claim 23, further comprising a second mode in which said controller causes the system to tune to said second program and display said second display information packet when the system pointer is manipulated to point to the area associated with the second program.

26. The system as set forth in claim 23, further comprising:

a first status indication displayed on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

a second status indication displayed on said electronic program guide that indicates to said user a status of said system pointer.

27. A computer readable medium containing executable instructions which, when executed in a processing system, causes the system to perform the steps for generating an on-screen guide for a user to select channels in a multiple channel broadcasting system comprising:

tuning to a channel to provide a display of a broadcast of a first program on a display;

generating an electronic program guide identifying channels and programming in the broadcasting system;

translating the display of the broadcast of the first program to a smaller broadcast window on the screen, said step of translating comprising the steps of superimposing at least one of a series of successively smaller broadcast window outlines over the display of the broadcast on the screen and displaying the broadcast in the smaller broadcast window; and

displaying the electronic program guide along with the broadcast on the screen, such that no portion of the broadcast is covered by the electronic program guide.

28. The computer readable medium as set forth in claim 27, further comprising instructions, which when executed, performing the steps of: displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

replacing the display of the first display information packet with a display of a second display information packet containing a description of the second program.

29. The computer readable medium as set forth in claim 28, said instructions, when executed, further performing the steps of:

indicating selection of a channel pointed by the pointer;

tuning said broadcast system to said channel if said channel is different from said first channel; and

removing the electronic program guide and display information packet in response to selection of a channel.

30. The computer readable medium as set forth in claim 29, further comprising instructions for generating an on–screen guide in a second mode for a user to select channels to view, said instructions, when executed, performing the steps of:

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

tuning said broadcasting system to said second program and displaying the second display information packet containing a description of said second program.

31. The computer readable medium as set forth in claim 27, said further comprising instruction, which when executed, performing the steps of:

displaying an electronic category guide; and

displaying a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

32. The computer readable medium as set forth in claim 31, wherein the instructions for displaying the electronic category guide, when executed, perform the steps of:

displaying a category guide identifying a plurality of categories;

identifying programs on channels that correspond to each category of said plurality of categories;

highlighting those programs on said program guide that are identified to be the selected category;

wherein all programming can be viewed and the selected category of programs is highlighted for easy viewing by the user.

33. The computer readable medium as set forth in claim 32, further comprising instructions, which when executed, and in response to user selection of one of the plurality of categories, performs the steps of:

displaying said selected category;

displaying a subcategory guide identifying a plurality of subcategories;

identifying programs on channels that correspond to each subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are identified to be the selected subcategory;

wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

34. The computer readable medium as set forth in claim 27, further comprising instructions, which when executed, perform the steps of:

supplying a system pointer which points to a location in said electronic program guide, said location identifying a channel program in the broadcasting system; and

providing an indication to said user as to the status of the broadcasting system tuner and said system pointer comprising the steps of;

displaying said channel program on said electronic program guide as appearing to be depressed into said screen when said broadcasting system is tuned to said channel program,

displaying said channel program on said electronic program guide as appearing to be protruding from said screen when said broadcasting system is not tuned to said channel program,

displaying said channel program as highlighted when said pointer is pointing to said channel program, and

displaying said channel program as unhighlighted when said pointer is not pointing to said channel program.

35. In a multiple channel broadcasting system which displays a first window containing a broadcast of a program and a second window containing programming information, a method for removing the programming information from a display, comprising the steps of:

translating the broadcast of a program displayed in the first window to a larger window on the display by superimposing at least one of a series of successively larger video window outlines over the screen;

removing the display of said programming information from said display;

displaying said video of a broadcast in the area of the largest video window outline.

36. A system comprising:

a processor configured to be coupled to a display device, said processor,

configured to control the system to tune to a channel in a multiple channel broadcasting system to provide a broadcast of a program on said display device in a first window on the display;

configured to control the system to generate programming information identifying channels in the broadcasting system;

configured to control the system to translate video of the broadcast of a program to a smaller broadcast window on the display device, said translation superimposing at least one of a series of successively smaller broadcast window outlines over the broadcast on the display device;

configured to control the system to display the programming information along with the translated broadcast on the display device.

37. The system as set forth in claim 29, wherein the programming information is removed from the display device, said processor,

configured to control the system to translate video of a broadcast of a program displayed in the smaller broadcast window to a larger broadcast window on the display device by superimposing at least one of a series of successively larger broadcast window outlines over the display device;

configured to control the system to remove the display of the programming information from said display device;

configured to control the system to display the video of the broadcast in the area of the largest broadcast window outline.

38. In a multiple channel broadcasting system in which programs are broadcasted for display on a screen, a method for generating an on-screen guide in a first mode for a user to select channels to view, comprising the steps of:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying a first display information packet containing a description of said first program;

displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

replacing the display of the first display information packet with a display of a second display information packet containing a description of the second program.

39. The method as set forth in claim 38, further comprising the steps of:

indicating selection of a channel pointed by the pointer;

tuning said broadcast system to said channel if said channel is different from said first channel; and

removing the electronic program guide and display information packet in response to selection of a channel.

40. The method as set forth in claim 38, further comprising a method for generating an on-screen guide in a second mode for a user to select channels to view, comprising the steps of:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying a first display information packet containing a description of said first program;

displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

tuning said broadcasting system to said second program and displaying a second display information packet containing a description of said second program.

41. The method as set forth in claim 38, further comprising the steps of:

displaying a status indication on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

displaying a status indication on said electronic program guide that indicates to said user a status of said system pointer.

42. The method as set forth in claim 41, wherein said step of displaying said status indication of said broadcasting system tuner comprises the steps of:

displaying said channel program on said electronic program guide as appearing to be depressed into said screen when said broadcasting system is tuned to said channel program;

displaying said channel program on said electronic program guide as appearing to be protruding from said screen when said broadcasting system is not tuned to said channel program.

43. The method as set forth in claim 41, wherein said step of displaying said status indication of said system pointer comprises the steps of:

displaying said channel program on said electronic program guide as highlighted when said pointer is pointing to said channel program;

displaying said channel program on said electronic program guide as unhighlighted when said pointer is not pointing to said channel program.

44. In a multiple channel broadcasting system in which programs are broadcasted for display on a screen, a method for generating an on-screen guide for a user to select channels to view, comprising the steps of:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying an electronic category guide; and

displaying a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

45. The method as set forth in claim 44, wherein said step of displaying said electronic category guide comprises the steps of:

displaying a category guide identifying a plurality of categories;

identifying programs on channels that correspond to each category of said plurality of categories;

highlighting those programs on said program guide that are identified to be the selected category;

wherein all programming can be viewed and the selected category of programs is highlighted for easy viewing by the user.

46. The method as set forth in claim 44, further comprising the steps of:

displaying a status indication of said electronic program guide that indicates to said user a status of said broadcasting system tuner;

displaying a status indication on said electronic program guide that indicates to said user a status of said system pointer, displaying a status indication on said electronic category guide that indicates to said user a status of said system pointer, said status indication causing one of a plurality of categories on said electronic category guide to be displayed as highlighted when said pointer is pointing to said category.

47. The method as set forth in claim 44, further comprising the steps of displaying an electronic subcategory guide in response to user selection of one of said plurality of categories, comprising the steps of:

displaying said selected category;

displaying a subcategory guide identifying a plurality of subcategories;

identifying programs on channels that correspond to each subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are identified to be the selected subcategory;

wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

48. A computer system comprising:

a processor configured to be coupled to a display device, said processor,

configured to control the system to tune to a first channel to provide a broadcast of a first program on the screen;

configured to control the system to display an electronic program guide identifying a plurality of channels and programming on the channels;

configured to control the system to display a first display information packet containing a description of said first program;

configured to control the system to display a system pointer;

configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

configured to control the system to replace the display of the first display information packet with a display of a second information packet containing a description of the second program.

49. The computer system as set forth in claim 48, wherein said processor generates an on-screen guide in a second mode for a user to select channels to view, said processor:

configured to control the system to tune to a first channel to provide a broadcast of a first program on the screen;

configured to control the system to display an electronic program guide identifying a plurality of channels and programming on the channels;

configured to control the system to display a first display information packet containing a description of said first program;

configured to control the system to display a system pointer;

configured to control the system to manipulate said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

configured to control the system to tune said broadcasting system to said second program and displaying a second display information packet containing a description of said second program.

50. A computer system comprising:

a display device;

a processor coupled to said display device, said processor,

configured to control the system to tune to a first channel to provide a broadcast of a first program on the screen;

configured to control the system to display an electronic program guide identifying a plurality of channels and programming on the channels;

configured to control the system to display an electronic category guide; and

configured to control the system to display a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

51. The computer system as set forth in claim 50, wherein said display of said electronic subcategory guide comprises:

displaying said selected category;

displaying a subcategory guide identifying a plurality of subcategories;

identifying programs on channels that correspond to each subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are identified to be the selected subcategory;

wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

52. A system for generating an on-screen guide in a first mode for a user to select channels to view, comprising:

a multiple channel broadcasting system configured to be tuned to a first channel to provide a broadcast of a first program on a screen;

an electronic program guide configured to operate in a first mode to identify a plurality of channels and programming on the channels in the broadcasting system;

a display information packet configured to contain a description of said first program;

a system pointer configured to be manipulated in response to input by said user to point to an area associated with a second program in said electronic program guide; and

a controller configured to, in response to said manipulation of said pointer, keep said broadcasting system tuned to said first channel thereby allowing said user to view the contents of said area associated with said second program while viewing said broadcast of said first program on said screen.

53. The system as set forth in claim 52, further comprising the first status indication indicates the status of said broadcasting system tuner by:

displaying said channel program on said electronic program guide as appearing to be depressed into said screen when said broadcasting system is tuned to said channel program;

displaying said channel program on said electronic program guide as appearing to be protruding from said screen when said broadcasting system is not tuned to said channel program; and

a first status indication displayed on said electronic program guide that indicates to said user a status of said broadcasting system tuner;

a second status indication displayed on said electronic program guide that indicates to said user a status of said system pointer, the second status indication indicates the status of said system pointer by:

displaying said channel program on said electronic program guide as highlighted when said pointer is pointing to said channel program;

displaying said channel program on said electronic program guide as unhighlighted when said pointer is not pointing to said channel program.

54. A computer readable medium containing executable instructions which, when executed in a processing system, causes the system to perform the steps for generating an on-screen guide in a first mode for a user to select channels to view in a multiple channel broadcasting system comprising:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying a first display information packet containing a description of said first program;

displaying a system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with a second program; and

replacing the display of the first display information packet with a display of a second display information packet containing a description of the second program.

55. The computer readable medium as set forth in claim 54, wherein generating an on-screen guide in a second mode for a user to select channels to view comprises the steps of:

tuning to the first channel to provide the broadcast of a first program on the screen;

displaying the electronic program guide identifying a plurality of channels and programming on the channels;

displaying the first display information packet containing the description of said first program;

displaying the system pointer;

manipulating said system pointer in response to input by said user to an area of the electronic program guide associated with the second program; and

tuning said broadcasting system to said second program and displaying the second display information packet containing a description of said second program.

56. A computer readable medium containing executable instructions which, when executed in a processing system, causes the system to perform the steps for generating an on-screen guide in a first mode for a user to select channels to view in a multiple channel broadcasting system comprising:

tuning to a first channel to provide a broadcast of a first program on the screen;

displaying an electronic program guide identifying a plurality of channels and programming on the channels;

displaying an electronic category guide; and

displaying a system pointer that can be manipulated in response to input by said user to an area of the electronic category guide.

57. The computer readable medium as set forth in claim 56, wherein said instruction to display said electronic subcategory guide comprises:

displaying said selected category;

displaying a subcategory guide identifying a plurality of subcategories;

identifying programs on channels that correspond to each subcategory of said plurality of subcategories;

highlighting those programs on said program guide that are identified to be the selected subcategory;

wherein all programming can be viewed and the selected subcategory of programs is highlighted for easy viewing by the user.

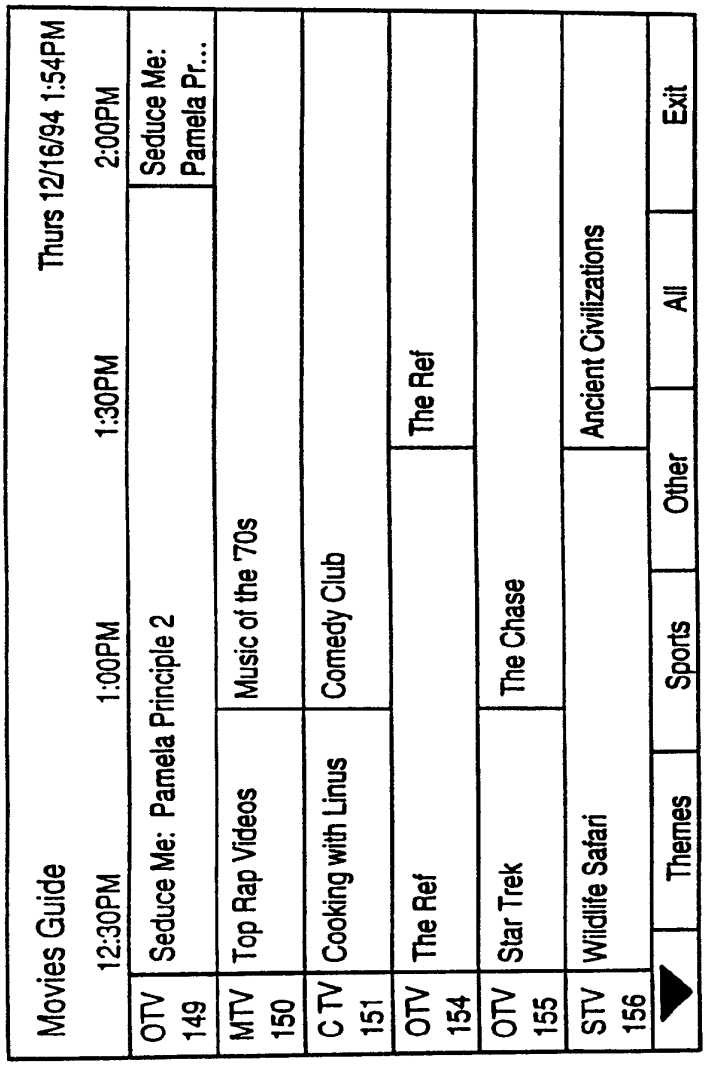


FIG. 1
PRIOR ART

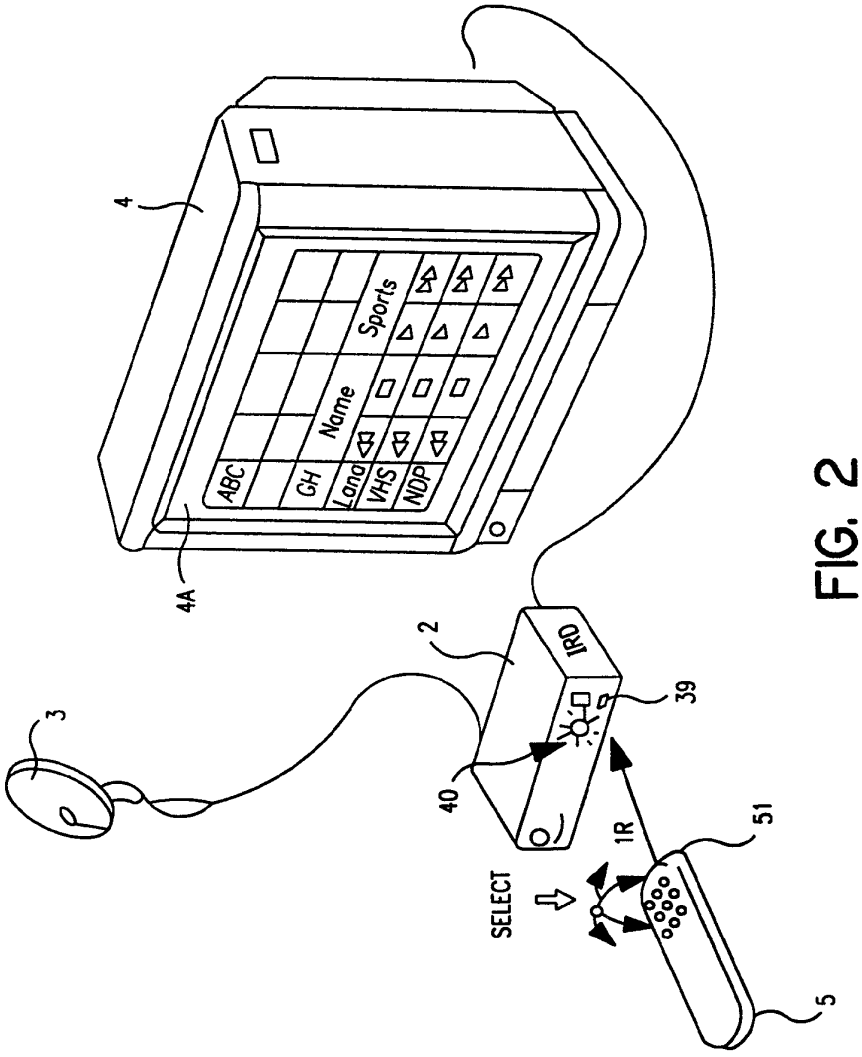


FIG. 2

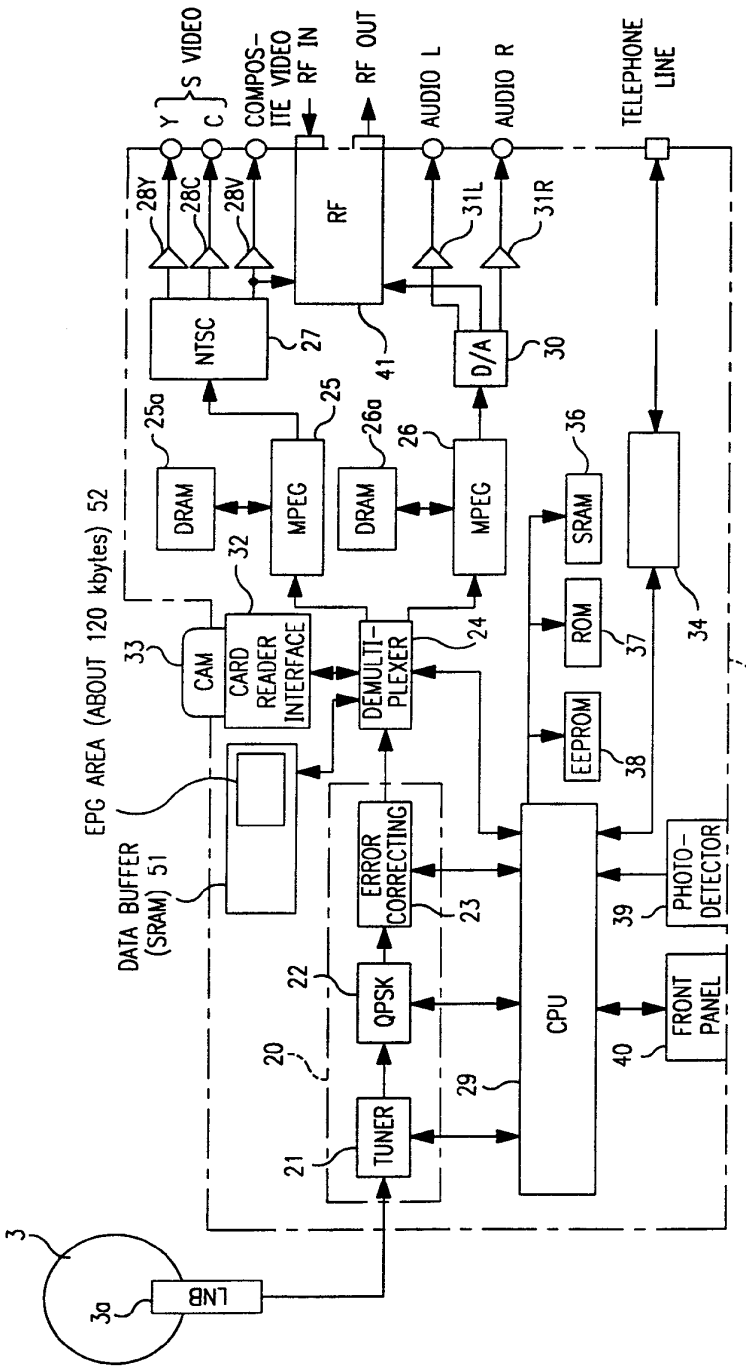

S VIDEO
Y
C
COMPOS-ITE VIDEO
RF IN
RF OUT
AUDIO L
AUDIO R
TELEPHONE LINE
28Y
28C
28V
RF
31L
31R
NTSC
27
41
D/A
30
25a
25
26a
26
36
DRAM
MPEG
DRAM
MPEG
SRAM
32
ROM
37
34
33
CAM
CARD READER INTERFACE
DEMULTI-PLEXER
24
EEPROM
38
2
EPG AREA (ABOUT 120 kbytes) 52
DATA BUFFER (SRAM) 51
ERROR CORRECTING
23
PHOTO-DETECTOR
39
22
QPSK
CPU
FRONT PANEL
40
20
29
TUNER
21
3
LNB
3a

FIG. 3

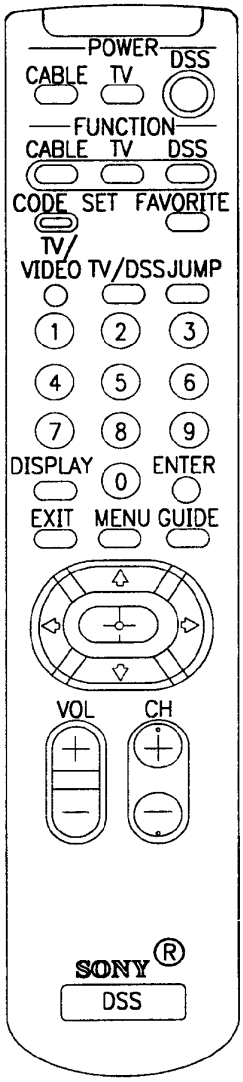

POWER
CABLE
TV
DSS
FUNCTION
CABLE
TV
DSS
CODE SET
FAVORITE
TV/
VIDEO
TV/DSS
JUMP
1
2
3
4
5
6
7
8
9
DISPLAY
0
ENTER
EXIT
MENU
GUIDE
VOL
CH
SONY
DSS

FIG. 4

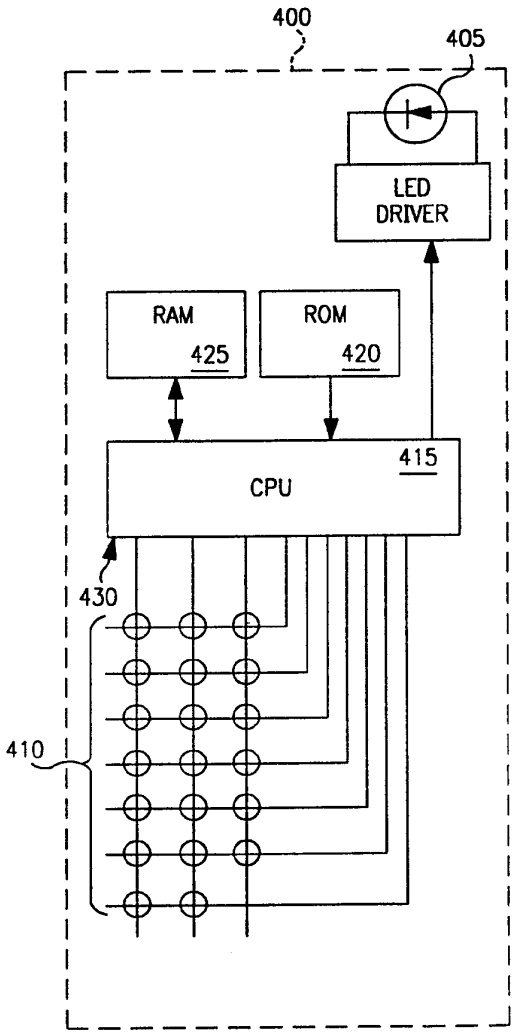


FIG. 5

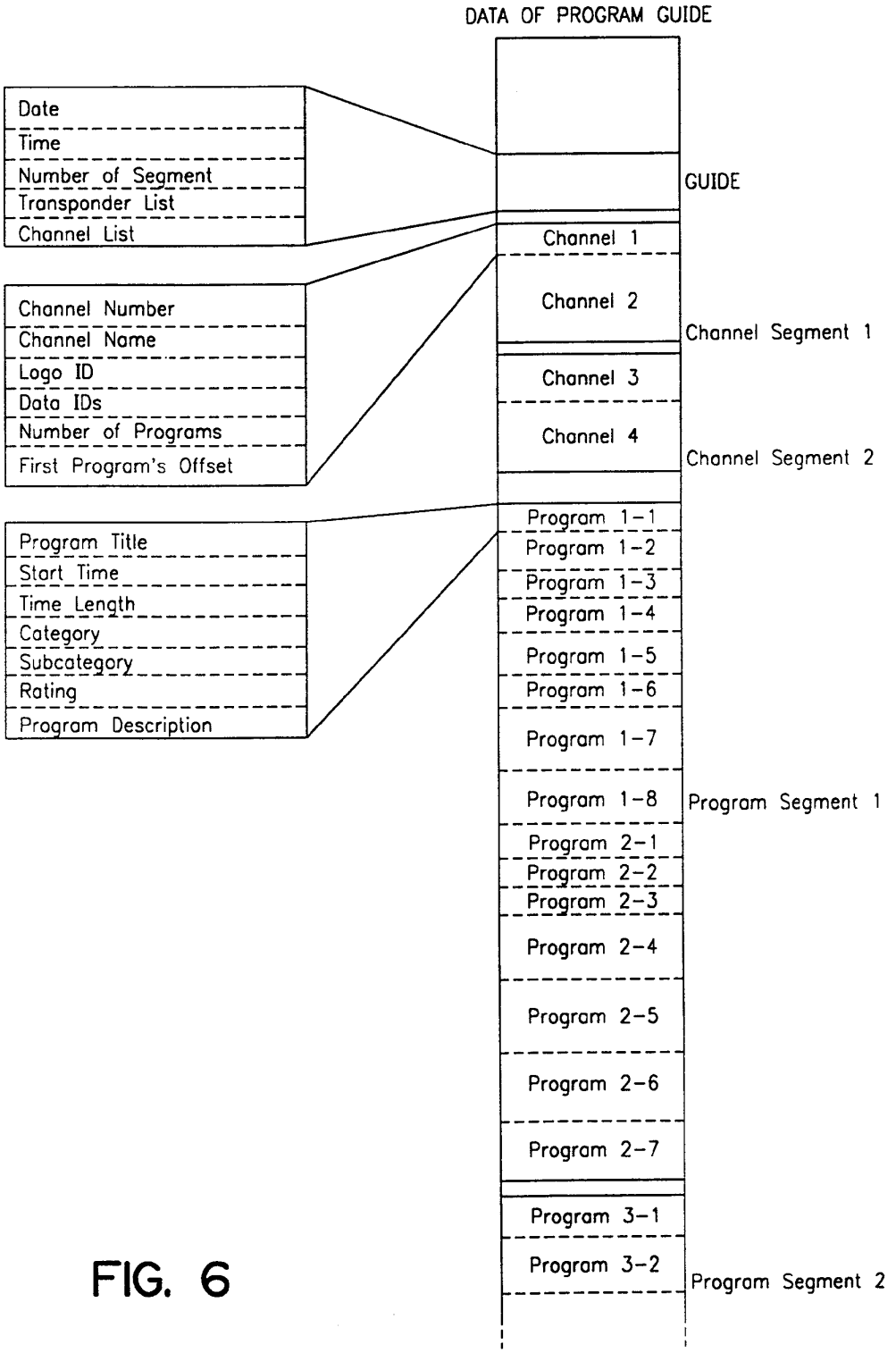

DATA OF PROGRAM GUIDE
Date
Time
Number of Segment
Transponder List
Channel List
GUIDE
Channel Number
Channel Name
Logo ID
Data IDs
Number of Programs
First Program's Offset
Channel 1
Channel 2
Channel Segment 1
Channel 3
Channel 4
Channel Segment 2
Program Title
Start Time
Time Length
Category
Subcategory
Rating
Program Description
Program 1-1
Program 1-2
Program 1-3
Program 1-4
Program 1-5
Program 1-6
Program 1-7
Program 1-8
Program Segment 1
Program 2-1
Program 2-2
Program 2-3
Program 2-4
Program 2-5
Program 2-6
Program 2-7
Program 3-1
Program 3-2
Program Segment 2

FIG. 6

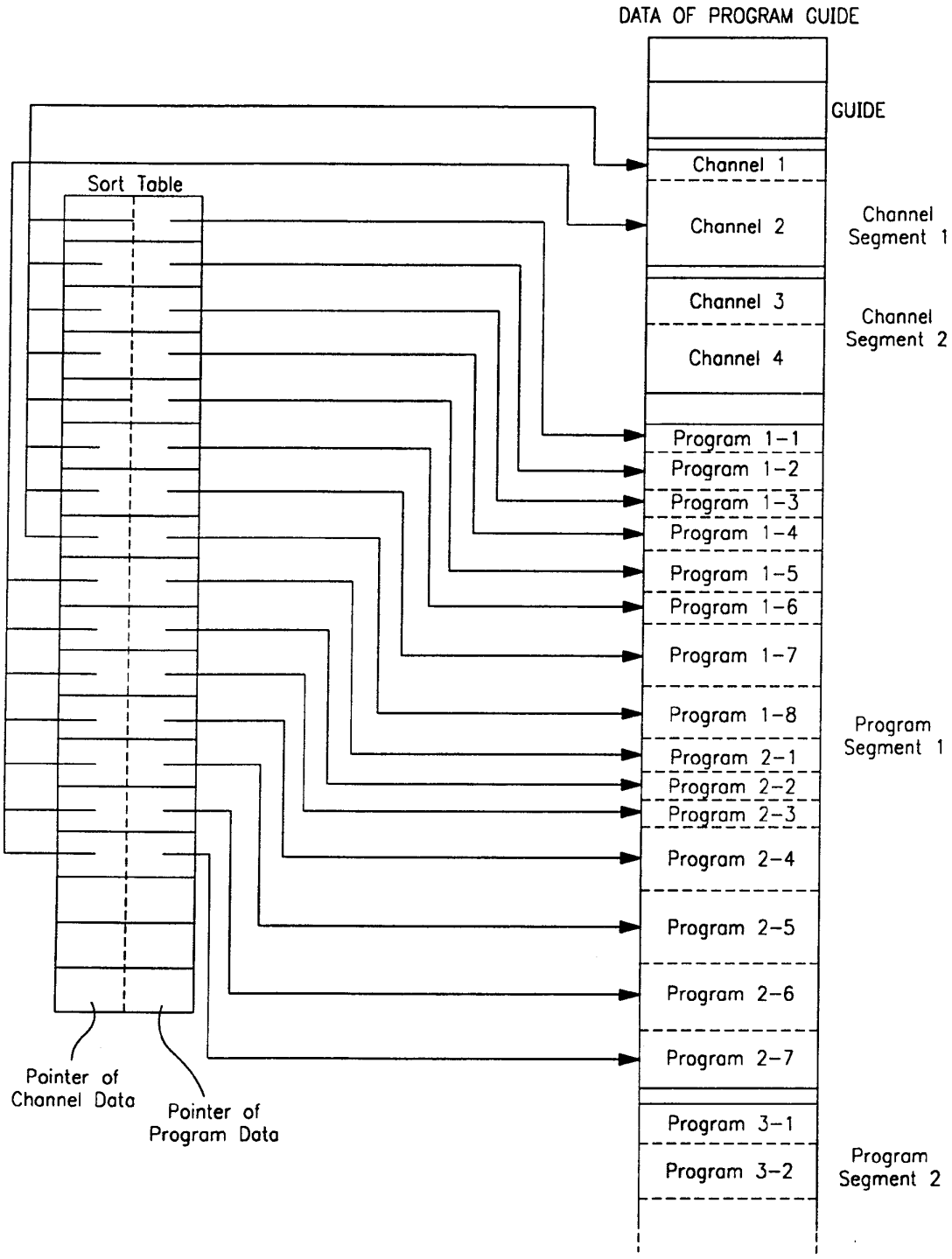

DATA OF PROGRAM GUIDE
GUIDE
Channel 1
Channel 2
Channel 3
Channel 4
Program 1-1
Program 1-2
Program 1-3
Program 1-4
Program 1-5
Program 1-6
Program 1-7
Program 1-8
Program 2-1
Program 2-2
Program 2-3
Program 2-4
Program 2-5
Program 2-6
Program 2-7
Program 3-1
Program 3-2
Channel Segment 1
Channel Segment 2
Program Segment 1
Program Segment 2
Sort Table
Pointer of Channel Data
Pointer of Program Data

FIG. 7

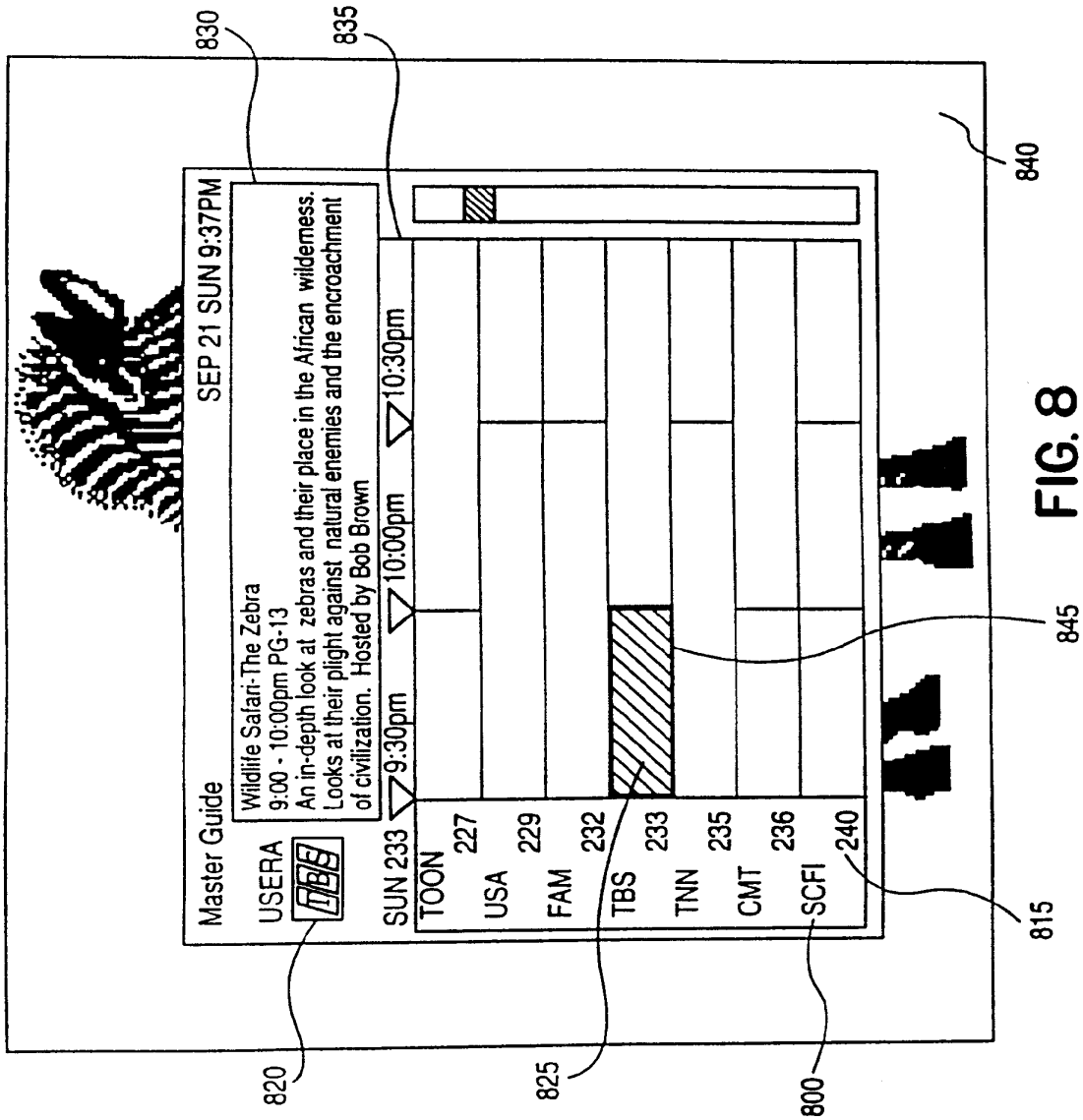

830
835
840
SEP 21 SUN 9:37PM
Master Guide
Wildlife Safari-The Zebra
9:00 - 10:00pm PG-13
An in-depth look at zebras and their place in the African wilderness.
Looks at their plight against natural enemies and the encroachment
of civilization. Hosted by Bob Brown
USERA
SUN 233
9:30pm
10:00pm
10:30pm
TOON 227
USA 229
FAM 232
TBS 233
TNN 235
CMT 236
SCFI 240
845
815
820
825
800

FIG. 8

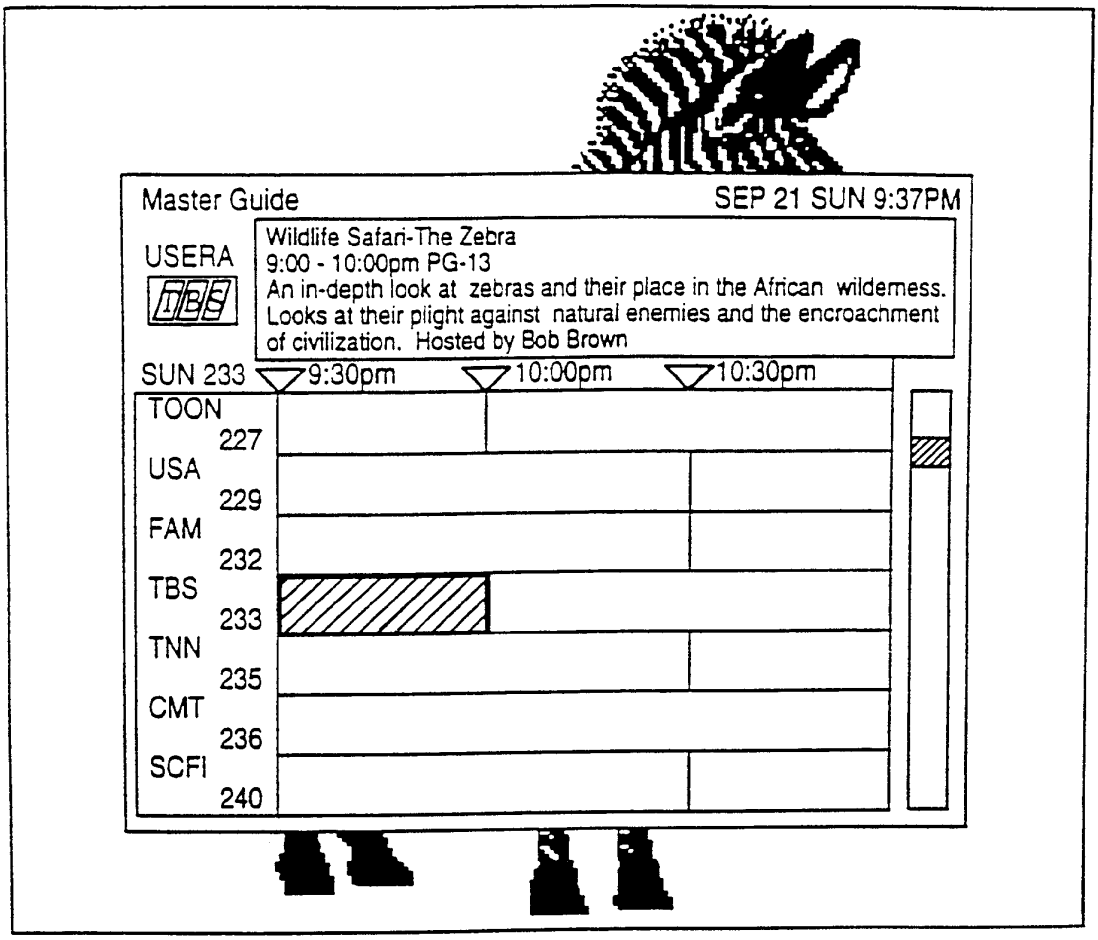


FIG. 9A

EX. 1002
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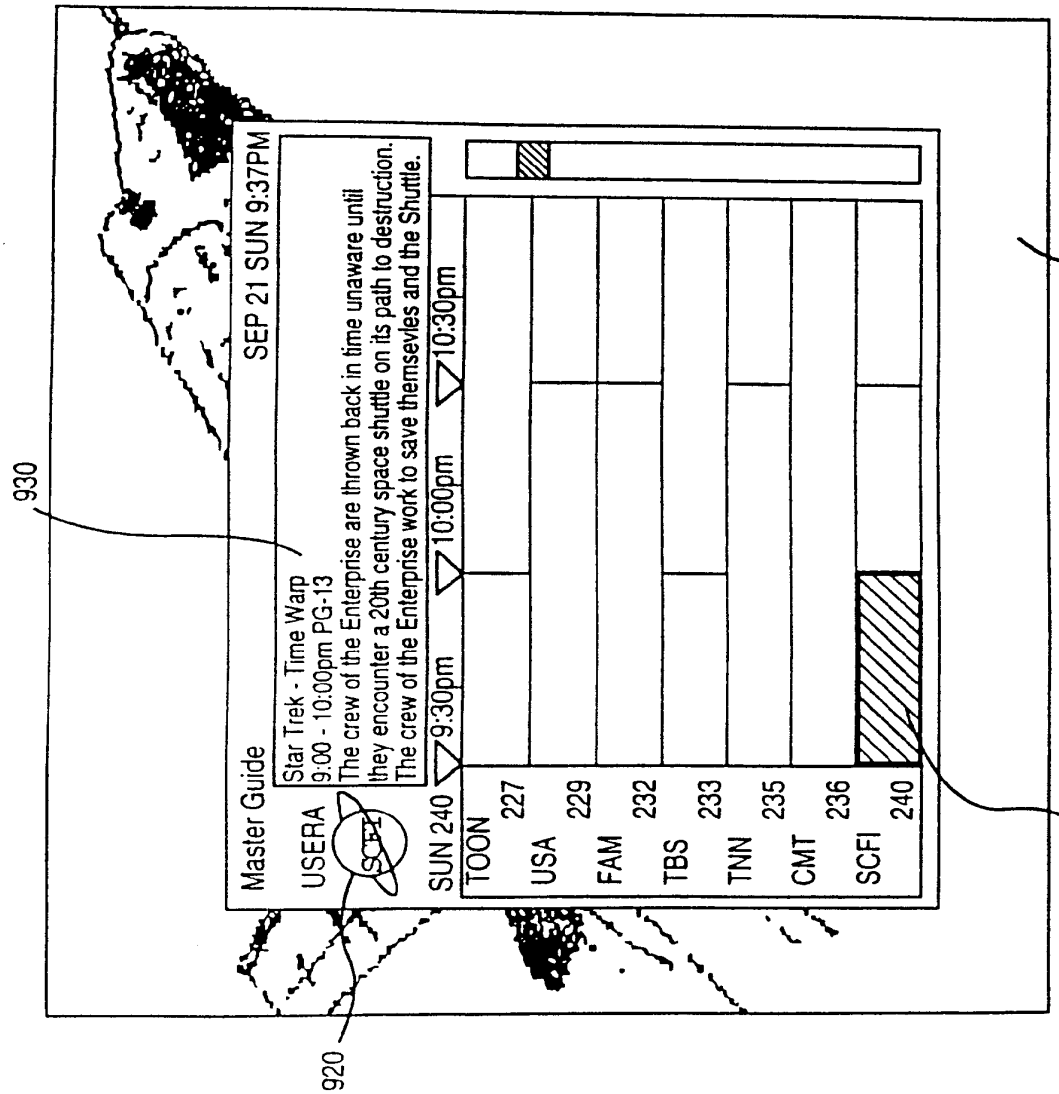

930
965
960
920
Master Guide
SEP 21 SUN 9:37PM
USERA
SCFI
Star Trek - Time Warp
9:00 - 10:00pm PG-13
The crew of the Enterprise are thrown back in time unaware until they encounter a 20th century space shuttle on its path to destruction. The crew of the Enterprise work to save themselves and the Shuttle.
SUN 240
9:30pm
10:00pm
10:30pm
TOON 227
USA 229
FAM 232
TBS 233
TNN 235
CMT 236
SCFI 240

FIG. 9B

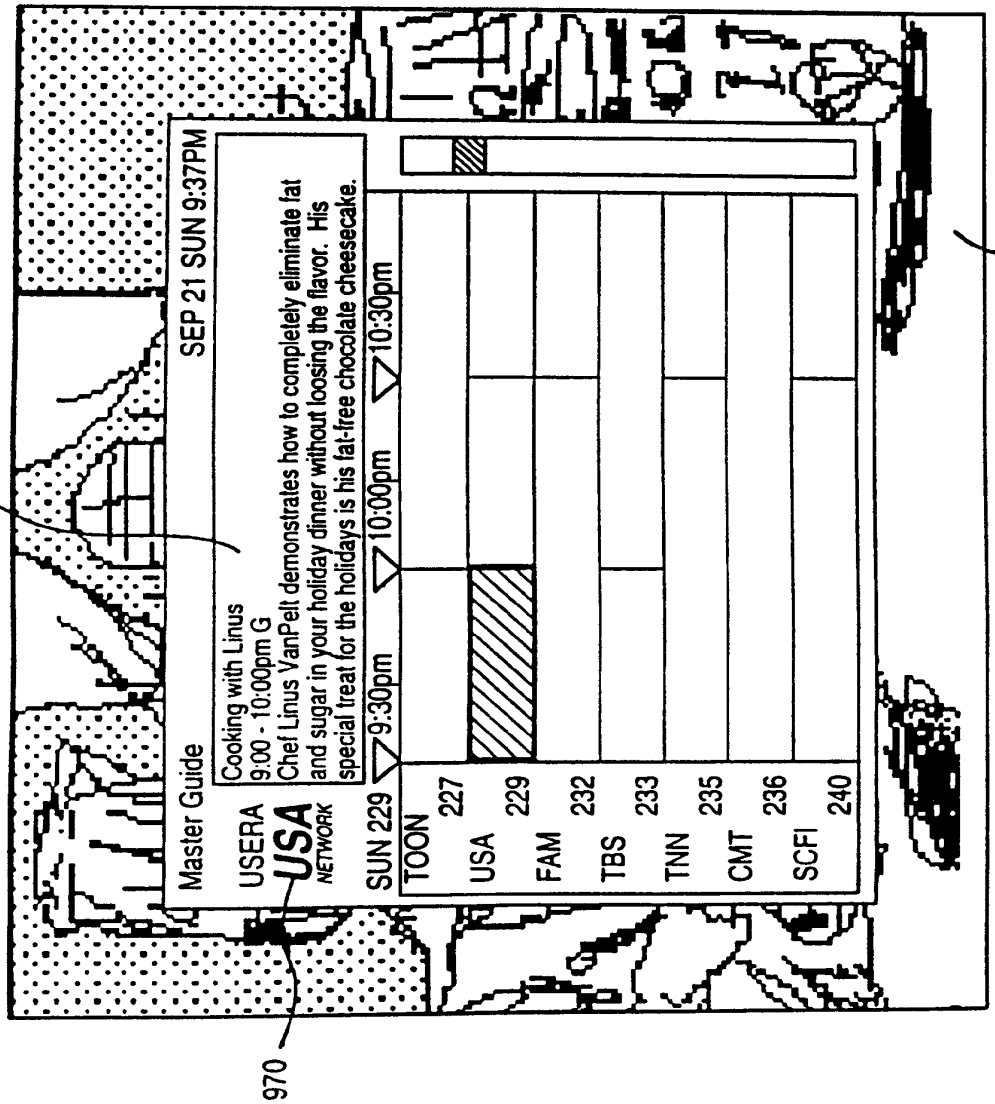

975
970
980
Master Guide
SEP 21 SUN 9:37PM
USERA
USA NETWORK
Cooking with Linus
9:00 - 10:00pm G
Chef Linus VanPelt demonstrates how to completely eliminate fat and sugar in your holiday dinner without loosing the flavor. His special treat for the holidays is his fat-free chocolate cheesecake.
9:30pm
10:00pm
10:30pm
SUN 229
TOON 227
USA 229
FAM 232
TBS 233
TNN 235
CMT 236
SCFI 240

FIG. 9C

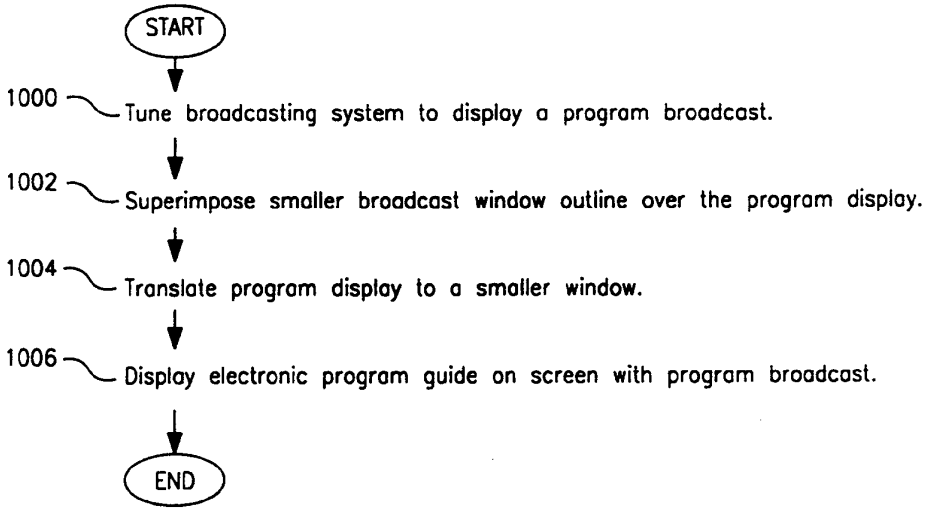

START
1000
Tune broadcasting system to display a program broadcast.
1002
Superimpose smaller broadcast window outline over the program display.
1004
Translate program display to a smaller window.
1006
Display electronic program guide on screen with program broadcast.
END

FIG. 10



FIG. 11

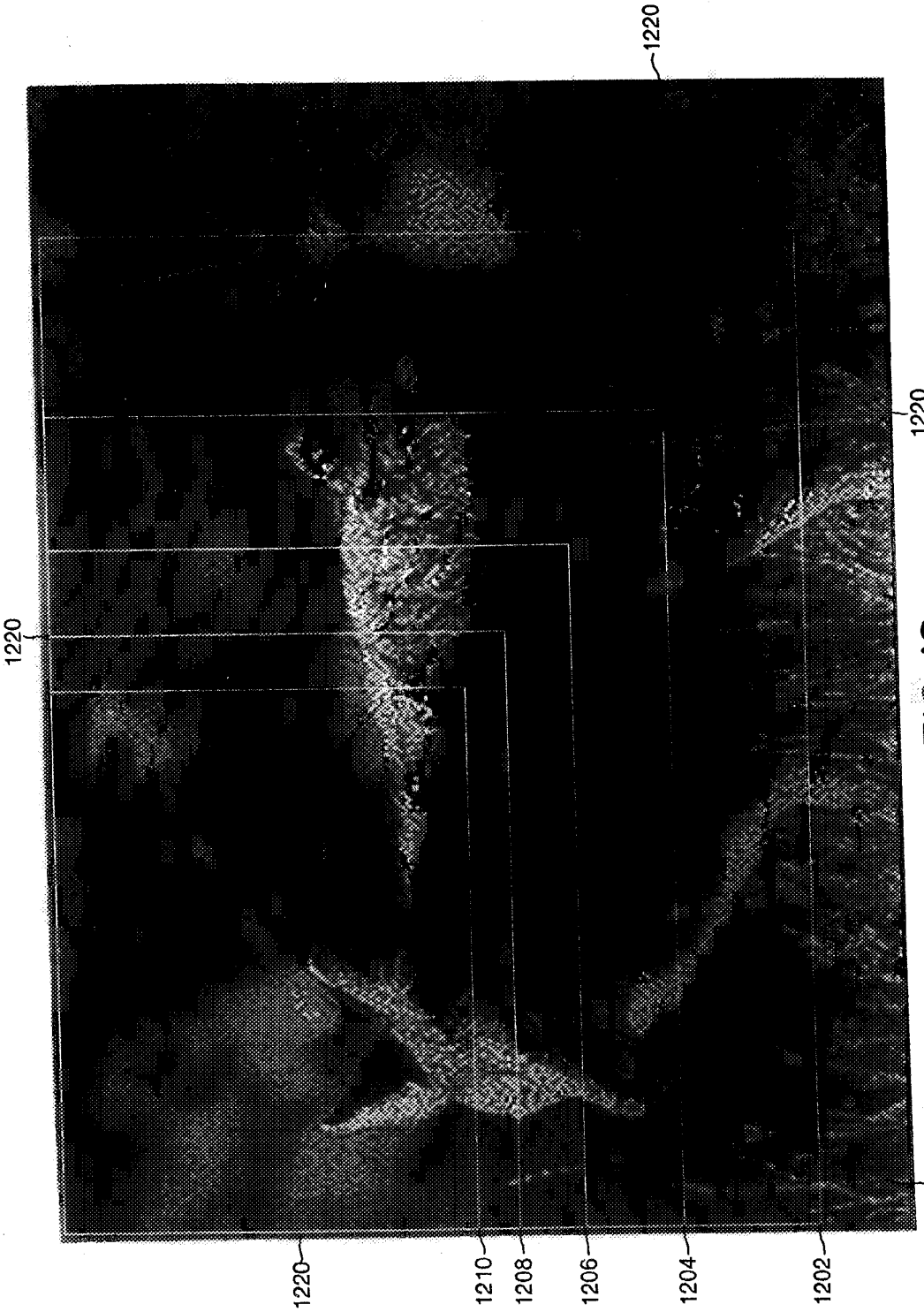


FIG. 12

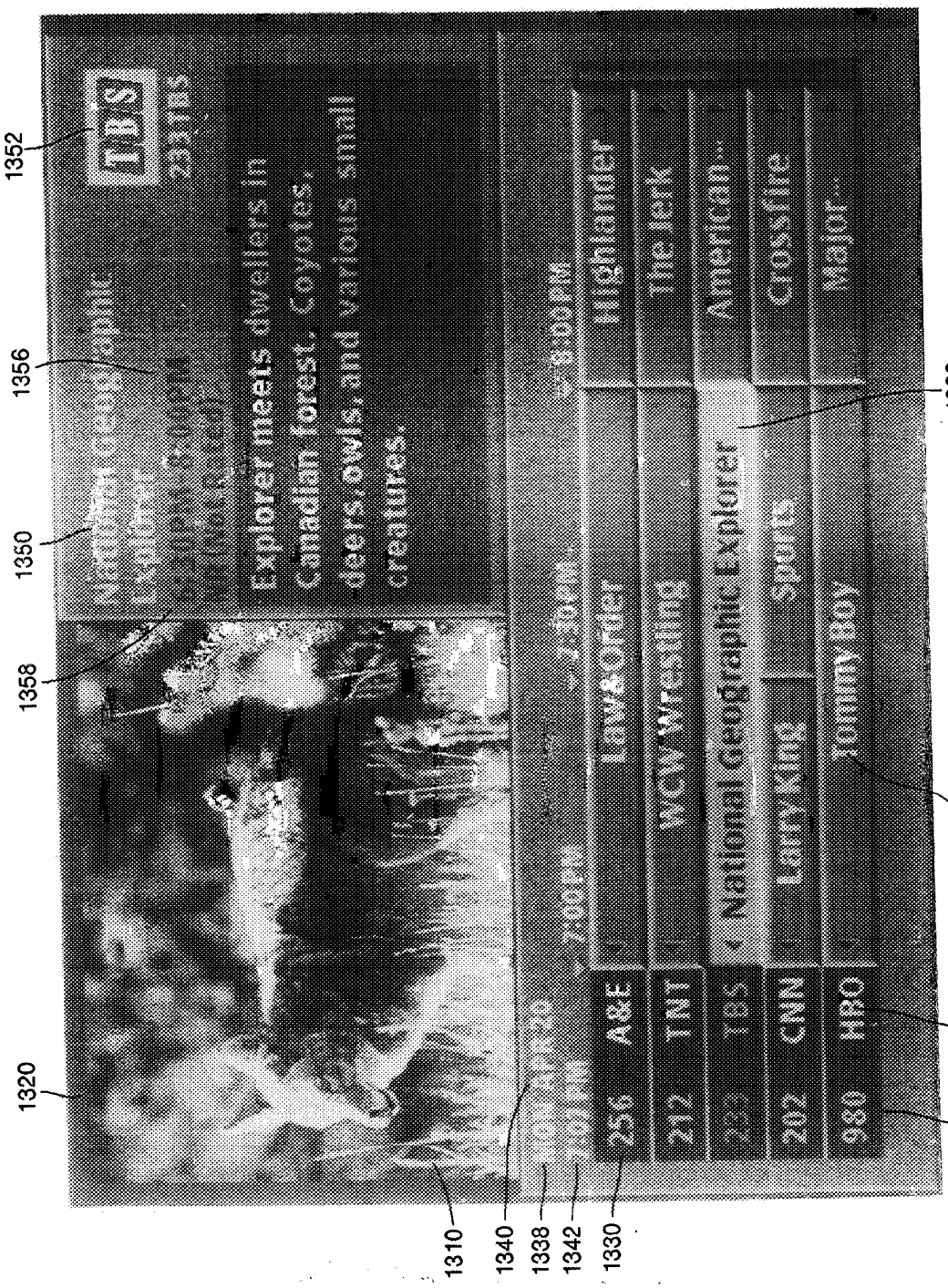

1352
1356
1350
1358
1320
1310
1340
1338
1342
1330
1380
1334
1332
1301
TBS
Explorer meets dwellers in Canadian forest. Coyotes, deers, owls and various small creatures.
Highlander
The Jerk
National Geographic Explorer
Crossfire
Major...
Tommy Boy
A&E
TNT
TBS
CNN
HBO
256
212
203
202
930

FIG. 13

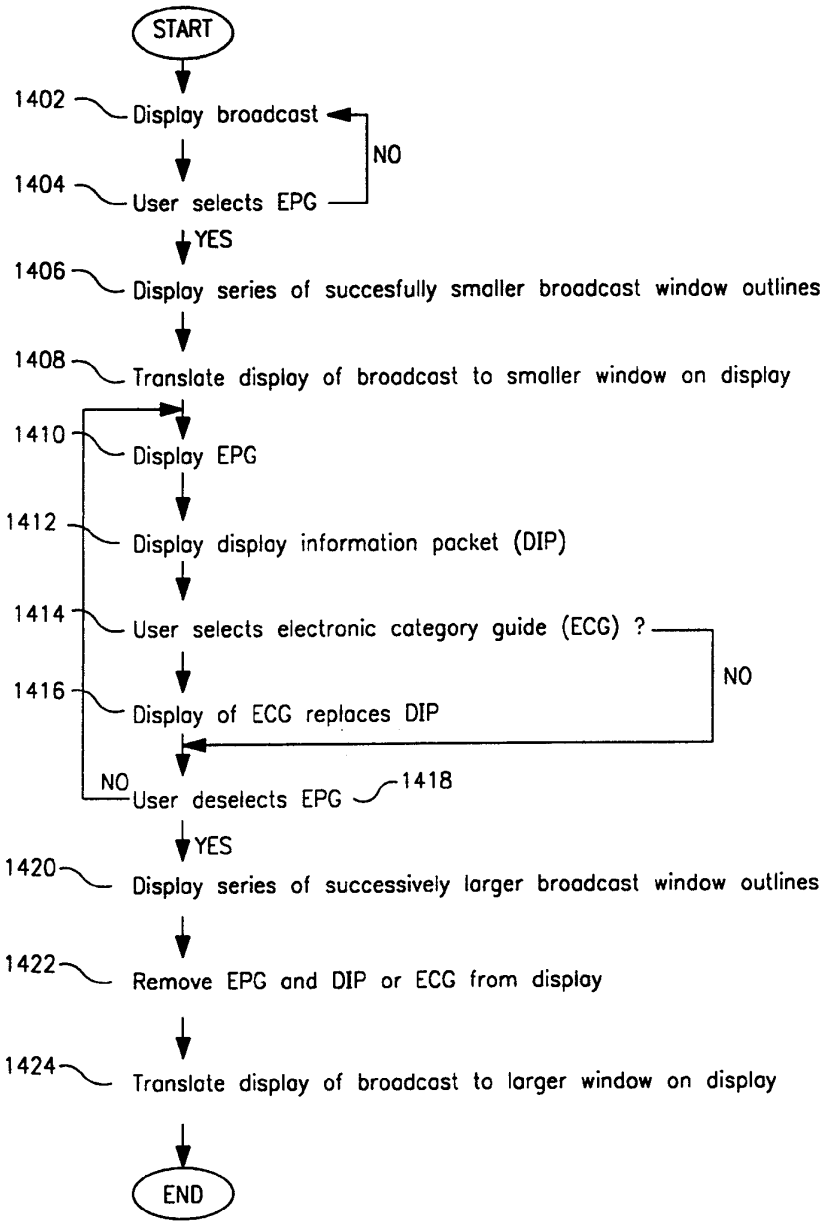

START
1402
Display broadcast
NO
1404
User selects EPG
YES
1406
Display series of succesfully smaller broadcast window outlines
1408
Translate display of broadcast to smaller window on display
1410
Display EPG
1412
Display display information packet (DIP)
1414
User selects electronic category guide (ECG) ?
NO
1416
Display of ECG replaces DIP
NO
User deselects EPG
1418
YES
1420
Display series of successively larger broadcast window outlines
1422
Remove EPG and DIP or ECG from display
1424
Translate display of broadcast to larger window on display
END

FIG. 14

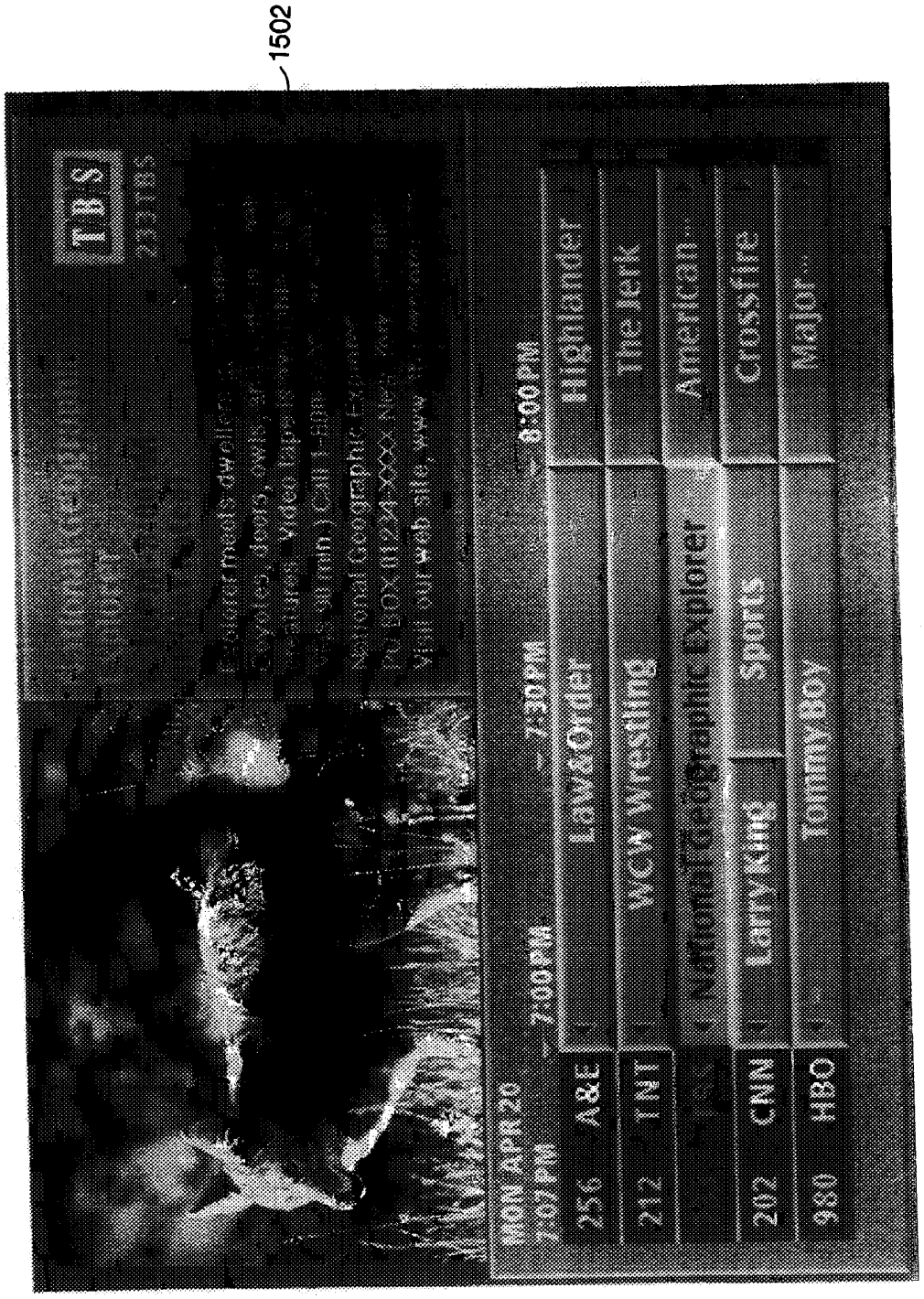

1502
TBS
MON APR 20
7:07 PM
7:00PM
7:30PM
8:00PM
Highlander
The Jerk
American...
Crossfire
Major...
Law&Order
WCW Wrestling
National Geographic Explorer
Sports
Tommy Boy
Larry King
A&E
TNT
CNN
HBO
256
212
202
980

FIG. 15

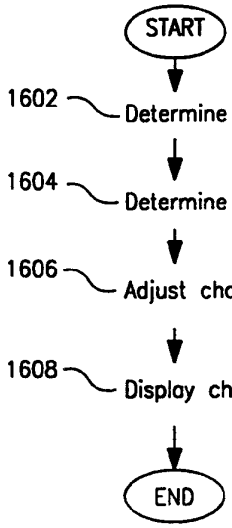

START
1602
Determine number of characters to be displayed.
1604
Determine number of display pixels available for character display.
1606
Adjust character font size to display characters in available pixels.
1608
Display characters.
END

FIG. 16

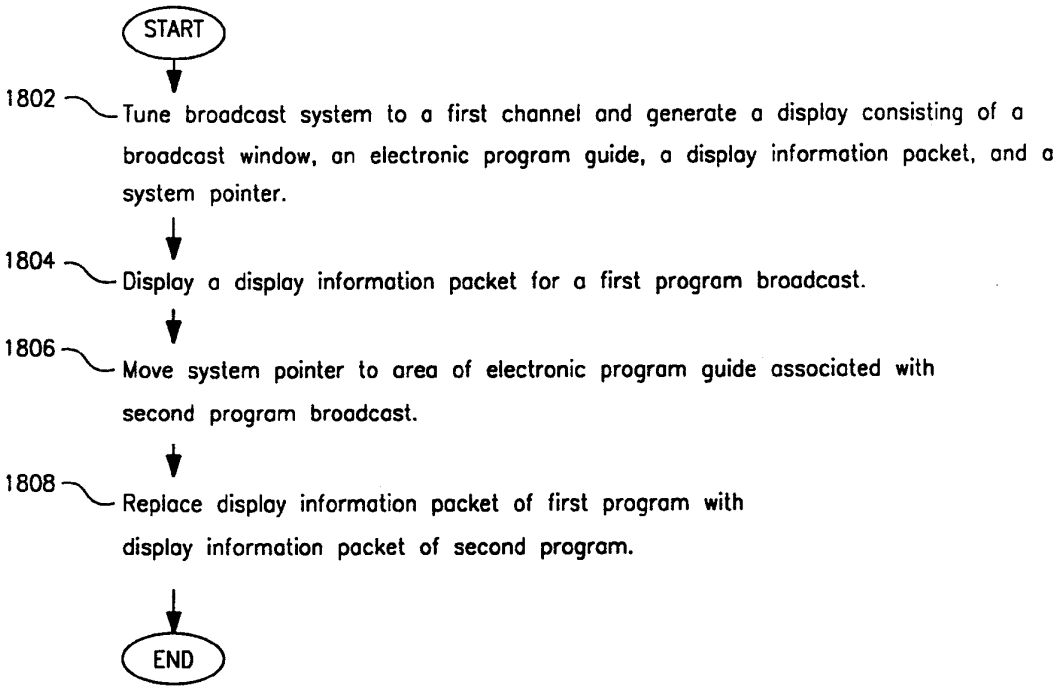

START
1802
Tune broadcast system to a first channel and generate a display consisting of a broadcast window, an electronic program guide, a display information packet, and a system pointer.
1804
Display a display information packet for a first program broadcast.
1806
Move system pointer to area of electronic program guide associated with second program broadcast.
1808
Replace display information packet of first program with display information packet of second program.
END

FIG. 18

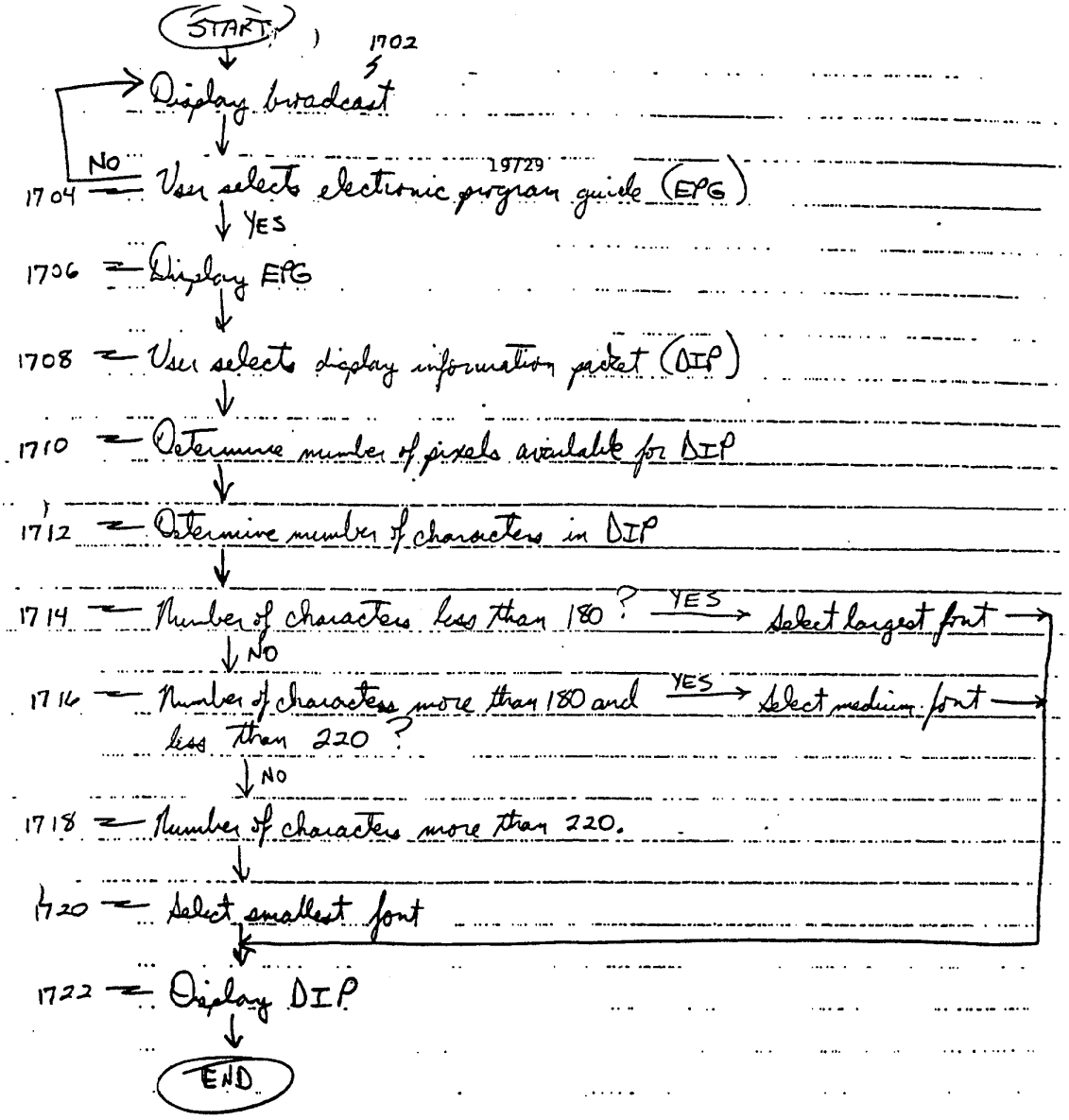

START
1702
Display broadcast
NO
19729
1704 User selects electronic program guide (EPG)
YES
1706 Display EPG
1708 User selects display information packet (DIP)
1710 Determine number of pixels available for DIP
1712 Determine number of characters in DIP
1714 Number of characters less than 180?
YES
Select largest font
NO
1716 Number of characters more than 180 and less than 220?
YES
Select medium font
NO
1718 Number of characters more than 220.
1720 Select smallest font
1722 Display DIP
END

FIGURE 17

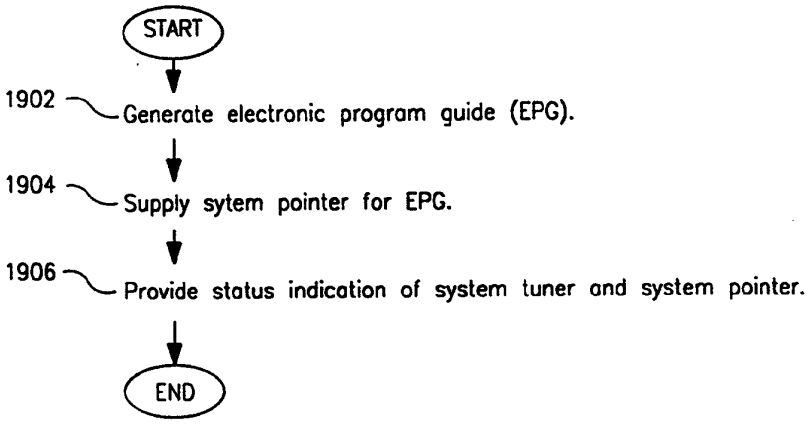

START
1902
Generate electronic program guide (EPG).
1904
Supply sytem pointer for EPG.
1906
Provide status indication of system tuner and system pointer.
END

FIG. 19

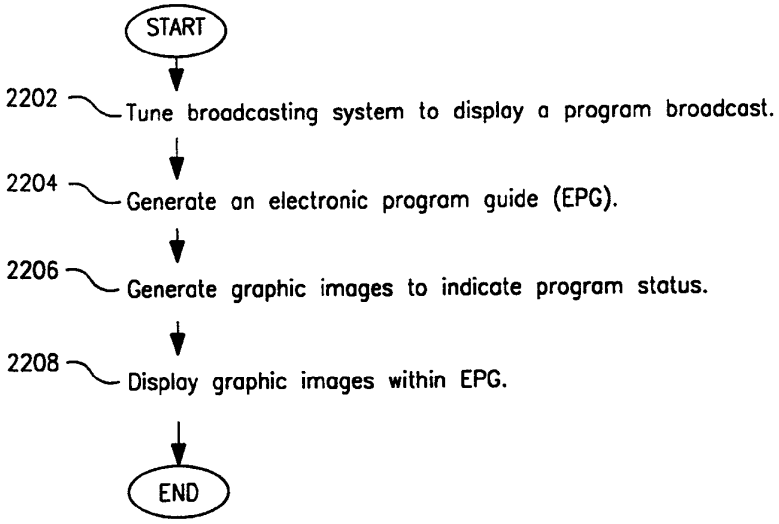

START
2202
Tune broadcasting system to display a program broadcast.
2204
Generate an electronic program guide (EPG).
2206
Generate graphic images to indicate program status.
2208
Display graphic images within EPG.
END

FIG. 22

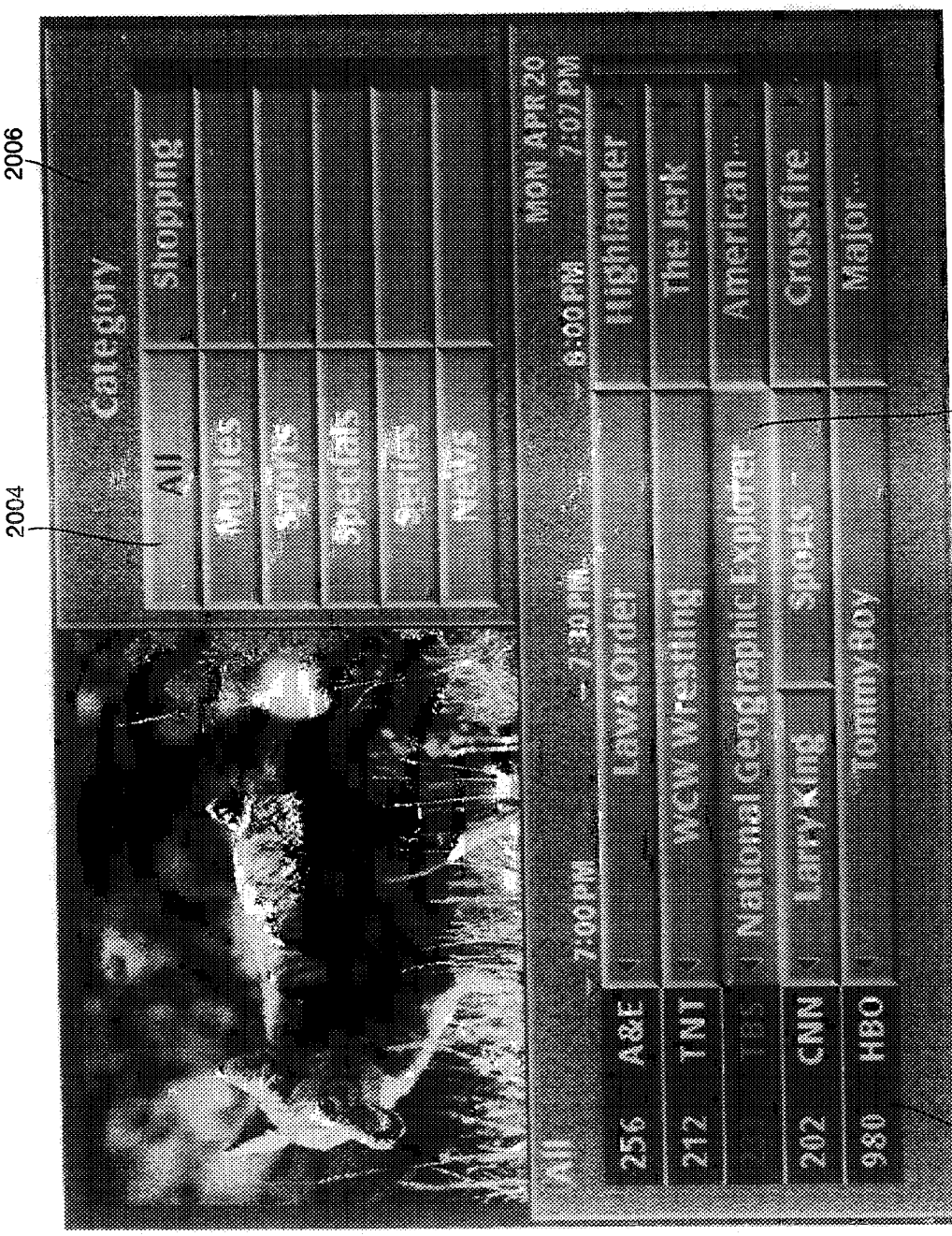


FIG. 20

EX. 1002
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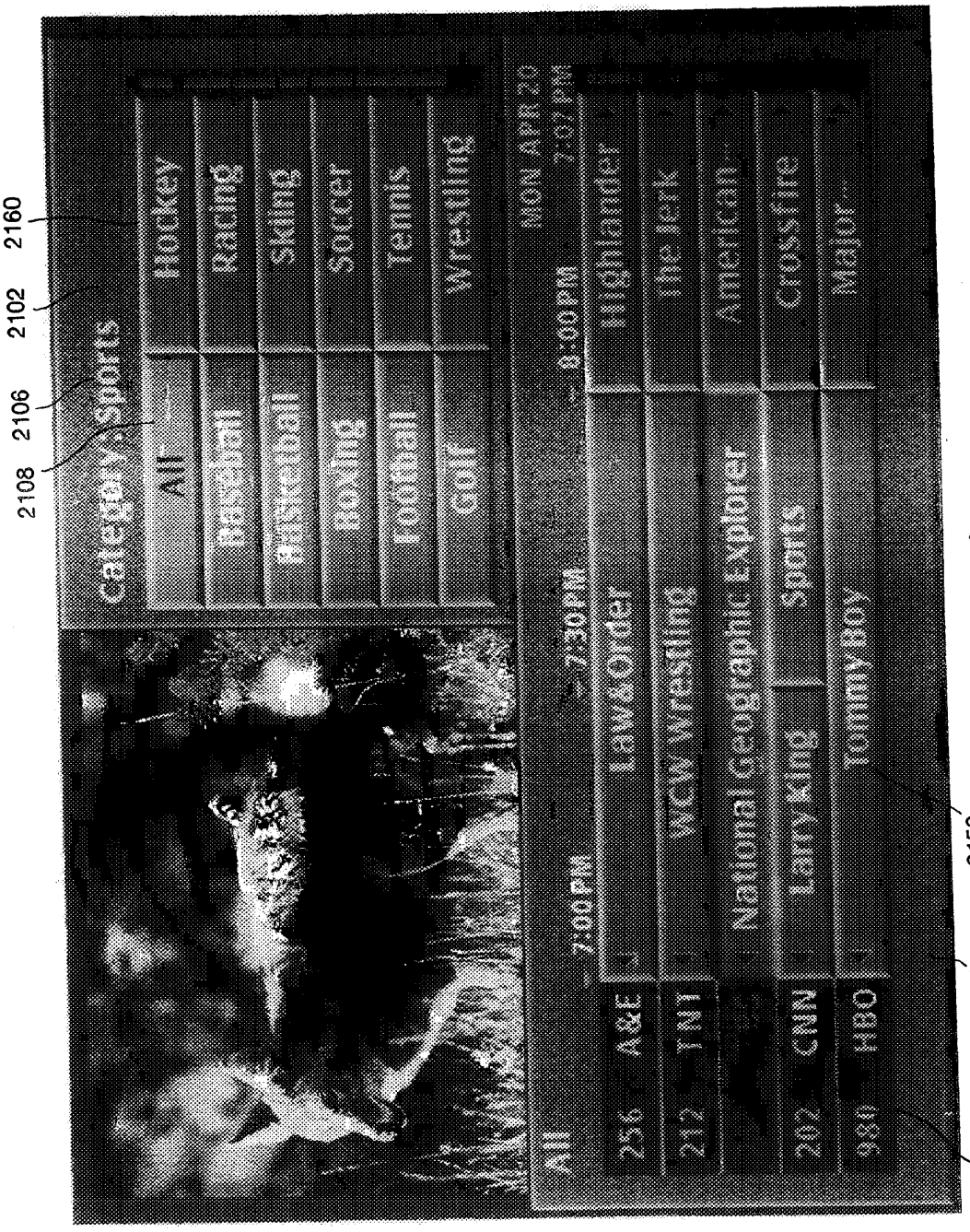

2160
2102
2106
2108
Category: Sports
All
Baseball
Basketball
Boxing
Football
Golf
Hockey
Racing
Skiing
Soccer
Tennis
Wrestling
MON APR 20
2:07 PM
7:00 PM - 7:30PM
7:30PM - 8:00PM
All
236 A&E
212 TNT
202 CNN
930 HBO
Law&Order
WCW Wrestling
National Geographic Explorer
Larry King
Sports
Highlander
The Jerk
American
Crossfire
Major
Tommy Boy
2152
2150
2104

FIG. 21

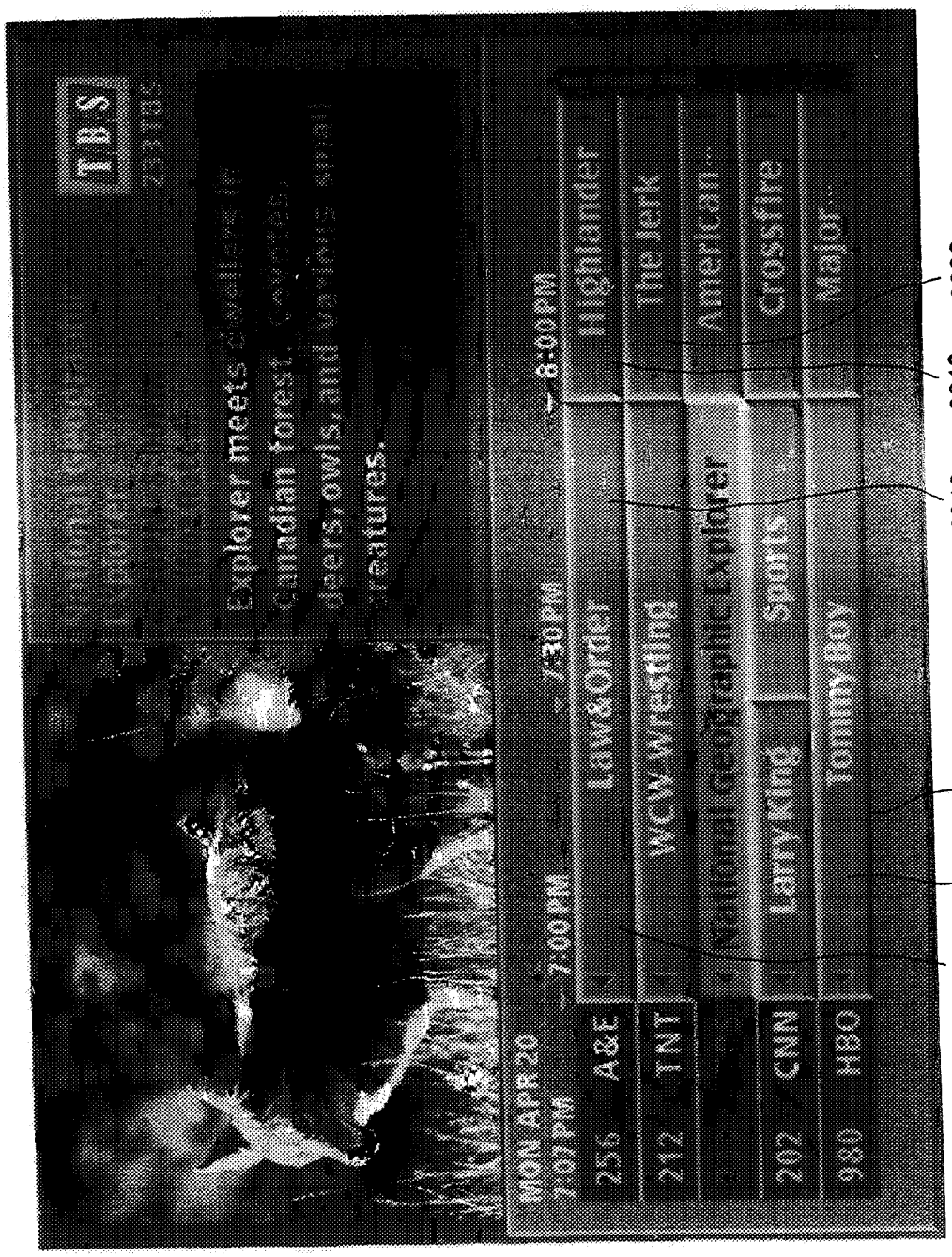


FIG. 23

EX. 1002
LG Electronics, Inc. / Page 1240 of 3523

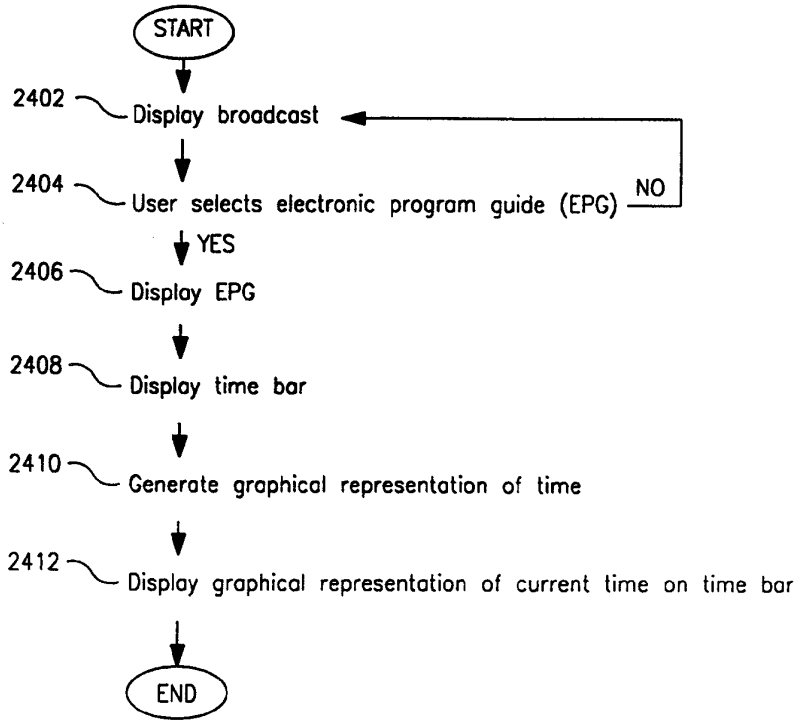

START
2402
Display broadcast
2404
User selects electronic program guide (EPG)
NO
YES
2406
Display EPG
2408
Display time bar
2410
Generate graphical representation of time
2412
Display graphical representation of current time on time bar
END

FIG. 24

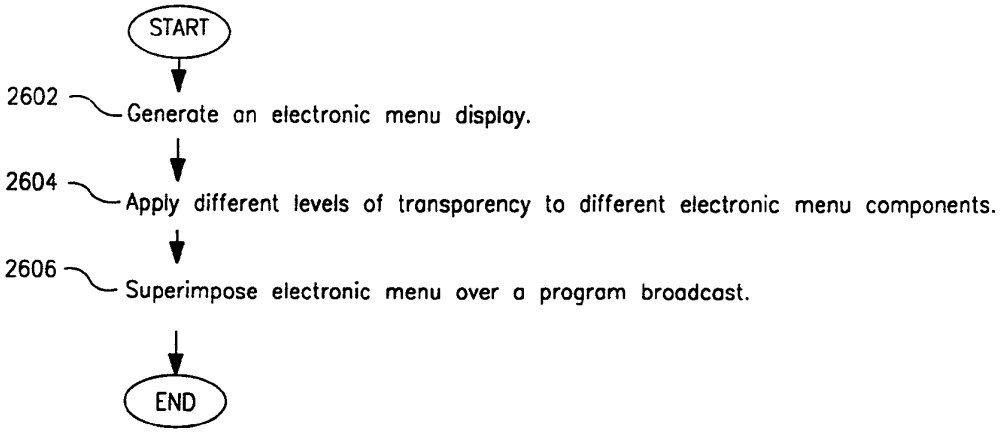

START
2602
Generate an electronic menu display.
2604
Apply different levels of transparency to different electronic menu components.
2606
Superimpose electronic menu over a program broadcast.
END

FIG. 26

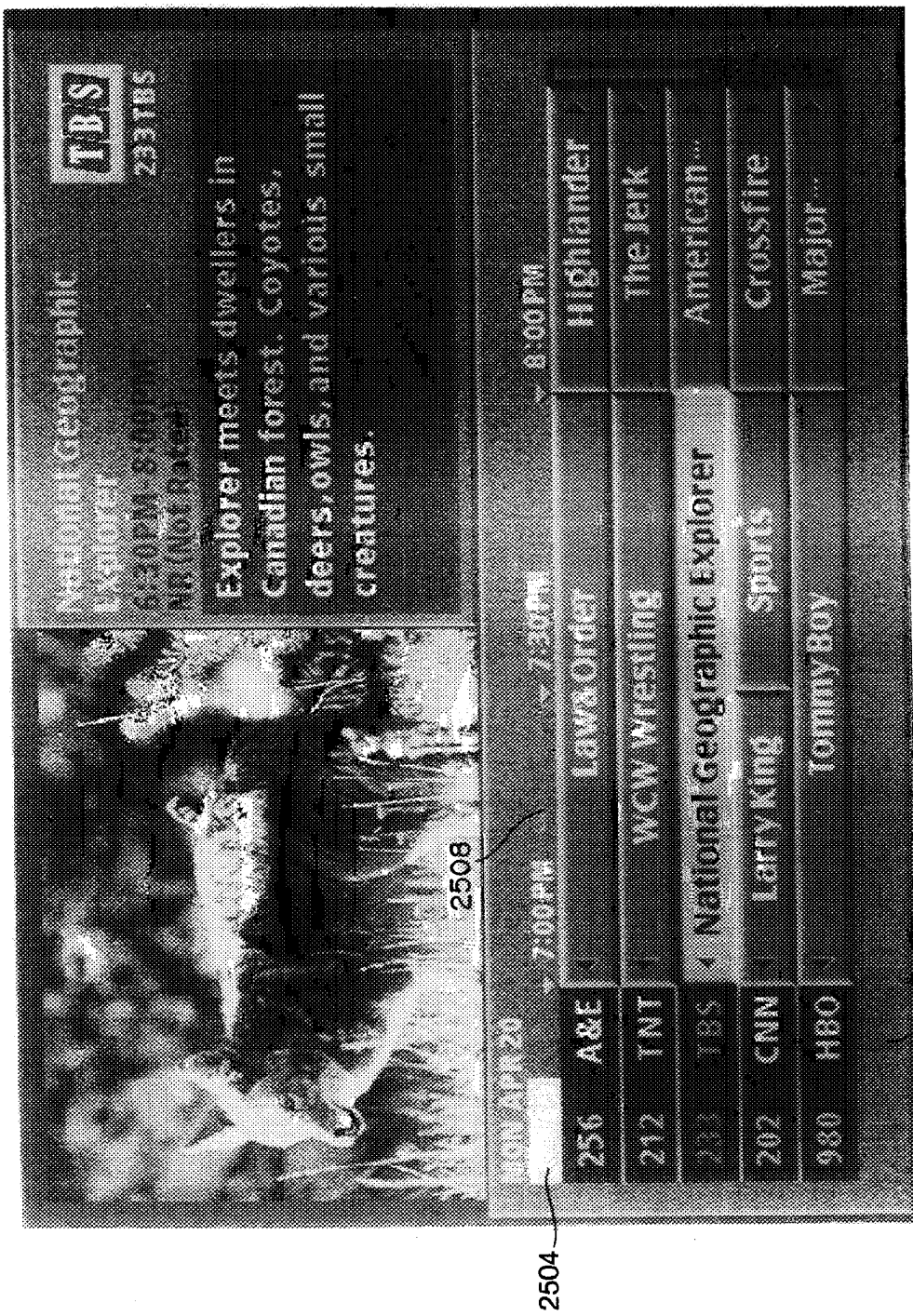

TBS
23 ttes
Explorer meets dwellers in Canadian forest. Coyotes, deers, owls, and various small creatures.
8:00Pm
Highlander
The Jerk
American...
Crossfire
Major...
256 A&E
212 TNT
TBS
207 CNN
980 HBO
Law&Order
WCW Wrestling
National Geographic Explorer
Larry King
Sports
TommyBoy
2508
2504
2502

FIG. 25

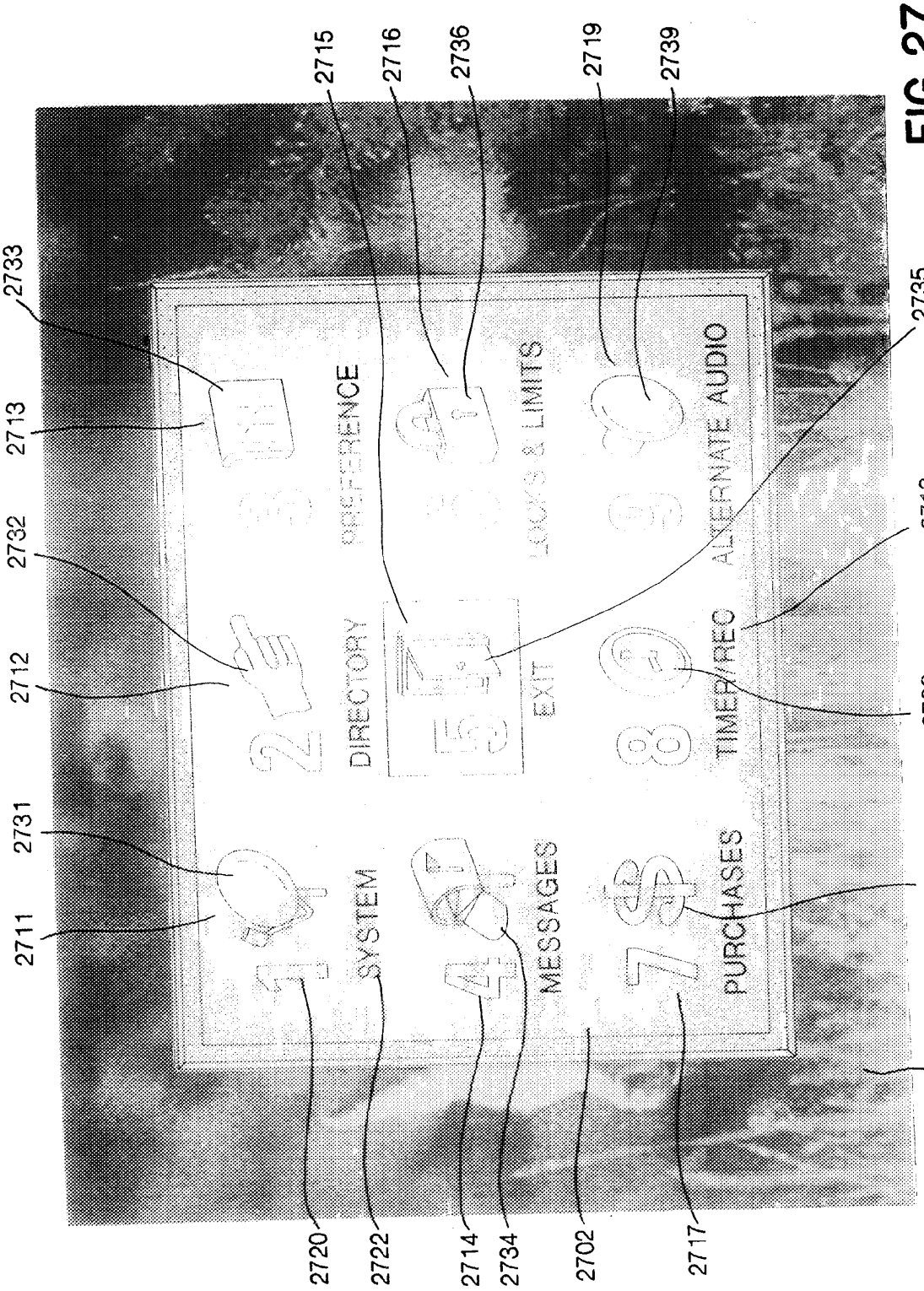

2715
2716
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2712
2738
2731
2737
2711
2750
2720
2722
2714
2734
2702
2717
DIRECTORY
PREFERENCE
LOCKS & LIMITS
ALTERNATE AUDIO
EXIT
TIMER/REC
SYSTEM
MESSAGES
PURCHASES

FIG. 27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/21991

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04H 1/02; H04N 5/445, 5/50, 7/08, 7/10
US CL :Please 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)

U.S. : Please See Extra Sheet.

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,585,838 A (LAWLER et al) 17 December 1996, see whole document.	1-57
X	US 5,594,509 A (FLORIN et al) 14 January 1997, see whole document.	1-57
Y	US 5,625,406 A (NEWBERRY et al) 29 April 1997, see whole document.	1-57
Y	US 5,650,826 A (EITZ) 22 July 1997, see whole document.	1-57

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
"E"	earlier document published on or after the international filing date	"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
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"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 29 DECEMBER 1998	Date of mailing of the international search report 25 FEB 1999
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 JOHN W. MILLER Joni Hill Telephone No. (703) 305-4795

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/21991

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	US 5,559,548 A (DAVIS et al) 24 September 1996, see whole document.	10, 11, 14, 18, 19, 24, 31-34, 44-47, 50, 51, 56, 57
Y	US 5,585,866 A (MILLER et al) 17 December 1996, see whole document.	10, 11, 14, 18, 19, 24, 31-34, 44-47, 50, 51, 56, 57
Y	US 5,589,892 A (KNEE et al) 31 December 1996, see whole document.	10, 11, 14, 18, 19, 24, 31-34, 44-47, 50, 51, 56, 57

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/21991

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

345/327; 348/10, 461, 473, 565, 570, 906; 455/6.2

B. FIELDS SEARCHED
Minimum documentation searched
Classification System: U.S.

345/326, 327; 348/6, 10, 11, 461, 468, 469, 473, 552, 563, 564, 565, 566, 567, 569, 570, 906; 455/3.1, 6.1, 6.2

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(22) International Filing Date: 5 January 1999 (05.01.99)

(30) Priority Data:
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(71) Applicant: AMIGA DEVELOPMENT LLC [US/US]; 600 North Derby Lane, North Sioux City, SD 57049 (US).

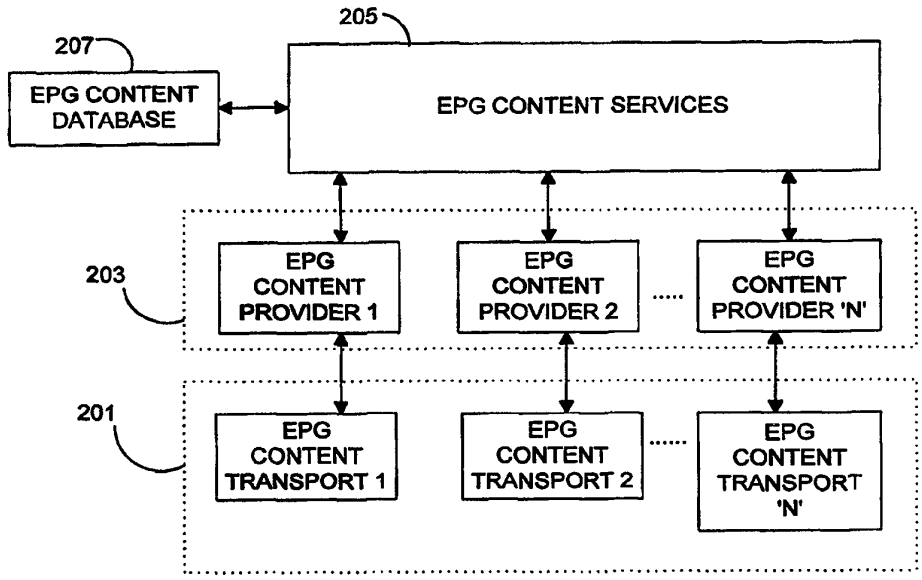
(72) Inventor: WUGOFSKI, Theodore, D.; 4828 Overton Hollow, Fort Worth, TX 76109 (US).

(74) Agent: VIKSNINS, Ann, S.; Schwegman, Lundberg, Woessner & Kluth, P.O. Box 2938, Minneapolis, MN 55402 (US).

(81) Designated States: AU, CA, JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: SYSTEM FOR COMBINING ELECTRONIC PROGRAM GUIDE DATA



(57) Abstract

An electronic program guide (EPG) system combines different sources of television program guide data supplied by different providers into a unified data store. When different sources provide similar data, the EPG system combines the program guide data from the multiple sources in accordance with criteria such as quality of the data, timeliness of the data, and timeliness of the data provider.

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System for Combining Electronic Program Guide Data

Related Applications

This application is related to the co-assigned and co-filed applications, "Method for managing multiple channel maps from multiple input devices in a multimedia system," "System for time-shifting events in a multi-channel convergence system," "Method and system for associating web sites to television programs," "Individualized parameter control for multiple media sources in a data processing system," "System for scheduled caching of in-band data services," and "Integration of Internet sources into an electronic program database list," all of which are hereby incorporated by reference.

Field of the Invention

The present invention is related to electronic program guides and in particular to retrieving and combining electronic program guide data from more than one provider.

Background of the Invention

One of the current trends in consumer electronics is the convergence of television technology and computer technology. Starting with the inclusion of a simple microprocessor chip in a television set, the convergence of the two technologies has evolved into sophisticated personal computers equipped with television tuners and large VGA monitors. Convergence systems enable the user to perform data processing tasks while simultaneously viewing a broadcast television program. Standard television add-ons, such as VCR's or laser disks, increase the content choices available to the user. The advent of personal satellite receivers has also opened up a vast range of broadcast content.

However, the number of channel choices also requires the user scrutinize many pages of printed schedules and program information to find the programs the user is

interested in watching. One existing approach to managing the great amount of scheduling and program information available is to organize the information in an electronic program guide (EPG). The data for an EPG is downloaded from a particular provider to a microprocessor either in the television or in an attached device. The program guide data is stored in a data store, such as a database, and displayed on the television screen when the user requests. The source of the information differs from provider to provider. For example, StarSight Telecast, Inc. places program guide data in the vertical blanking interval in the broadcast television signal, Direct TV™ and Echostar Communications Corp. use a portion of the MPEG2 (Motion Picture Experts Group) digital satellite data stream, and TV Host and Intel Corp.'s Smart TV® require a dial-up telephone connection. The data stores created from the source information are proprietary to the provider and are incompatible.

Because of the incompatibilities, an EPG user currently must chose a single provider from which to receive program guide data. However, television schedules are often in flux and some providers reflect the changes more quickly than others. Furthermore, the program information given by one provider may be good for one category of program but poor for another category.

Therefore, there is a need for an EPG system that receives program guide data from different sources and resolves conflicts among the data.

Summary of the Invention

An electronic program guide (EPG) system combines data from multiple EPG content providers and organizes the EPG data into an EPG content data store. The EPG system includes an EPG content services function which creates and manages the EPG content data store; a plurality of EPG content transport functions that retrieve the EPG data provided by the EPG content providers from multiple sources and in multiple source-specific formats and a plurality of EPG content provider function which convert the source-specific formatted EPG data into a format compatible with the EPG data store. The EPG content services function also includes a conflict resolution function

which determines what EPG data is of higher quality or more timely when similar data is received from more than one source. In addition, the EPG content services function registers new EPG content providers into the EPG data store. The data structure of the EPG data store is also described, as is a specific arrangement of modules that implement processes necessary for the operation of the EPG system.

Additionally, a system for combining EPG data in multiple formats from a plurality of sources using a content organizer is described. The multiple EPG formats are combined into a single EPG data format. The content organizer includes an EPG content data store created and managed by an EPG content services function, a plurality of EPG content transport functions which retrieves the EPG data from the plurality of sources, and an EPG content provider function which converts the EPG data from the multiple formats to an EPG content data store format for storage in the EPG content data store. A specific arrangement of modules for the content organizer is also described.

Because the EPG system of the present invention retrieves EPG data supplied by multiple EPG content providers through different sources and organizes the EPG data into a single data store, the viewer is not required to select a single provider, be reliant on a single source for the information, or become familiar with multiple EPG systems. Thus, the EPG system gives the viewer more selections, provides more dependability, and makes the EPG data more accessible. Furthermore, because the EPG system resolves conflicts between the data from different providers based on data quality or timeliness, the viewer has access to better and more reliable information.

Brief Description of the Drawings

Figure 1A is a block diagram of hardware components for a convergence system utilizing an electronic program guide (EPG) system.

Figure 1B is a block diagram of a digital processing system shown in Figure 1A.

Figure 1C is a block diagram of a software architecture executing in the digital processing system of Figure 1B.

Figure 2 is a block diagram of four primary modules of one embodiment of an EPG system operating in the software architecture of Figure 1C.

Figure 3 is a block diagram of one embodiment of an EPG content data store in the EPG system of Figure 2.

Figure 4 is a field layout diagram of a provider record in the EPG content data store of Figure 3.

Figure 5 is a field layout diagram of a guide record in the EPG content data store of Figure 3.

Figure 6 is a field layout diagram of a channel record in the EPG content data store of Figure 3.

Figure 7 is a block diagram of the EPG content data store of Figure 3 showing detailed tables associated with an event table.

Figure 8 is a field layout diagram of an event record in the EPG content data store of Figure 7.

Figure 9 is a field layout diagram of an event title record in the EPG content data store of Figure 7.

Figure 10 is a field layout diagram of an event description record in the EPG content data store of Figure 7.

Figure 11 is a field layout diagram of an event extension record in the EPG content data store of Figure 7.

Figure 12 is a field layout diagram of an event start record in the EPG content data store of Figure 7.

Figures 13-15 are operation flow diagrams of the processes of the EPG system of Figure 2.

Description of the Embodiments

In the following detailed description of the embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These

embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural, logical and electrical changes may be made without departing from the spirit and scope of the present inventions. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present inventions is defined only by the appended claims.

The leading digit(s) of reference numbers appearing in the Figures corresponds to the Figure number, with the exception that the same reference number is used throughout to refer to an identical component which appears in multiple Figures. Signals and connections may be referred to by the same reference number or label, and the actual meaning will be clear from its use in the context of the description.

Electronic Program Guide System Overview

An electronic program guide (EPG) system of the present invention organizes schedule and program information from multiple EPG content providers through differing sources and presents a single, optimized menu to the user based on criteria such as quality of the data, timeliness of the data, and timeliness of the program guide provider. The EPG system is part of a convergence system 100 shown in Figure 1A, such as the Destination personal computer system available from Gateway 2000, Inc. The convergence system 100 incorporates television tuner circuitry into a digital processing system 101, such as a computer which is compatible with standard personal computer systems, and displays television signals and digital output on a large monitor 122 of VGA or better resolution. The EPG system is described in terms of software processes which execute within a microprocessor 186 in the digital processing system 101, as shown in Figure 1B. The processes for the EPG system can be implemented in software, hardware or firmware without departing from the scope of the invention. One embodiment of a software architecture which provides the underlying infrastructure of processing and file input/output operations necessary for the execution of the EPG system is illustrated in Figure 1C. The EPG system operates as part of the system

services 103 and is represented in Figure 1C as EPG data services 109. The software architecture illustrated in Figure 1C is described in detail in co-pending and co-assigned patent application entitled "Architecture for Convergence Systems" filed on the same day as the present application and assigned to the same assignee, which application is hereby incorporated by reference.

In the context of the present application, an "EPG content provider" is a company that supplies program guide data and a company that provides the audio, video and/or data transmitted in a channel is referred to as a "channel content provider." A single company can be both a channel content provider and an EPG content provider. The EPG data may be transmitted either in-band or out-of-band, as known by those of ordinary skill within the art.

In one embodiment, the EPG system 200 comprises four primary modules as illustrated in Figure 2: a plurality of EPG content transport functions 201, a plurality of EPG content provider functions 203, an EPG content services function 205, and an EPG content data store 207. Arranging the tasks performed by the EPG system into different modules will be readily apparent to one skilled in the art upon reading the detailed descriptions below.

The EPG content transport functions 201 move guide data from various sources and into a storage area, such as a hard disk 107, on the digital processing system 101. Each EPG content transport function 201 is specific to the particular source, such as the vertical blanking interval in the broadcast television signal, an MPEG2 data stream transmitted via satellite, a phone line, hard media such as CD-ROM, or some other communications means. The EPG content provider functions 203 convert the guide data from source-specific formats into a format understood by the EPG content services functions 205. Detailed information on a source-specific format necessary to support the conversion can be in the public domain, obtained from standards publications, or licensed from the owner of a proprietary format.

The EPG content services function 205 stores the converted guide data into the EPG content data store 207, resolving conflicts and combining information from the

different EPG content providers according to user preferences as described further below. The EPG content services function 205 also provides an interface for other applications to access the EPG content data base 207 or the EPG content providers through the EPG content provider functions 203.

EPG Content Data store

Figure 3 illustrates data structures in one embodiment of the EPG content data store 207. The data store 207 comprises a provider table 301, a guide table 303, a guide descriptor table 305, a channel table 307, a channel descriptor table 309, a channel region table 311, a channel extension table 313, a service type table 315, a service table 317, and an event table 319. While the EPG content data store 207 is described in terms of tables in a relational database system, one skilled in the art will readily appreciate that the data contained in the data store 207 can be stored in any type of data structure, including flat files or look-up tables, without departing from the scope of the invention. A brief overview of each data structure is given next, with detailed descriptions following.

The provider table 301 describes the EPG content providers that are registered with the EPG content services function. The registration process is described in detail below. Each provider can supply more than one program guide. The guide table 303 identifies which program guides for a provider are managed by the EPG content services function 203. The guide descriptor table 305 provides a description of each guide in the guide table 303 in one or more languages. The channel table 307 identifies which channels are described in a guide. The channel description table 309 provides a description of each channel in the channel table 307 in one or more languages. The channel region table 311 identifies regions (countries, local regions, etc.) in which each channel in the channel table 307 is accessible. The channel extension table 313 identifies any external data associated with a channel in the channel table 307, such as a World Wide Web Internet site or multimedia files stored on media accessible by the convergence system 100. The service type table 315 indicates what type of content,

such as audio, video, or data, is available on each channel in the channel table 307. The services table 317 enumerates which source services, i.e., the communications links for downloading the guide data, are supported by each provider. The event table 319 contains program information for each event on a channel during the time period covered by a program guide that contains the channel.

The provider table 301 comprises a plurality of provider records. One embodiment of a provider record 400 is shown in Figure 4. A provider identifier field 401 contains a unique identifier for each EPG content provider. A provider type field 403 identifies whether the EPG content services function 205 must request an update of the guide data from the EPG content provider, or whether the provider operates autonomously and notifies the EPG content services function 205 when its guide data has changed.

A provider timeliness field 405 indicates how often the provider updates the data it receives from the channel content owner. For example, the provider may supply new guide data every four hours, but the only difference between each update is that the four hours prior to the update time are truncated and the four hours following the update time are included. Schedule or information changes supplied to the EPG content provider by the channel content provider are not reflected in the update. The provider timeliness field 405 for such an EPG content provider would contain a value representing "low" timeliness. For an EPG content provider that changes data in the guide on a daily basis, the provider timeliness field 405 contains a value representing "medium" timeliness. For an EPG content provider that changes data in the guide on an hourly basis, the provider timeliness field 405 contains a value representing "high" timeliness. Other update frequencies, such as more than once a day, can also be designated as being of "high" timeliness.

A provider next-update field 407 contains a time at which the EPG content services function 205 should ask for an update to the guide data. A provider quality field 409 contains values which represent ratings of various content categories with respect to the quality of the descriptions supplied by the provider. For example, one

EPG content provider may provide better movie descriptions while another may provide better sports descriptions. The provider quality field 409 is user-defined.

A service provider name field 411 is a text description of the services made available by the channel content provider, such as audio, video, or data. A content provider name field 413 is a text description of the EPG content provider. A guide provider name field 415 is a text description of the guide provided by the EPG content provider.

The guide table 303 comprises a plurality of guide records, one for each guide supplied by a provider. One embodiment of a guide table record 500 shown in Figure 5.

A guide identifier field 501 contains a unique identifier for each program guide. A provider identifier field 503 identifies the EPG content provider that initialized (and generally owns) the guide. A starting slot field 505 contains a time for the first time slot that is represented in the guide and a starting day field 507 designates the day of the week for the first time slot. If the guide extends beyond one week, the starting day field 507 includes the appropriate week, month, and/or year values. A validity field 509 rates the validity of the data in the guide. If the provider performs some sort of comparison of the data in the guide, the value in the validity field 509 represents a "high" validity rating. If the previous update (as determined by the provider next-update field 407) has not been able to run as scheduled, or if the data in the guide has expired as defined by a lifetime field 511, the value in the validity field 509 represents a "low" validity rating. The lifetime field 511 contains a value indicating the latest date/time before which the provider expects the guide will be updated. A guide width field 513 contains a value which represents the period of time included in the guide, measured in "slots." A slot length field 515 defines the number of seconds represented by a slot, such as 108000 seconds (30 minutes).

The channel table 307 comprises a plurality of channel records. One embodiment of a channel record 600 is shown in Figure 6. The channel table 307 contains a channel record 600 for each channel included in a program guide that is supplied by an EPG content provider.

A guide identifier field 601 designates the guide that contains the channel's information. A provider identifier field 603 refers to the channel content provider responsible for the channel. A display channel number field 605 contains the channel number which is displayed on the monitor. A physical channel number field 607 contains the physical transmission number of the channel on a particular device, such as a satellite receiving station. A short name field 609 holds the channel's call letters while a long name field 611 holds the channel's full name. A conditional access field 613 indicates what level of conditional access is associated with the channel, such as pay-per-view or subscription content. A number-of-streams field 615 contains a value defining the number of audio, video, and data streams associated with the channel. A purchase information field 617 provides data on purchasing the channel, if such purchase is necessary.

Figure 7 illustrates one embodiment of the event table 319 that is associated with each channel stored in the channel table 307. In this embodiment, the provider table 301 is logically connected to one or more channel tables 307. Each channel table 307 is logically connected to one or more event tables 319. The event table 319 comprises a plurality of event records 800 (as shown in Figure 8). Each event record comprises an event identifier field 801, a title field 803, a description field 805, an extension field 807, a start time field 809, and end time field 811, a duration field 813, a category field 815, a subcategory field 817, a closed captioning flag 819, a subtitles flag 821, a taping flag 831, and a plurality of ratings fields 825. For example the ratings fields 825 can contain a TV rating field, an MPAA movie rating field, a content advisory field, a violence rating field, a language rating field, a sexual content rating field, and a V-chip rating field. The number of ratings fields 825 is variable and depends on the number of rating tables provided by the program guide providers. Rating tables are described below.

The event identifier field 801 contains a unique identifier for each event. The title field 803 contains references to one or more event title records 900 in an event title

table 701. Each event title record 900 comprises a language identifier field 901 and a title field 903 that contains text for the title as illustrated in Figure 9.

The description field 805 contains references to one or more event description records 1000 in an event description table 703. In one embodiment shown in Figure 10, an event description record 1000 comprises a language identifier field 1001 and a description field 1003 that contains text for the description.

The extension field 807 contains references to one or more event extension records in an event extension table 705. One embodiment of an event extension record 1100 is shown in Figure 11. Each event extension record 1100 comprises at least one external data field 1101 which identifies a data source associated with a channel, such as a World Wide Web Internet site or a multimedia file.

The start time field 809 contains references to one or more event start records 1200 stored in an event start table 707. As shown in Figure 12, in one embodiment, each event start record 1200 comprises a day field 1201 and a slot field 1203 which together define the beginning of the event. The end time field 811 can contain a value representing the ending time of the program supplied by the guide data provider, a reference to one or more event ending records similar to the event start records 1200, or be blank. If the end time field 811 is blank, the ending time of a program can be calculated from the start time field 809 and the duration field 813 if the duration field contains a value. Alternatively, the ending time of a program can be implied from the start time field 809 for the event immediately following.

The category 815 and subcategory 817 fields contains a category and a subcategory identifier from a category table 709 and a subcategory table 711 respectively. The closed captioning flag 819, subtitles flag 821, and the taping flag 823 indicate when the event contains closed captions, subtitles, or is scheduled for taping by the convergence system 100.

Each of the rating fields 825 in the event record 800 contains a value selected from entries in corresponding tables in the EPG database 207. Using the example tables shown in Figure 7, a TV ratings field contains a TV rating from a TV rating table 713,

an MPAA ratings field contains an MPAA rating from a MPAA rating table 715, a content advisory field contains a content advisory rating from a content advisory rating table 717, a violence rating field contains a violence rating from a violence rating table 719, and a sexual content rating field contains a sexual content rating from the sexual content rating table 721. Additional rating fields and related tables can be added to the event table record 800 and the EPG data store 207 as new rating systems are introduced and supplied by the guide data providers.

EPG System Operation

The operation of the EPG system 200 is shown in Figures 13-15 which illustrate the processes performed by the EPG content services function 205.

Figure 13 illustrates the registration process initiated by the EPG content services function 205 to register a new EPG content provider in the data store 207. The registration process 1300 creates a provider record 400 (step 1301), fills in the appropriate fields (1303), and stores the provider record 400 in the provider table 301 in the EPG data store 207 (1305). If no additional EPG content providers are to be registered (step 1307), the registration function exits; otherwise it loops back to step 1301.

Once the EPG content provider is registered, the EPG content provider function 203 uses the appropriate EPG content transport function 201 to retrieve the guide data from the source. The EPG content provider function 203 then converts the retrieved data from the content provider-specific formats into the appropriate EPG data store record formats which are passed to the EPG content services function 205. The EPG content services function 205 stores the records in the EPG content data store 207 using an update data store process shown in Figure 14. For a newly registered EPG content provider (step 1401), the update data store process 1400 stores a guide record 500 for each guide supplied by the EPG content provider (steps 1403 and 1405) and stores a channel record 600 for each channel contained within each guide supplied (steps 1407 and 1409). If the event record received from the EPG content provider function 203 is

unique (step 1411), the update data store process adds an event record 800 into the data store 207 (step 1413). An event is not unique if there is an existing event record 800 associated with the same channel record 600 and which contains a value in the start time field 809 that overlaps the time slot of the new event. If an event is not unique, a conflict resolution process within the EPG content services function 205 resolves the conflict (step 1415).

The operation of the conflict resolution process is shown in Figure 15. The conflict resolution process 1500 compares data for the existing and new event records (step 1501). In one embodiment, the comparison evaluates event record fields such as the title field 803, the description field 805, the ratings fields 825, and the conditional access field 613 in the associated channel record 600. Alternate embodiments that evaluate different data fields will be apparent to one skilled in the art.

If the data matches exactly (step 1503), the new event record is discarded as a duplicate (step 1505). A mismatch occurs if the data for the existing event does not exactly match the corresponding data for the new event record. Mismatches are handled in several ways.

If the new event has data that the existing event record lacks (step 1507), the new data is merged into the existing event record (step 1509). However when there is conflicting data, the conflict resolution process 1500 selects a conflict resolution algorithm based on the field(s) in conflict, or on the provider of the data, or the source of the data, or a combination thereof (step 1511). The conflict resolution algorithm determines which of the conflicting records is selected as valid.

One embodiment of a conflict resolution algorithm is selected if the title 803, start time 809, end time field 811 (or the calculated or implied ending time as described above), or conditional access 613 fields are different. The selected conflict resolution uses the data from the EPG content provider that has a value representing higher quality timeliness in the timeliness field 405 in its provider record 400. In another embodiment of a conflict resolution algorithm selected when the description fields 805 are different, the event record with a higher quality description text in its description field 805 is

chosen. Higher quality descriptions contain more relevant words (words such as "a," "and," and "if" not considered relevant) and include more proper names, such as those of people or places. In yet another alternate embodiment, a conflict resolution algorithm compares the provider quality fields 409 to determine the event record with the higher quality description.

The conflict resolution process 1500 updates the data store 207 by storing the new event record (step 1515) if the new record is selected by the conflict resolution algorithm. If there has been a change in an event's starting time or ending time (step 1517), the conflict resolution process 1500 requests the event record for each event that follows the modified event from the EPG content provider function 203 that provided the modified event record (step 1519). The conflict resolution process 1500 determines subsequent event records are not needed when the starting and ending times in a subsequent event record in the data store 207 are the same as those provided by the EPG content provider function 203, i.e., the events "re-align" (step 1521).

Conclusion

Because the EPG system of the present invention retrieves EPG data supplied by multiple EPG content providers through different sources and organizes the EPG data into a single data store, the viewer is not required to select a single provider, be reliant on a single source for the information or become familiar with multiple EPG systems. Thus, the EPG system gives the viewer more selections, providing more dependability, and makes the data more accessible. Furthermore, because the EPG system resolves conflicts between the data from different providers based on data quality, the viewer has access to more timely and reliable information.

It is to be understood that the above description is intended to be illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

What is claimed is:

1. A computerized system for combining electronic program guide (EPG) data from multiple EPG content providers, the system comprising:

an EPG content data store;

an EPG content services function operable for creating and managing the EPG content data store;

a plurality of EPG content transport functions operable for retrieving EPG data from a plurality of sources in a plurality of source-specific formats; and

a plurality of EPG content provider functions, each EPG content provider function operable for receiving the EPG data in a source-specific format from an EPG content transport function, converting EPG data from a source-specific format to an EPG content data store format, and delivering the EPG data in the EPG content data store format to the EPG content services function.

2. The computerized system of claim 1, wherein the EPG content services function is further operable for registering each EPG content provider in the EPG content data store.

3. The computerized system of claim 1, wherein the EPG content services function is further operable for resolving conflicts between similar EPG data from the multiple EPG content providers.

4. The computerized system of claim 3, wherein the EPG content services function determines if a conflict exists between the similar EPG data by comparing channel values and start time values contained in the EPG data.

5. The computerized system of claim 3, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a value representing higher quality timeliness.

6. The computerized system of claim 3, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a description of higher quality.

7. The computerized system of claim 3, wherein the EPG content services function resolves a conflict between the similar EPG data based on the provider of the EPG data.

8. The computerized system of claim 1, wherein at least one of the sources is an in-band source.

9. The computerized system of claim 1, wherein at least one of the sources is an out-of-band source.

10. A method of combining electronic program guide (EPG) data from multiple EPG content providers comprising the steps of:

registering an EPG content provider in an EPG content data store;

retrieving EPG data from a source in a source-specific format;

converting the EPG data from the source-specific format to a format for the EPG content data store;

adding the converted EPG data to the EPG content data store when there is no conflict between the converted EPG data and EPG data existing in the EPG content data store;

resolving conflicts between the converted EPG data and existing EPG data; and

updating the EPG content data store with the converted EPG data when any conflict is resolved in favor of the converted EPG data.

11. The method of claim 10, wherein the step of resolving conflicts comprises:

comparing the converted and existing EPG data; and

resolving the conflict in favor of the EPG data contain a value representing higher quality.

12. A computer-readable medium having computer-executable modules for combining electronic program guide (EPG) data from multiple EPG content providers, the modules comprising:

an EPG content services module for creating and managing an EPG content data store;

an EPG content transport module for retrieving EPG data from a plurality of sources in a plurality of source-specific formats; and

an EPG content provider module for converting EPG data received from the EPG content transport module from the plurality of source-specific formats to an EPG content data store format and for delivering the EPG data in the EPG content data store format to the EPG content services module.

13. The computer-readable medium of claim 12, wherein the EPG content services module further registers each EPG content provider in the EPG content data store.

14. The computer-readable medium of claim 12, wherein the EPG content services module is further operable for resolving conflicts between similar EPG data from the EPG content providers.

15. The computer-readable medium of claim 14, wherein the EPG content services module determines if a conflict exists between the similar EPG data by comparing channel values and start time values contained in the EPG data.

16. The computerized system of claim 14, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a value representing higher quality.

17. A digital processing system comprising:

a processor;

communications circuitry communicatively coupled to the processor;

a computer-readable medium communicatively coupled to the central processor; and

an application program executed from the computer-readable medium by the processor, wherein the application program combines electronic program guide (EPG) data from multiple EPG content providers by retrieving the EPG data through the communications circuitry and converting the EPG data from source-specific formats to an EPG content data store format.

18. The digital processing system of claim 17, wherein the communications circuitry comprises tuning circuitry for tuning and receiving broadcast transmissions.

19. The digital processing system of claim 17, wherein the communication circuitry comprises a modem.

20. A computer-readable medium having stored thereon a data structure, comprising:

a first data field containing data representing an electronic program guide (EPG) content provider;

a second data field containing data representing an EPG provided by the EPG content provider identified by the first data field;

a third data field containing data representing a content channel listed in the EPG identified by the second field; and

a fourth data field containing data representing an event delivered in the content channel identified by the third data field.

21. The computer-readable medium of claim 20 further comprising a fifth data field containing data representing a measure of quality of the EPG content provider identified by the first data field.

22. The computer-readable medium of claim 20 further comprising a fifth data field containing data representing a measure of quality of the EPG identified by the second field.

23. The computer-readable medium of claim 20 further comprising a fifth data field containing data representing a rating of the event identified by the fourth data field and further comprising a sixth data field containing a value representing a logical connection to the fifth data field.

24. A computerized system for combining electronic program guide (EPG) data from multiple EPG content providers, the system comprising:

an EPG content data store;

an EPG content services function having means for creating and managing the EPG content data store;

a plurality of EPG content transport functions having means for retrieving EPG data from a plurality of sources in a plurality of source-specific formats; and

a plurality of EPG content provider functions, each EPG content provider function having means for receiving the EPG data in a source-specific format from an EPG content transport function, converting EPG data from a source-specific format to an EPG content data store format, and delivering the EPG data in the EPG content data store format to the EPG content services function.

25. The computerized system of claim 24, wherein the EPG content services function further has means for registering each EPG content provider in the EPG content data store.

26. The computerized system of claim 24, wherein the EPG content services function further has means for resolving conflicts between similar EPG data from the multiple EPG content providers.

27. A system for combining electronic program guide (EPG) data comprising:
a plurality of sources configured to provide the EPG data in multiple formats; and
a content organizer configured to combine the multiple EPG data formats.

28. The system of claim 27, wherein the content organizer is configured to combine the multiple EPG data formats into a single EPG data format.

29. The system of claim 27, wherein the content organizer comprises:
an EPG content data store;
an EPG content services function for creating and managing the EPG content data store;
a plurality of EPG content transport functions for retrieving the EPG data from the plurality of sources; and
an EPG content provider function for receiving the EPG data from the EPG content transport functions, converting EPG data from the multiple formats to an EPG content data store format, and delivering the EPG data in the EPG content data store format to the EPG content services function.

30. The system of claim 29, wherein the EPG content services function registers an EPG content provider in the EPG content data store.

31. The system of claim 29, wherein the EPG content services function resolves conflicts between similar EPG data from the multiple sources.

32. The system of claim 31, wherein the EPG content services function determines if a conflict exists between the similar EPG data by comparing channel values and start time values contained in the EPG data.

33. The system of claim 31, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a value representing higher quality timeliness.

34. The system of claim 31, wherein the EPG content services function resolves a conflict between the similar EPG data by selecting the EPG data containing a description of higher quality.

35. The system of claim 31, wherein the EPG content services function resolves a conflict between the similar EPG data based on the source of the EPG data.

36. The system of claim 29, wherein at least one of the sources is an in-band source.

37. The system of claim 29, wherein at least one of the sources is an out-of-band source.

38. A method of combining electronic program guide (EPG) data comprising the steps of:

receiving the EPG data in multiple formats; and

combining the multiple EPG data formats.

39. The method of claim 38, wherein the step of combining the multiple EPG data formats comprises the step of combining the multiple EPG data formats into a single EPG data format.

40. The method of claim 38, wherein the step of combining the multiple EPG data formats comprises the steps of:

converting the EPG data from the multiple formats to a format for the EPG content data store;

adding the converted EPG data to the EPG content data store when there is no conflict between the converted EPG data and EPG data existing in the EPG content data store;

resolving conflicts between the converted EPG data and existing EPG data; and

updating the EPG content data store with the converted EPG data when any conflict is resolved in favor of the converted EPG data.

41. A computer-readable medium having a computer executable module for combining electronic program guide (EPG) data, the module comprising:

a content organizer module to combine multiple EPG data formats from a plurality of sources.

42. The computer-readable medium of claim 41, wherein the content organizer module combines the multiple EPG data formats into a single EPG data format.

43. The computer-readable medium of claim 41, wherein the content organizer module comprises:

an EPG content services module for creating and managing an EPG content data store;

an EPG content transport module for retrieving the EPG data from the plurality of sources; and

an EPG content provider module for converting the EPG data retrieved from the plurality of sources from the multiple formats to an EPG content data store format and for delivering the EPG data in the EPG content data store format to the EPG content services module.

44. A system for combining electronic program guide (EPG) data comprising:
a plurality of source means for providing multiple formats of EPG data; and
a content organizer means for combining the multiple EPG data formats.

45. The system of claim 44, wherein the content organizer means combines the multiple EPG data formats into a single EPG data format.

46. The system of claim 44, wherein the content organizer means comprises:
an EPG content data store;
an EPG content services function having means for creating and managing the EPG content data store;
a plurality of EPG content transport functions having means for retrieving EPG data from the plurality of sources; and
an EPG content provider function having means for receiving the EPG data and converting the EPG data from the multiple formats to an EPG content data store format, and delivering the EPG data in the EPG content data store format to the EPG content services function.

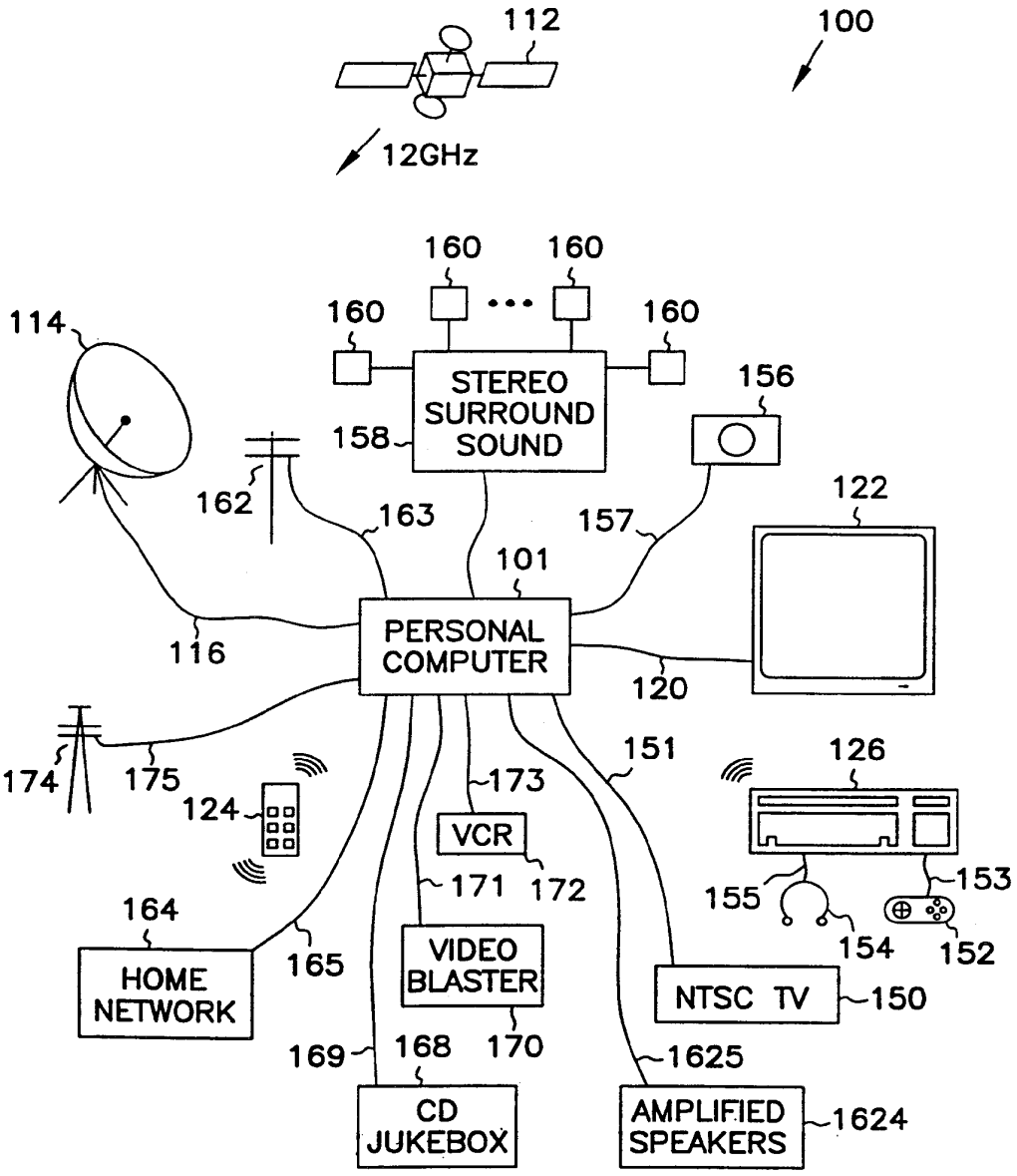

112
100
12GHz
160
160
160
160
114
STEREO SURROUND SOUND
156
158
162
163
157
122
101
PERSONAL COMPUTER
116
120
174
175
124
173
151
126
VCR
171
172
155
153
154
152
164
165
VIDEO BLASTER
NTSC TV
150
169
168
170
1625
CD JUKEBOX
AMPLIFIED SPEAKERS
1624
HOME NETWORK

FIG. 1A

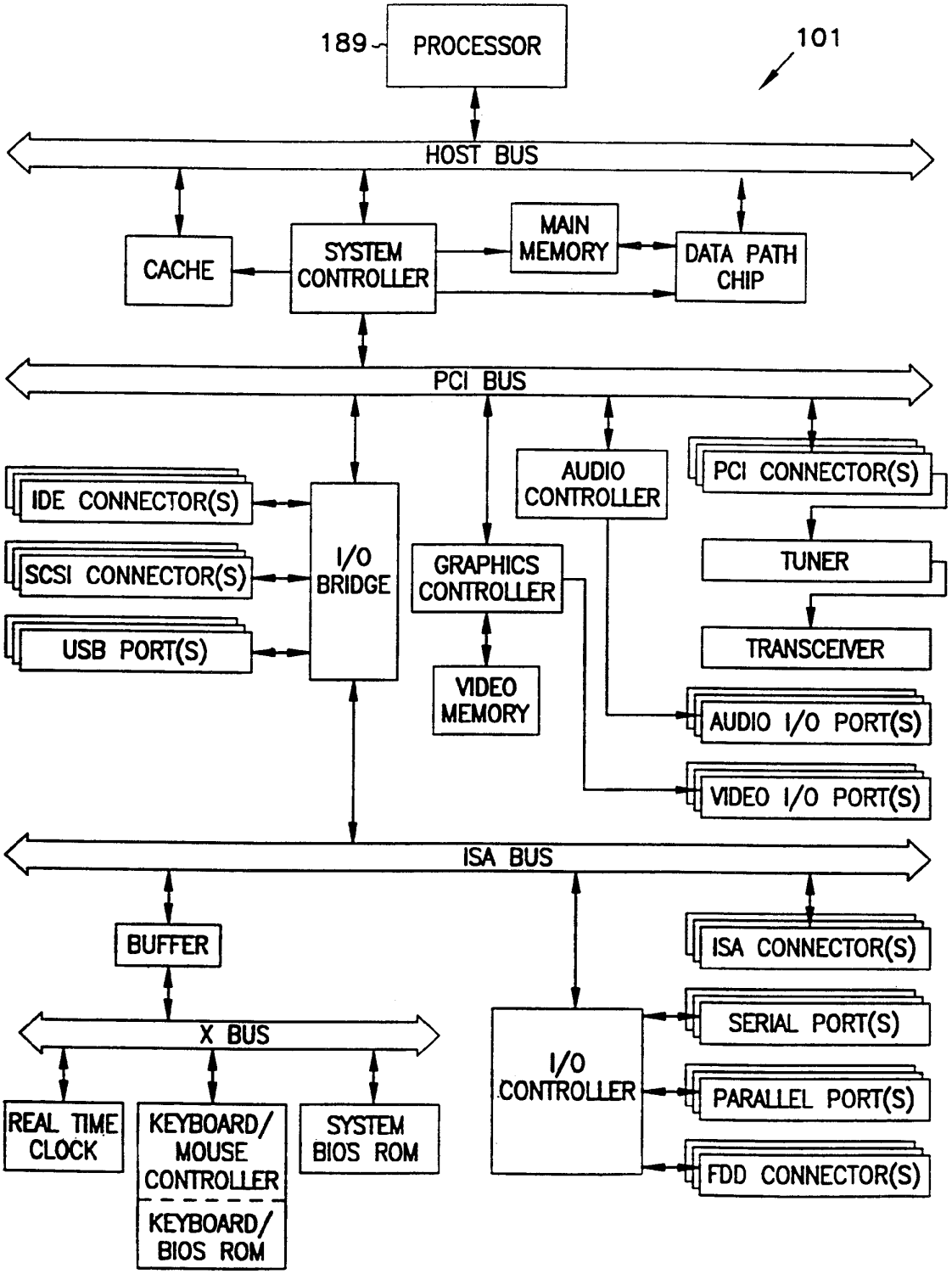

189
PROCESSOR
101
HOST BUS
CACHE
SYSTEM CONTROLLER
MAIN MEMORY
DATA PATH CHIP
PCI BUS
IDE CONNECTOR(S)
SCSI CONNECTOR(S)
USB PORT(S)
I/O BRIDGE
GRAPHICS CONTROLLER
VIDEO MEMORY
AUDIO CONTROLLER
PCI CONNECTOR(S)
TUNER
TRANSCEIVER
AUDIO I/O PORT(S)
VIDEO I/O PORT(S)
ISA BUS
BUFFER
X BUS
REAL TIME CLOCK
KEYBOARD/ MOUSE CONTROLLER
KEYBOARD/ BIOS ROM
SYSTEM BIOS ROM
I/O CONTROLLER
ISA CONNECTOR(S)
SERIAL PORT(S)
PARALLEL PORT(S)
FDD CONNECTOR(S)

FIG. 1B

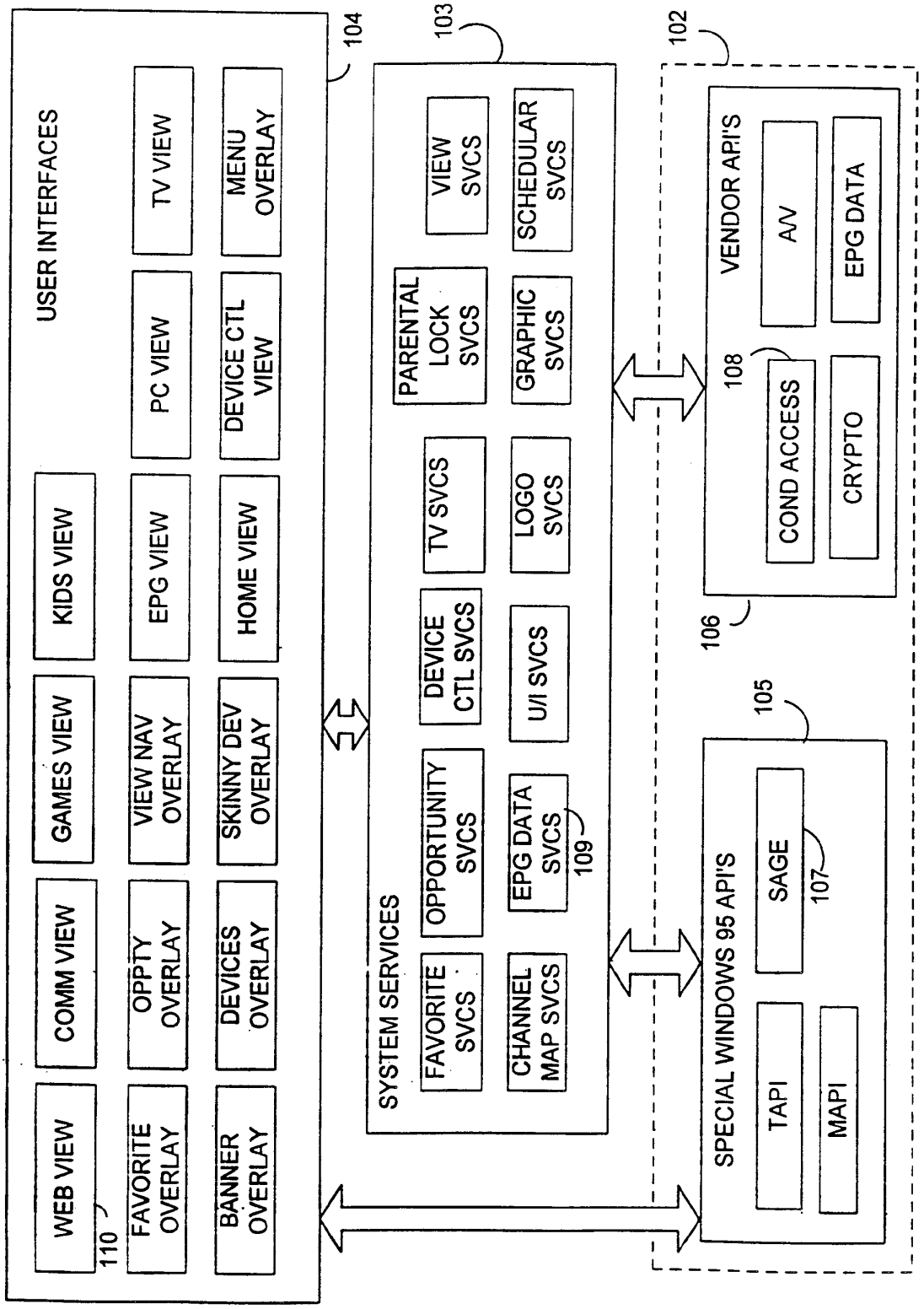

USER INTERFACES
104
WEB VIEW
COMM VIEW
GAMES VIEW
KIDS VIEW
TV VIEW
PC VIEW
DEVICE CTL VIEW
MENU OVERLAY
FAVORITE OVERLAY
OPPTY OVERLAY
VIEW NAV OVERLAY
EPG VIEW
HOME VIEW
BANNER OVERLAY
DEVICES OVERLAY
SKINNY DEV OVERLAY
110
SYSTEM SERVICES
103
FAVORITE SVCS
OPPORTUNITY SVCS
EPG DATA SVCS
109
CHANNEL MAP SVCS
DEVICE CTL SVCS
U/I SVCS
TV SVCS
LOGO SVCS
PARENTAL LOCK SVCS
GRAPHIC SVCS
VIEW SVCS
SCHEDULAR SVCS
102
VENDOR API'S
A/V
EPG DATA
108
COND ACCESS
CRYPTO
106
105
SPECIAL WINDOWS 95 API'S
TAPI
MAPI
SAGE
107

FIG. 1C

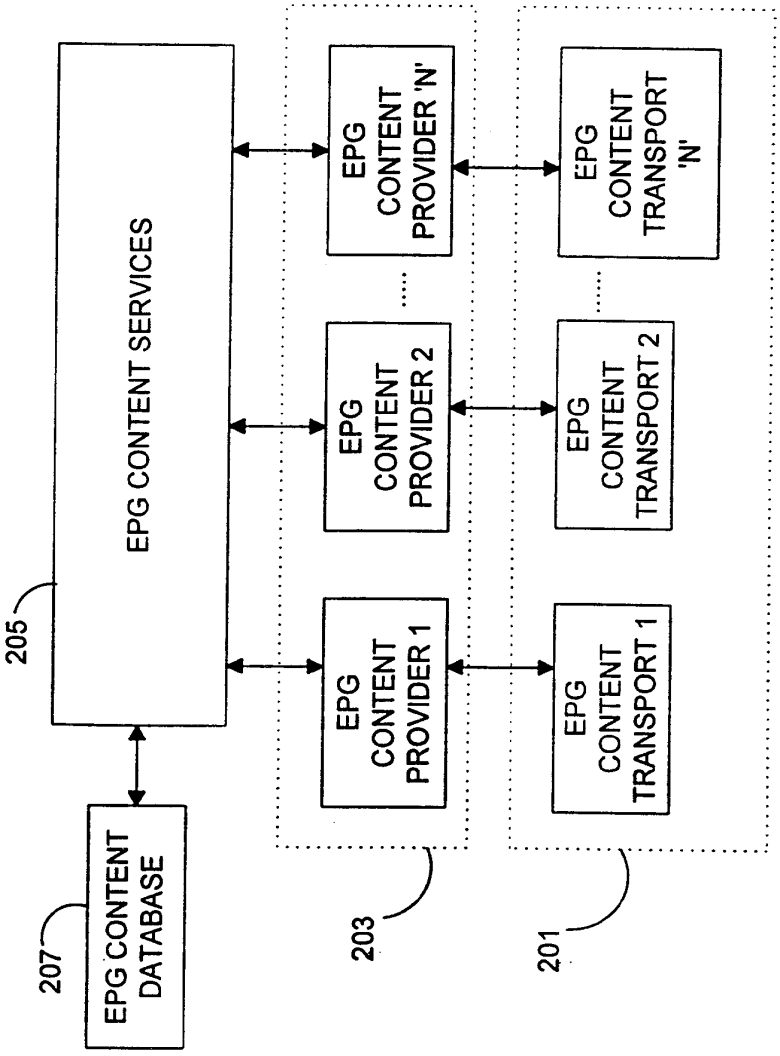

EPG CONTENT SERVICES
205
EPG CONTENT DATABASE
207
EPG CONTENT PROVIDER 1
EPG CONTENT PROVIDER 2
EPG CONTENT PROVIDER 'N'
203
EPG CONTENT TRANSPORT 1
EPG CONTENT TRANSPORT 2
EPG CONTENT TRANSPORT 'N'
201

FIG. 2

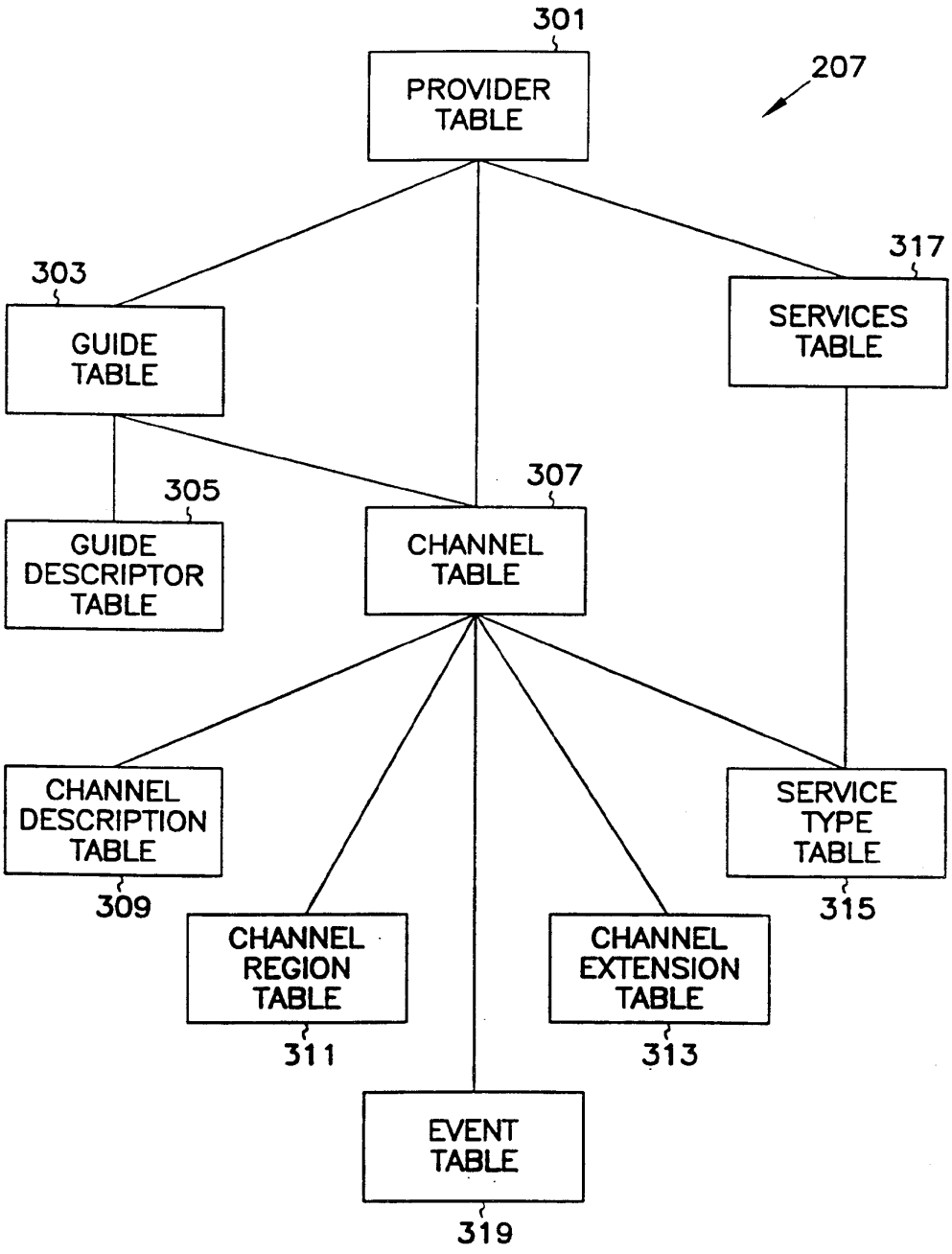

301
PROVIDER TABLE
207
303
GUIDE TABLE
317
SERVICES TABLE
305
GUIDE DESCRIPTOR TABLE
307
CHANNEL TABLE
CHANNEL DESCRIPTION TABLE
309
CHANNEL REGION TABLE
311
CHANNEL EXTENSION TABLE
313
SERVICE TYPE TABLE
315
EVENT TABLE
319

FIG. 3

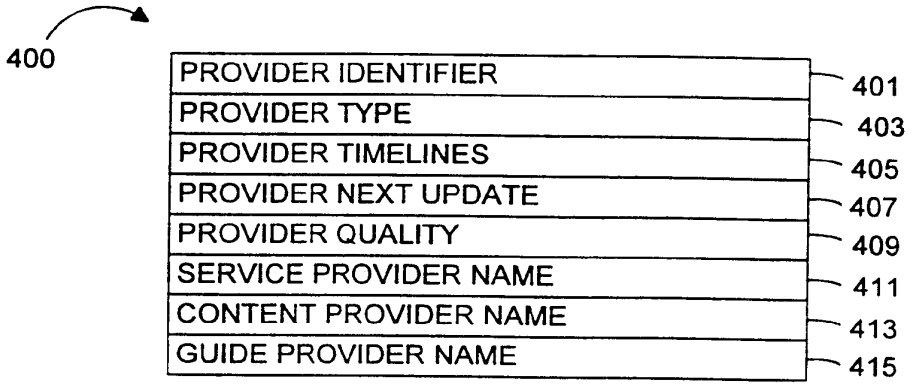

400
PROVIDER IDENTIFIER
PROVIDER TYPE
PROVIDER TIMELINES
PROVIDER NEXT UPDATE
PROVIDER QUALITY
SERVICE PROVIDER NAME
CONTENT PROVIDER NAME
GUIDE PROVIDER NAME
401
403
405
407
409
411
413
415

FIG. 4

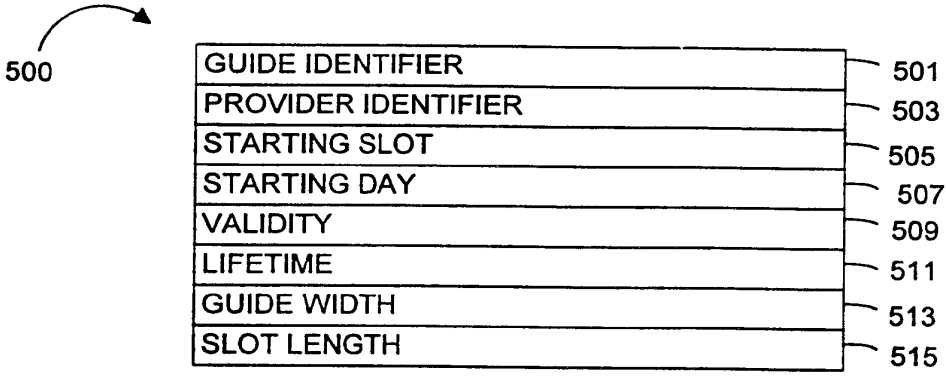

500
GUIDE IDENTIFIER
PROVIDER IDENTIFIER
STARTING SLOT
STARTING DAY
VALIDITY
LIFETIME
GUIDE WIDTH
SLOT LENGTH
501
503
505
507
509
511
513
515

FIG. 5

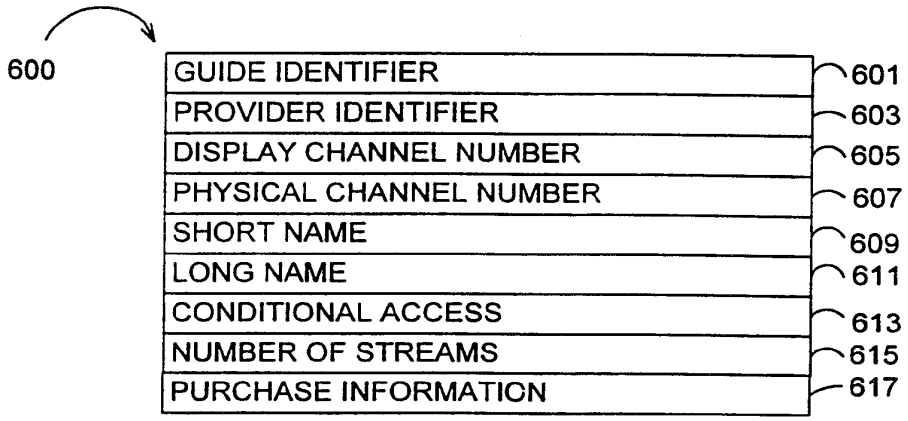

600
GUIDE IDENTIFIER
PROVIDER IDENTIFIER
DISPLAY CHANNEL NUMBER
PHYSICAL CHANNEL NUMBER
SHORT NAME
LONG NAME
CONDITIONAL ACCESS
NUMBER OF STREAMS
PURCHASE INFORMATION
601
603
605
607
609
611
613
615
617

FIG. 6

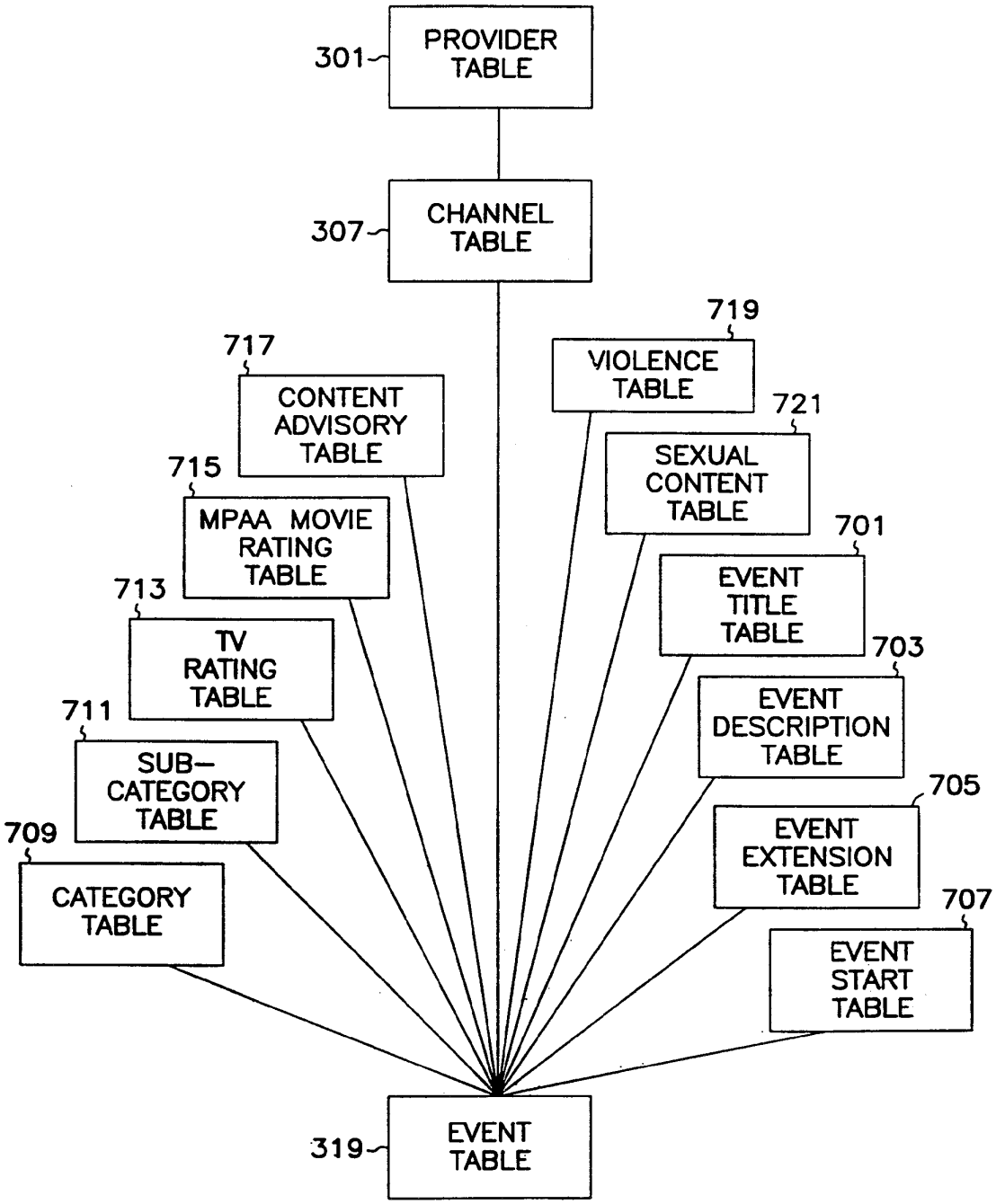

301
PROVIDER TABLE
307
CHANNEL TABLE
719
VIOLENCE TABLE
717
CONTENT ADVISORY TABLE
721
SEXUAL CONTENT TABLE
715
MPAA MOVIE RATING TABLE
701
EVENT TITLE TABLE
713
TV RATING TABLE
703
EVENT DESCRIPTION TABLE
711
SUB-CATEGORY TABLE
705
EVENT EXTENSION TABLE
709
CATEGORY TABLE
707
EVENT START TABLE
319
EVENT TABLE

FIG. 7

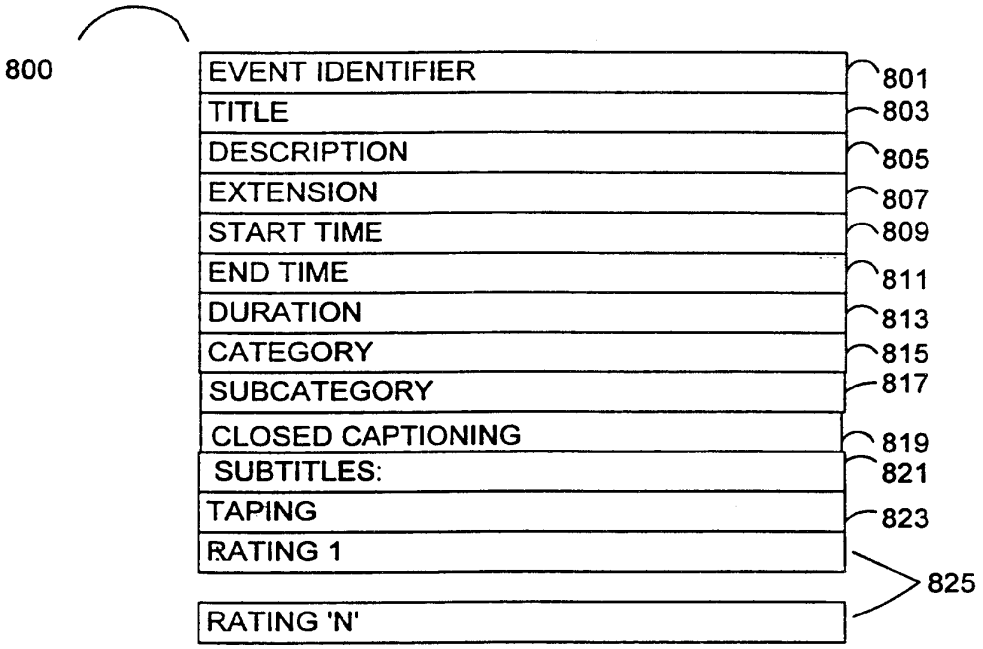

800
EVENT IDENTIFIER
TITLE
DESCRIPTION
EXTENSION
START TIME
END TIME
DURATION
CATEGORY
SUBCATEGORY
CLOSED CAPTIONING
SUBTITLES:
TAPING
RATING 1
RATING 'N'
801
803
805
807
809
811
813
815
817
819
821
823
825

FIG. 8

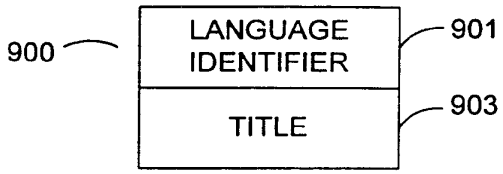


FIG. 9

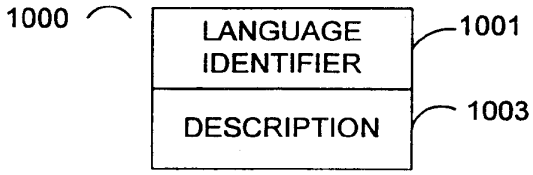


FIG. 10

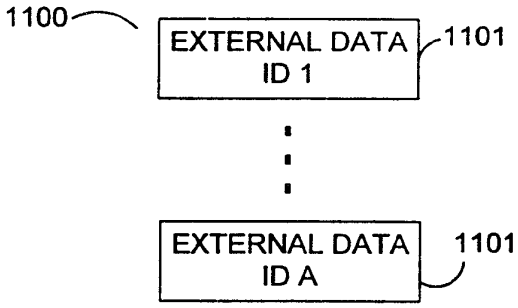


FIG. 11

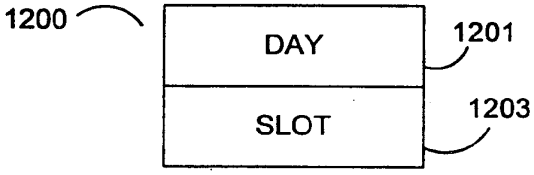


FIG. 12

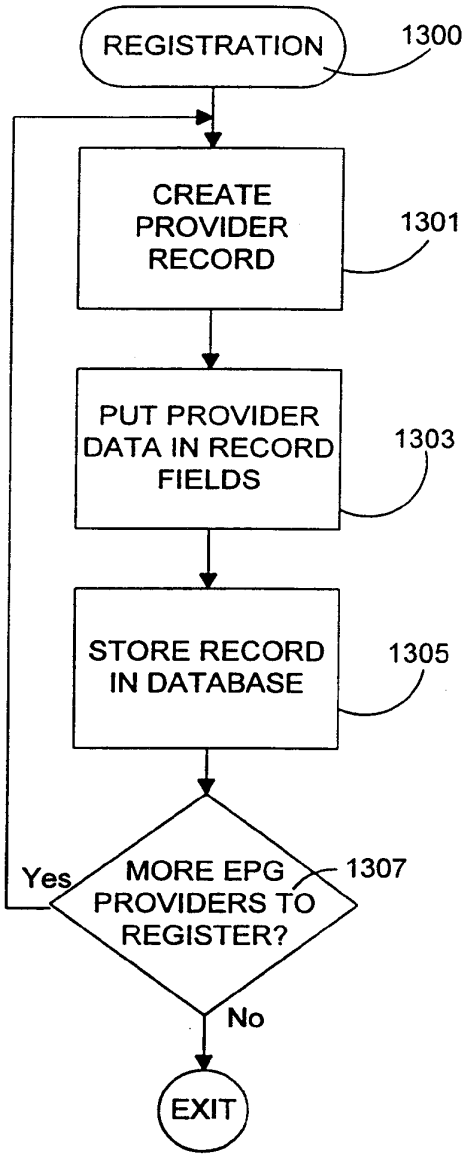
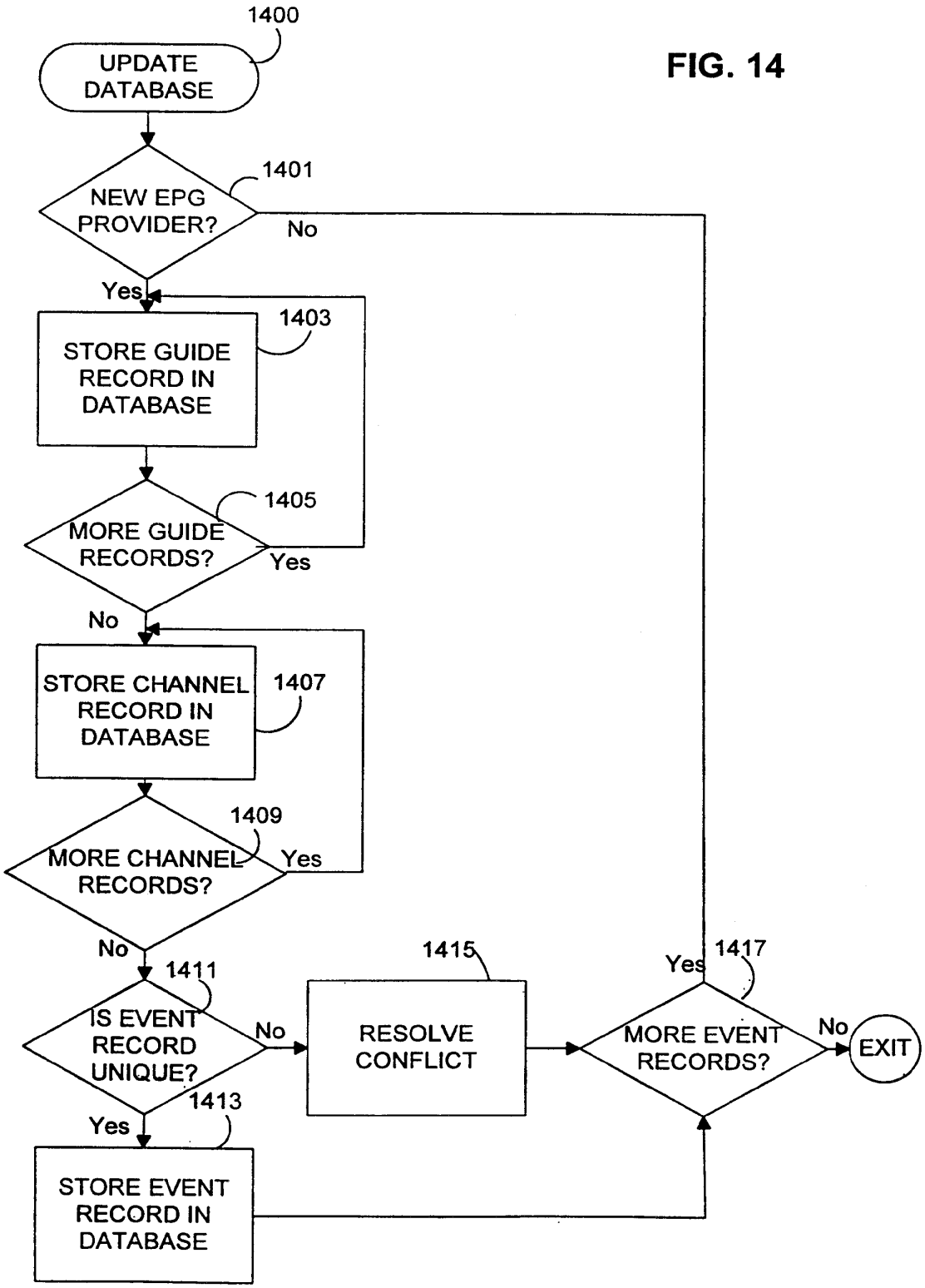

REGISTRATION
1300
CREATE PROVIDER RECORD
1301
PUT PROVIDER DATA IN RECORD FIELDS
1303
STORE RECORD IN DATABASE
1305
MORE EPG PROVIDERS TO REGISTER?
1307
Yes
No
EXIT

FIG. 13

FIG. 14


1400
UPDATE DATABASE
1401
NEW EPG PROVIDER?
No
Yes
1403
STORE GUIDE RECORD IN DATABASE
1405
MORE GUIDE RECORDS?
Yes
No
1407
STORE CHANNEL RECORD IN DATABASE
1409
MORE CHANNEL RECORDS?
Yes
No
1411
IS EVENT RECORD UNIQUE?
No
1415
RESOLVE CONFLICT
1417
Yes
MORE EVENT RECORDS?
No
EXIT
1413
Yes
STORE EVENT RECORD IN DATABASE

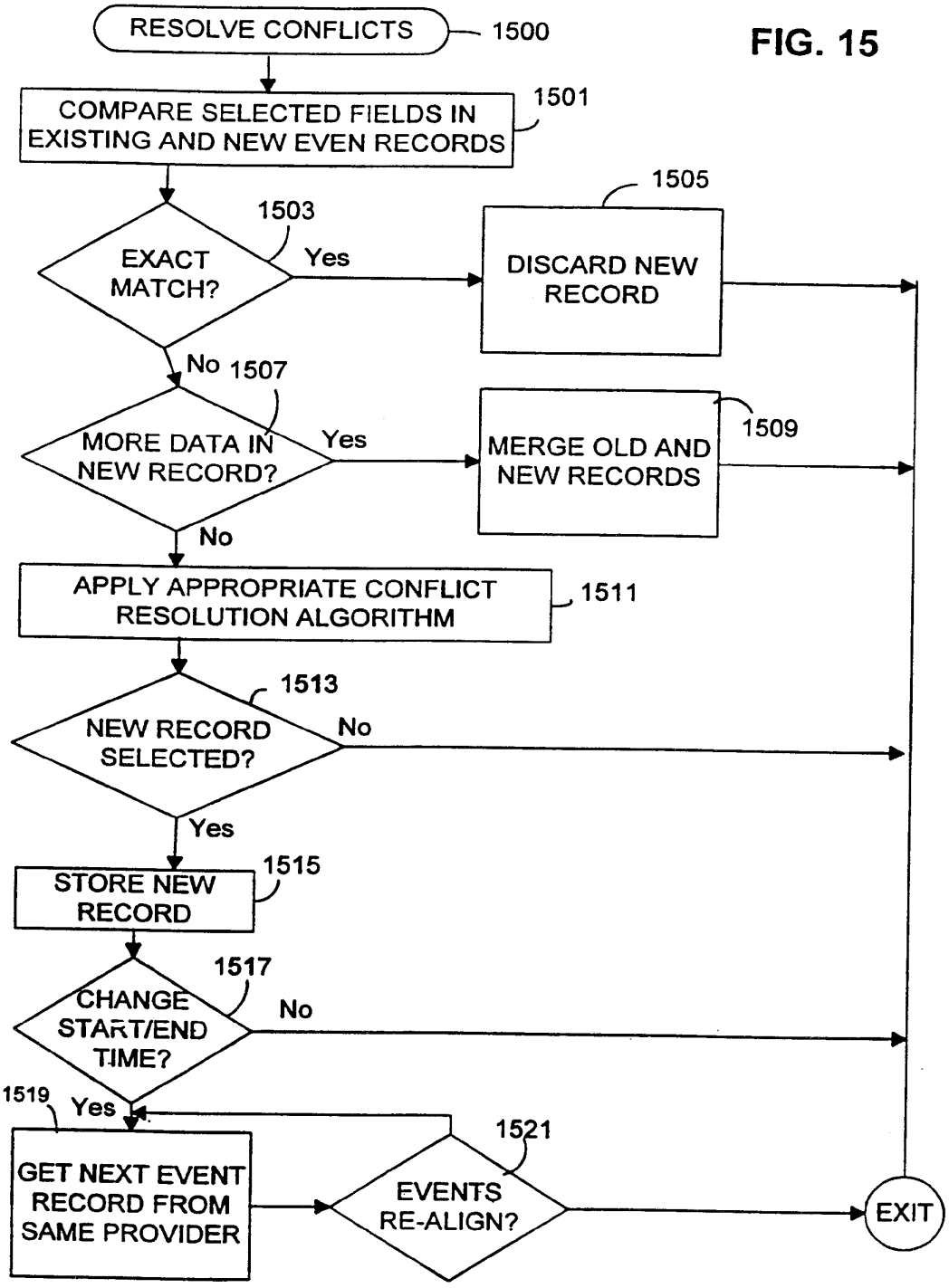

RESOLVE CONFLICTS
1500
COMPARE SELECTED FIELDS IN EXISTING AND NEW EVEN RECORDS
1501
EXACT MATCH?
1503
Yes
DISCARD NEW RECORD
1505
No
MORE DATA IN NEW RECORD?
1507
Yes
MERGE OLD AND NEW RECORDS
1509
No
APPLY APPROPRIATE CONFLICT RESOLUTION ALGORITHM
1511
NEW RECORD SELECTED?
1513
No
Yes
STORE NEW RECORD
1515
CHANGE START/END TIME?
1517
No
1519
Yes
GET NEXT EVENT RECORD FROM SAME PROVIDER
EVENTS RE-ALIGN?
1521
EXIT

FIG. 15

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/00093

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/16

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 6 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 08 275077 A (SONY CORP) 18 October 1996	1,2,8,9, 12,13, 17-20, 24,25, 27-30, 36-39, 41-46
A	& US 5 808 694 A see abstract see column 1, line 1 - column 2, line 24 see column 3, line 27 - column 6, line 17 see column 8, line 20 - column 12, line 5 see column 13, line 35 - column 13, line -/--	3-7,10, 11, 14-16, 21-23, 26, 31-35,40

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

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
16 April 1999	22/04/1999

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	Hampson, F

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/00093

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
	42 see column 17, line 8 - column 18, line 29 see figures 1-3,7,8,23-25	
X	US 5 576 755 A (DAVIS BRUCE ET AL) 19 November 1996	1,2,8,9, 12,13, 17-20, 24,25, 27-30, 36-39, 41-46
A	see abstract see column 3, line 5 - column 3, line 66 see column 4, line 25 - column 7, line 55 see figure 1	3-7,10, 11, 14-16, 21-23, 26, 31-35,40
X	US 5 666 645 A (GUSTAFSON DAVID W ET AL) 9 September 1997	1-3,8,9, 12,13, 17-19, 24-31, 36-39, 41-46
A	see abstract see column 1, line 45 - column 2, line 25 see column 5, line 15 - column 8, line 45 see figures 1-4	4-7,10, 11, 14-16, 20-23, 32-35,40

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte...ational Application No
PCT/US 99/00093

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 08275077 A	18-10-1996	US 5808694 A	15-09-1998
US 5576755 A	19-11-1996	AU 700801 B	14-01-1999
		AU 3970795 A	23-05-1996
		BR 9509532 A	30-09-1997
		CA 2203017 A	09-05-1996
		EP 0788713 A	13-08-1997
		JP 10512692 T	02-12-1998
		WO 9613935 A	09-05-1996
US 5666645 A	09-09-1997	AU 5631396 A	18-11-1996
		CA 2219021 A	31-10-1996
		EP 0823176 A	11-02-1998
		WO 9634486 A	31-10-1996

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(30) Priority Data:
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(74) Agent: EITAN, PEARL, LATZER & COHEN-ZEDEK; Gav Yam Center 2, Shenkar Street 7, 46725 Herzlia (IL).

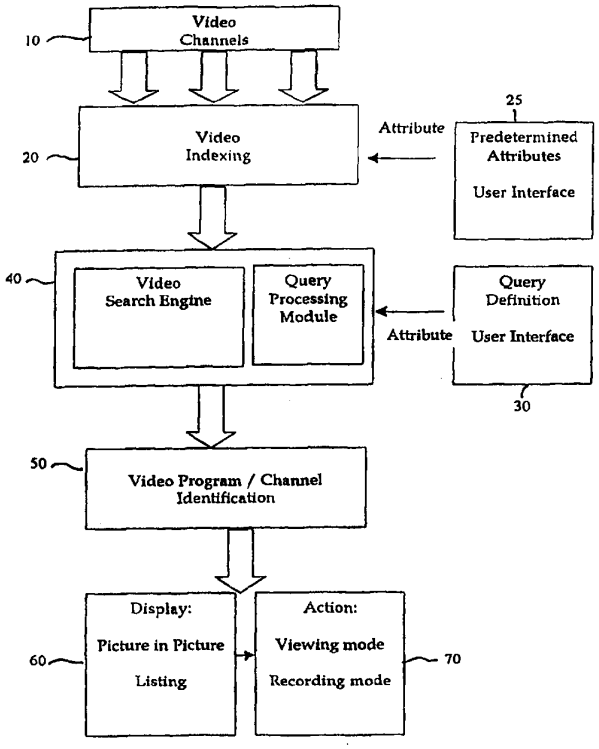
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(54) Title: A METHOD OF AUTOMATIC SELECTION OF VIDEO CHANNELS

(57) Abstract

A method of selecting, at a video receiver location, a desired video program channel from a number of program channels (10) transmitting video programs, by: automatically generating, for each program channel, indexing data (115) of at least one predetermined attribute based on the video program content of the respective channel; specifying at least one attribute corresponding to a desired program content, such as a program title or the occurrence of any event within a program; and identifying, from the indexing data, any program channel having a match with respect to the attribute specified. Preferably, the indexing data (115) is generated at a remote location, is encoded and transmitted in a separate indexing channel for all the program channels, and is received and decoded at the receiver location, the attribute corresponding to a desired program being specified at the receiver location.



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A METHOD OF AUTOMATIC SELECTION OF VIDEO CHANNELS

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to multi-channel video / television systems and, in particular, to a method of providing viewers with automated selection of channels which match viewer's defined search criteria.

The number of video channels available over cable television systems and satellite television systems increases rapidly. Therefore, users need improved methods for selecting video channels that at a given time carry a preferred program and or content. Similar needs occur in video on demand systems, interactive television, and certain internet-television arrangements.

For years, viewers have relied on pre-printed television program listing. There are numerous disadvantages in using an external paper-based information source, which is updated usually once a week.

In recent years, television-based electronic program guides (EPG) have been developed. Program listing are displayed directly on the TV screen and provide better access and ease of updating as compared to pre-printed guides. Typically, the EPG is a scrolling TV program list that is transmitted over a dedicated cable channel. Viewers can tune to the guide channel and view information about programs being then transmitted or to be transmitted in the near future.

Another form of dedicated cable channel contains a split screen display of the other channels. A video combination device generates the display such that several video channels (say 16) are displayed concurrently. When the number of channels is greater than the capacity of a single display screen, several displays are time-toggled to cover the entire set of channels. However, the passive nature of this technique limits its value. Also, one cannot search by title, genre, channel or view listing for programs scheduled a few days ahead.

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Several prior art methods are specifically directed to channel searching.

In some prior art methods, the search capabilities are manual and therefore disturb the viewing habit. Also, manual techniques are very limited in situations of hundreds of video channels.

In other prior art methods, automatic searching is based on pre-encoded textual descriptions of the video content. Such descriptions are subjective and usually very concise. Closed captions, which are encoded into the video signal, contain a transcription of the dialogues but do not relate to any visual information. Additionally, no provision is made for events that are happening in real time such as a sudden or dramatic event that is as "breaking news". Such event is probably not contained in the EPG data.

There exists a need for an improved television channel selection method, which employs automatic searching in video, based on the audio and video content of the television channels. There exists also a need for the method to match the viewer's preferences, specified as a query, with the content attributes of the television channels which are extracted automatically and in real-time from these channels.

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BRIEF SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided a method of selecting, at a video receiver location, a desired video program channel from a number of program channels transmitting video programs, comprising: automatically generating for each of the program channels, indexing data of at least one predetermined attribute based on the video program content of the respective channel; specifying at least one attribute corresponding to a desired program content; and identifying, from the indexing data, any program channel having a match with respect to the attribute specified.

According to further features in many of the described preferred embodiments, the indexing data is generated at a remote location, is encoded and transmitted in a separate indexing channel for all the program channels, and is received and decoded at the receiver location; and the at least one attribute corresponding to a desired program is specified at the receiver location.

According to still further features in the described preferred embodiment of the invention, the indexing data is collected from selected key-frames of the respective video program; and is tagged with a channel identification code and with a time tag. In addition, the indexing data from a plurality of channels is multiplexed into a data stream before transmission.

According to still further features in the described invention, the selection of the channel to be viewed may be "event-driven", as an extension of the prior art methods of "program-driven". Thus, the video material is segmented into multiple sets of "events", such as occurrences of people, objects, sounds and other; the occurrence of the events can be detected and presented to the viewer at the receiver location.

Thus, according to another aspect of the invention, there is provided a method for indicating at a video receiver location, the occurrence of a particular event when occurring on any number of program channels transmitting video programs, comprising: automatically generating at a remote location, for each of

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the program channels, indexing data of the respective video programs; encoding and transmitting said indexing data for all the channels; receiving and decoding the indexing data; specifying at the receiver location the particular event when occurring on any of the programmed channels; and identifying, from the indexing data each occurrence of the particular event on any of the program channels.

According to further features with respect to this aspect of the invention, the specified event, when occurring on any of the program channels may be automatically displayed (e.g., as a picture within a picture) on the screen of the video receiver; and / or, may be recorded in a recorder.

According to one embodiment of the invention, the indexing data is transmitted in a separate indexing channel and is received and decoded at the receiver location. In a second described embodiment, the indexing data is used at a central control node for selecting programs to be transmitted to a plurality of viewer stations at a plurality of receiver locations according to the attribute specified at the respective receiver location.

According to another aspect of the present invention, therefore, there is provided a method of selecting, at a plurality of viewer locations, a desired video program from a plurality of video programs transmitted in a plurality of program channels, comprising: automatically indexing, at a remote location, attributes of each of the video programs transmitted in the program channels; transmitting said attributes of each of the video programs in the program channels; receiving, at a central control node, the video programs and the attributes thereof; specifying, at each of the viewer locations, particular attributes of a video program desired to be viewed at the respective viewer location; and utilizing, at the central control node, the attributes specified at the viewer location for identifying the video programs matching the specified attributes.

Thus, the system may include a central control node that receives the indexed data from the indexing channel and transmits programming over a network to multiple viewer stations (e.g. homes). The programming may include

standard analog video broadcasts (e.g., NTSC, PAL), digitally encoded video broadcasts (e.g. MPEG), or digital information related to computer-executed applications. Each viewer station includes at least one video display set (e.g., a television receiver) and an interactive station controller which is sometimes referred to as a set-top box. The interactive station controller at the viewer station specifies at least one attribute corresponding to a desired program to be viewed. The central control node then identifies from the indexed data received and decoded the channel representing the best match with respect to the content-based attribute specified and transmits the best-match channel to the receiver location.

In one described preferred embodiment, the content that is searched and detected may be stored in a recording device, enabling future viewing and programs/events statistics information gathering. In another described preferred embodiment, the data processor at the remote location generates indexing data that is stored in a web server in the internet.

According to a still further aspect of the present invention, there is provided a method of generating a program schedule of desired video program channels from a number of program channels transmitting video programs of various program contents, comprising: automatically generating, for each of the program channels, indexing data of at least one predetermined attribute based on the content of the programs to be transmitted on the respective channel, and the scheduled transmission time thereof; specifying at least one attribute corresponding to a desired program content; and identifying, from the indexing data, the program channels and the scheduled transmission times thereof, having a match with respect to the specified attribute to thereby produce a program schedule of the program channels.

Further features and advantages of the invention will be apparent from the description below.

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BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1A is a block diagram illustrating an overall system in accordance with the present invention.

FIG. 1B illustrates a video channel selection system based on automatic searching by content according to one aspect of the present invention;

FIG. 2 illustrates a video channel selection system that includes a central control node;

FIGS. 3A and 3B depict a partitioning of a video program into high-resolution segments, or events;

FIG. 4 is a flow diagram of preferred steps for selecting video channel based on automatic searching by content;

FIG. 5 illustrates a video indexing data multiplexing and encoding device according to another aspect of the present invention;

FIG. 6 illustrates an automatic video indexer according to another aspect of the present invention;

FIG. 7 illustrates a search menu for defining a user query from pre-defined attributes of audio and video content;

FIG. 8 illustrates a sequence of video indexing data, which is a low-resolution representation of the respective video images;

FIG. 9 is a flow diagram of preferred steps for searching explosions in video based on visual content only;

FIG. 10 illustrates a data sequence of measurements characteristic of explosions;

FIG. 11 is a flow chart of a web-based television channel selection system based on automatic searching by content; and

FIGS. 12A, 12B and 12C illustrate the system used for producing a personalized program schedule; and

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FIG. 13 illustrates the system used for computing topic-oriented video summaries of television channels according to one aspect of the present invention.

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DETAILED DESCRIPTION OF THE PRESENT INVENTION

This invention presents a method of selecting at a video receiver location, a desired video program channel from a number of program channels transmitting video programs. FIG. 1A presents an overview of the main system components. Video channels can be inputted from a variety of sources 10, including live video streams, as well as archived video material. For each of said program channels, indexing data is generated 20, of at least one predetermined attribute 25, based on the video program content of the respective channel. The method entails specifying at least one attribute corresponding to a desired program content 30. The attribute may be a desired program title, or an occurrence of an event within any program at any channel, as will be elaborated on and demonstrated below. While utilizing the indexed data and user input attributes, a search is conducted to detect a match of the program channels and the attribute specified 40. Multiple attributes may be specified, along with a set of relating conjunctions, in which case a match is detected when all attributes are present, and when the associated conjunctions are met. Once a match is detected, the related program and program channel is identified 50. Multiple program channels may be identified as having a match. The match scores may be sorted, in which case the identified program channels are identified as the "best match program channel", "second-best match channel", and so forth. Identified programs are presented to the viewer, e.g., as a picture-in-picture or as a scrolling listing on the main display screen 60. With this information in hand, the viewer may select an option such as the viewing of the identified program content, or the recording of the content 70. Viewer may select these options in an interactive operational mode, or may predetermine selected actions. The variations within the presented method for video channel selection will be discussed as well as possible system embodiments.

Reference is now made to FIG. 1B, which is a block diagram showing a first embodiment of the video channel selection system. For purposes of simplicity and clarity, the system is described with reference to widely available systems and standards, including conventional analog television receivers and

cable-based video networks. It will be appreciated, however, that the particular components of the channel selection system may be implemented with a variety of conventions, standards, or technologies without departing from the underlying concepts of the present invention. The term "video-channel selection system" is used to emphasize the applicability of the invention beyond standard television-based systems. The term "video" is used to describe both an audio-visual content and the image part of that content which consists of a sequence of images.

The system illustrated in FIG. 1B comprises two parts: one at the transmitter side, and the other at the receiver side. Generally, the transmitter side of the system can be located at the service provider's site, and the video indexing channels can be encoded and transmitted along with other channels. The receiver side includes at least one video display set (e.g., a television receiver) and an interactive station controller which is sometimes referred to as a set-top box.

The receiver side of the system can be located in a user's set-top cable converter box or other signal reception or processing device such as a satellite receiver. Alternatively, the components can be mounted in a separate housing or included as a part of the television receiver, VCR, personal computer or multimedia player.

The transmitter side consists of a set of similar processing paths, one for each video channel. Each such path takes a digital video bit-stream 110, such as an MPEG2 stream, and decodes the stream in a decoder unit 111, into a sequence of video images. The video feed for each channel may be a live program or a recording on tape. The programming may include standard analog video broadcasts (e.g., NTSC, PAL), digitally encoded video broadcasts (e.g. MPEG), or digital information related to computer-executed applications. Regardless of input format, the bit-stream is converted into a sequence of images and the associated sound track in order to enable indexing on a wide range of video attributes.

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When the input for a specific television channel consists of a video signal 113, a video digitizer module 114 converts that signal into a digital representation of the sequence of images and the associated sound track in a format suitable for processing by the video indexer modules 115. The decoded or digitized video signals are encoded for transmission in the video indexer modules 115. The operation of each video indexer module 115 is described in detail in FIG. 6. In that described embodiment video indexing is based on key-frames (a subset of the original video frames), which are used as a representation for these original video frames. Video content is captured at frame rate of 25 frames or 30 frames per second (PAL or NTSC formats, respectively). Since the visual information content in video changes at slower rates, only a fraction of the video frames is retained, and the indexing data for content-attributes are automatically computed for these frames only. Although video-indexing data is related to key-frames, additional frames may be needed when computing this data. A specific example is in the case of motion where frames adjacent to each key-frames are analyzed to extracted motion attributes.

The key-frames and video indexing data of a number of selected channels are time multiplexed in multiplexer 116 (FIG. 1B) into at least one video index channel which is later processed to aid the user in television channel selection. The sparse nature of key-frames, coupled with the concise nature of video indexing data, allows multiplexing such frames and indexing data from multiple channels into a unified video index channel. All key-frames and associated indexing data are tagged with a channel identification code as well as a time-tag, so that channel-specific indexing data can be de-multiplexed and reconstructed at the receiver's side.

Video indexing data is preferably prepared at the transmitter side for the following reasons: The computational capacity of the set-top box or television receiver is limited; the indexing is done in a user-independent manner; and the bandwidth does not allow transmitting multiple channels to the receiver for indexing. Note that the "transmitter side" can be any central location, such as a cable head-end, as will be discussed below.

Since key-frames and indexing data depend on the content of each channel, multiplexer 116 is designed to handle several situations that may occur. One such situation is the occurrence of two or more key-frames at the same time. In such a situation key-frames are either dropped or re-encoded in a more concise manner.

FIG. 1B shows also a functional block diagram of the remote control handset 120 and set-top box controller 130 at the receiver side. The remote control handset 120 comprises: a query profile selection signal generator 121 that generates query profile selection signals in response to depression of suitable buttons: an automatic searching signal generator 122, and a regular channel changing signal generator 123 which generates channel changing signals in response to depression of the channel changing buttons.

The set-top box controller 130 at the receiver side further includes an indexing data decoder 131 in communication with the cable-company and connected to a video search engine 132 within controller 130. The latter further includes a channel selector 133 controlling a secondary channel receiver 134 within controller 130 in communication with the cable company. Controller 130 further includes a primary channel receiver 135, and a user interface 136.

FIG. 2 is a block diagram showing an alternate to the video channel selection system of FIG. 1B. In FIG. 2, the transmitter 200 and the receivers 210 are separated by a central control node 220, that includes a receiver 221, a server 222, a video search engine 223, and a transmitter 224. The receiver 221 receives the programs and indexed material from the transmitter 200. The server 221 stores the indexed material received from the transmitter 200, searches this material for specified attributes in the video search engine 223, and transmits programming over a network to the multiple viewer stations 210 (e.g. homes) via cable or wireless.

Each viewer station 210 includes a receiver 211, at least one video display set 212 (e.g., a television receiver), and an interactive station controller 213, e.g., that sometimes referred to as a set-top box. The server 222 in the central

control node 220 matches the indexed video material to a pre-allocated set of users. The users' preferences and search criteria are available at the server 211 by a user-controlled remote server within controller 213, and/or by automatic extraction of viewer preferences based on viewing-history profiles effected by the controller 213. The interactive station controllers 213 at the viewer stations also enable the viewers to specify at least one attribute corresponding to a desired program to be viewed. The central control node 220 then identifies, from the indexed data received and decoded, the channel representing the best match with respect to the content-based attribute specified by each user and transmits the best-match channel program to the receiver location of the respective viewer.

In the two embodiments described (FIG. 1B and FIG. 2), the channel selection (identification) process takes place in the set-top box (130) and the server in the central-control node (220), respectively. These units have access to the attributes coming from the receiver end, as well as the indexed data generated from the video channels. These units are then responsible for detecting any matches and identifying the respective channels, sorted by their match; specifically, identifying the channel representing the best match, and the channel of the next-best match. The two embodiments described represent two possible system architectures. In the one case, the indexed data is generated at a remote location, and transmitted to the receiver location, at which place the program identification is pursued. In the second case, the indexed data is generated at a remote location, transmitted to a centralized location (a central-control node), at which place the program identification is pursued and conveyed further to receiver locations. It should be noted that additional embodiments are possible, such as the generation of the indexing data locally at the server location; the detection of a match and identification of selected programs at a server location, which may be physically located with the video channel providers; and variations thereof.

An example is in news production houses that generate the video material, have indexing data generated in house, provide video material to

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editorial rooms based on predefined attributes, or user-specified attributes – all within a localized architecture.

With the present invention, video material, both pre-recorded programs as well as live material (e.g. live footage coming in a news program), are automatically indexed for content. Channel selection is thus enabled based on live material as well as predefined program categories. Multiple channels are indexed simultaneously.

The term "content" refers to all visual and auditory information that is extracted and indexed automatically from the video streams, in addition to any manual annotation available (e.g. the program title, program category etc). Moreover, video content relates to the partitioning of video streams into segments that correspond with video "attributes". Attributes may represent video program *titles*, as known in prior art, in which case the corresponding video segments are full–length video program segments. In this invention, attributes may also represent the occurrence of "events" *within a program segment*, thus partitioning the program into higher-resolution segments of content. Hereon, the terms *attributes* and *events* are used interchangibly.

FIG. 3-A depicts a partitioning of a video program segment 300 into "event" segments. Examples of attributes and events include: object (e.g., people) events 310-313, sport-events (e.g., "goals" 320, 321), and news events (e.g., "breaking-news" events 330). Examples of other events that may be specified by a user include: action-movie events (e.g., explosions), sound events (e.g., President Clinton's voice), spoken-word events (e.g., words about politics or the economy), and text-events (e.g., segments that have material regarding a certain location and that location is present as overlayed text on top of the video segment). Events are detected and indexed across several video channels simultaneously, as shown in FIG. 3-B. The time axis is segmented into events as they occur ("event-driven"). Each event, indicated as a short line segment, is linked to the related channel /video source.

With this definition of content, the selection of the channel to be viewed may be "event-driven", as an extension of the prior art methods of

"program-driven". Thus, the system enables searching video channels for attributes/events in addition to searching for full-length programs. Occurrences of the specified events are detected and presented to the viewer at the receiver location.

The user can predefine a table of attributes of interest. Alternatively, a viewer's preference list of search attributes, or a program viewing profile, may be learned from the user's viewing history.

An example of a user's attribute table, or a program and event list, is the following:

Category/Attributes	Programs/Events
News	CNN, NBC, ABC
Sports	NBA
News	"breaking news"
Sports	"Goal"
People	"Sharon Stone", "Clinton"
Words	"economy", "disaster"

The user may select a category of interest, such as news or sports; within each category, the user may define programs of interest such as CNN, NBC news. The user may choose attributes of interest, such as people or keywords, and particular events of interest, such as the appearance of "Sharon Stone" and "Clinton", or any words spoken about the "economy".

Combinations are possible within the selection criteria. The user may combine program categories with attribute events, such as selecting to see Pres. Clinton only on selected news programs (e.g. CNN); the user may add time constraints, such as selecting to be notified of events occurring during all evening news channels.

FIG. 4 is a flow diagram of preferred steps for selecting a television channel or any video channel based on automatic searching by content.

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In step 410, video streams are received from multiple video channels. In step 420, key-frames are selected from each video channel, based on the video content in a manner that represents the content of the video in a concise and efficient way; based on the key-frames, additional indexing data, which are attributes related to the content of the video, are computed. In step 430, key-frames and indexing data from all indexed channels are encoded and combined into a much smaller number of indexing streams or files.

Steps 440 to 480 constitute a particular sequence for channel selection by the viewer according to the present invention. In step 440, the viewer receives a particular primary video signal to the television receiver or set-top box controller; the primary signal is usually displayed on the main video display. In step 450, key frames and video-indexing data generated as described above are transmitted to the set-top box controller; alternatively, the video-indexing data is transmitted to the server at a central node location as described above with reference to FIG. 2. In step, 460 a video query is defined by manipulating an on-screen menu; alternatively, such a query can be defined by the user in a more flexible or pre-programmed manner in the user's personal computer and downloaded to the receiver or set-top box controller or server at the central control node 210 of FIG. 2. Alternatively, viewer's preference list of search attributes is updated based on viewer's query history or viewing profile, and used for current search.

In step 470, the search results, (e.g., in the form of key-frames) from video channels other than the primary channel that match the video query, are displayed on a secondary display (such as a picture-in-picture (PIP) arrangement). Alternatively, results may be presented as a listing. The user can, as shown by step 480, select interactively either to switch the primary channel, or to record a video channel, according to the search results.

A functional description of a mutiplexing device for video indexing data for use as multiplexer 116, FIG. 1B, is illustrated in FIG. 5. Video indexing data 510 enters the video index multiplexer from a plurality of channels and is encoded by the indexing data encoder 520 for each channel. The parallel to

serial converter 530 serializes the encoded indexing data streams from the plurality of channels. The serial index data stream enters a FIFO buffer 540 and exits to an arbitration logic 550 designed to handle co-occurrence of key-frames in more than one channel. Then, the encoded indexing data goes through a bit rate controller 560 to produce the output time-multiplexed video indexing data.

The serialization of a number of data channels, the arbitration of key-frames, and the control of the data-rate, can be implemented by a number of prior art methods from the field of communications that are not specific to the present invention.

FIG. 6 describes an automatic video indexer that may be for video indexer 115 in FIG. 1B to select key-frames and to generate indexing data.

The audio-video data stream is first processed by a key-frame selection module 610 to produce a content summary. A number of prior-art methods for selecting key-frames are known. Most of them are based on detecting video shot transitions and selecting a frame from each shot (generally the first one) as a key-frame. In the presence of motion, more key-frames have to be selected to represent the content of video including the temporal variation. Co-pending Application No. PCT/IL99/00169 by the same assignee as the present application, describes a preferred method of selecting key-frames. In most types of video content, it is sufficient to select only a few percentage points of the original video frames to get a good representation.

While the summary, which consists of the video key-frames, can be used as a concise descriptor of the video content, more indexing information should be extracted to allow for efficient automatic searching. This is due to the following reasons:

- The key-frames contain raw image data, while video searching is done based on image attributes.
- Some attributes, such as image motion information, cannot be extracted accurately from key-frames alone.

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- Practical limitations on the computing power inside set-top boxes require that video search engines inside such boxes will operate on concise indexing data.

Video indexing data is automatically computed from the video image sequence by video image indexing engines 620. Such engines may include a face detection engine 621, a motion indexing engine 622, a video text recognition engine 623, and / or a color indexing engine 624.

Audio indexing data is automatically computed from the audio track by audio indexing engines 630. Such engines may include: segmentation to silence, speech, music and effects 631; feature extraction for audio classification 632; and recognition of pre-programmed effects 633.

Prior art methods are known and may be used for implementing each of the above mentioned indexing engines 620 - 633.

Sometimes video streams carry video meta-data such as closed captions, and possibly encoded textual information such as annotations. Meta-data decoder 640 extracts this meta-data which is added to content-based indexing data. Manual annotations can also be added by annotation editor 650. In a live feed situation, the volume of such descriptions is limited due to time constraints. However, they provide additional information about the video content.

All video indexing data is time-stamped according to a global clock.

FIG. 7 illustrates a search menu 700 overlaid on the television display by a graphic generator that mixes the graphic video signal with the receiver video signal. The search menu consists of a set of content-based attributes such as visual attributes 710, audio attributes 720, topic-related attributes 730, and special attributes 740 such as breaking news or explosions. The search menu also includes a simple query language 750 that allows selecting "AND", "OR" and "NOT" control functions, for generating and displaying, in a display region 760, such queries as:

VISUAL = People AND AUDIO = Laughter

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Such a search menu is simple to operate and requires only a minimal user-interface. However, the indexing data transmitted to the viewer can support a wide range of video queries. For that purpose, a computer-based interface can be used to define a set of queries on the viewer's personal computer and to download the set of queries to the set-top box. Once downloaded, these queries can be selected by the remote controller handset 120 (FIG. 1B). In other TV-PC combinations, the query definition is supported more easily.

As mentioned above, the method for computing attribute-specific indexing data and for querying these attributes can be implemented by methods known in the art. For illustrative purposes, a simple example is described below teaching how to search for explosions based on the video image track.

The search is implemented, as described in FIG. 9, by a combination of indexing and searching. Indexing 910 consists of decimating the key-frame sequence that is computing a low-resolution version of the images. Low-resolution color representations support a wide variety of color-based queries.

FIG. 8 shows a low-resolution frame sequence obtained by decimating the key-frame sequence.

Searching for explosions in the indexing data is performed by computing the "fire magnitude" 920 at each frame. The fire magnitude value is computed by summing a quantity inversely related to the color distance from a pre-specified fire color value, over all pixels in the low-resolution image as shown by blocks 930 and 940 in FIG. 9. FIG. 10 shows the fire magnitude for the sequence of FIG. 8. The concise one-dimensional fire-magnitude sequence is processed by a derivative and threshold logic 950 to decide on a candidate explosion event.

The present invention can be implemented in additional embodiments other than those described above in which the multi-channel video indexing data are transmitted to the set-top box controller (FIG. 1B), or to a central control node (FIG. 2) that conducts the searching.

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Thus, the automatic television channel selection may be implemented over the Internet as illustrated in FIG. 11, wherein a set of video channels are indexed by content by the combination of a digital video decoder 1110 and a video indexer 1120 for each of the indexed channels. The index data is stored in a web server 1130 on the Internet 1131. The web server uses an Internet TCP/IP protocol to make the indexing data available to users at the PC and TV combinations 1140, 1150. 1160 and 1170.

Because of the growing overlap between the TV, the personal computer and the Internet, more configurations now support data integration between these elements. Several such configurations are illustrated in FIG. 11. These include: the configuration 1140 of TV viewing on a personal computer 1141 that has at least one TV tuner 1142 but is also connected to the Internet; the configuration 1150 of Internet-capable set-top boxes 1151 with a video- search engine 1152, and at least one TV tuner; the configuration 1160 of a computer connected directly to the television receiver, and the configuration 1170 of a personal computer only. Streaming video via an Internet connection, such as a broadband connection, is a replacement for a television signal connection.

Video streaming over the net is becoming more and more a reality, for example in "broadcast.com". Users of such sites are presented with listings of broadcast (video) material from multiple broadcast (video) channels. Video may be viewed and downloaded. With the present invention, users of such sites will be able to benefit from "event-driven" information, with program content provided by content-providers sorted according to viewer's preference lists, and all other additional characteristics that are described herein. In figure 11, the broadcast content is streamed via an Internet broadband connection. The user can select a user profile, formulate a query or provide a username for selection of previously defined search criteria. In a preferred embodiment, search results in the form of a listing of the currently available channels that meet the user-defined criteria, or a thumbnail presentation of the content of these channels in the form of updating key-frames can be put by the web-server as an HTML page and sent to the user.

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By clicking on at least one list item or one channel key-frame window, the selected video stream is buffered and played on the user terminal.

The identification of a channel meeting user-defined criteria is a process of finding a match between attributes in user-input query, or predefined attribute listing, and the indexed data. In case of multiple attributes and conjunctions, a match score may be given in reference to the number of attributes and conjunctions met (for example, the number of elements present). Alternatively, an all-or-nothing scheme may be used, in which a match is defined when all attributes and conjunctions are met, otherwise no match. Multiple matches correspond to multiple channels. Prioritizing between the channels may be introduced by utilizing the relative match scores; alternatively, viewer may set relative weights to the set of user-defined attributes; alternatively, video programs may be prioritized utilizing a viewer program preference table and history profile.

Once a video channel is automatically identified as containing the category and attribute of interest, the information may be conveyed to the viewer at the receiver location in several ways. In one embodiment the program (or a keyframe program representation) may be displayed in a secondary video display window as a picture-in-picture (PIP). A variety of PIP settings are known in the art. These may include partitioning of the main video display window into several smaller windows surrounding the main display, or a secondary display window as a small window top right, and others. In another embodiment, program identification is displayed as a listing on part of the display window. Program identification may include the program title (e.g. "CNN"), any defining attributes ("breaking news" segment) and any additional information desired (e.g., in a pay-per-view channel: "selecting this channel will cost X per hour"). In yet another embodiment, a signal may be used (such as a blinking signal or a sound signal) to notify of an event.

Following a channel identification event, the user at the receiver location may select via the controller 213, FIG. 2, one of several action items, including a viewing option and a recording option. In the viewing option, the user may select to switch over to a full-screen view of the selected channel. In

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the recording option, the user may select to record the content. The viewer may choose to select amongst these options interactively, following the notification of an event; alternatively, the viewer may decide on a fixed setting (e.g. record all events occurring during the 6-8pm time slot). For example, while a viewer is watching the sports channel, the viewer is notified in a picture-in-picture setting that there is a "breaking news" segment in the CNN channel whereupon the viewer may decide to select the CNN channel for viewing; alternatively, the "breaking news" may be automatically recorded.

A variety of techniques exist in the prior art that enable channel selection based on specific programs or categories, as selected by the viewer. Interactive television systems establish a database of viewer preferences based on particular characteristics previously delivered to the viewer. The system compares the viewer preference list to the video programming available at the selected time, and identifies the video programming which has the greatest degree of correlation. The main goal is to generate a personalized channel guide based on program preferences and times personalized for the individual viewer. An example of such a guide is shown in the following table:

	8:00-8:30	8:30-9:00	9:00-9:30	9:30-10:00
Sports	Soccer Game		NBA	
Drama	Gone with the Wind			
News	CNN	NBC	ABC	

In the present invention, an "event-driven" electronic program guide (EPG) can be generated. A block diagram for generating the event-driven EPG listing is shown in FIG 12-A. Video indexing data 1210 (generated based on a

set of predefined attributes) and user-specified attributes 1211,1212 are processed by a video search engine 1213, and the resultant program/events schedule is displayed in a listing 1214. The listing may be a scrolling listing, allowing the viewer to follow in real time, the video content from a number of channels, such that the content matches specific topics of interest. The listing may also entail future scheduled programs and events, in which case the listing entails programs and events, channel identification and time segments (such as the beginning and the end time of the segment of interest). Schedules of events that are non real-time are generated for any video material available that is non real-time material. An example of an event-based EPG real-time scrolling listing is shown in FIG. 12-B. At each time in which there is one or more identified matches, the identified events are listed along with the corresponding video channel identifications. The continuous scrolling listing of the events may be presented on a small portion of the main display screen, or as a buffered secondary screen. The viewer may be interested in future scheduling. A variety of scheduling screens are available to the viewer, as shown in FIG. 12-C. The display screens include a display that is channel based (for each channel, time schedule and attributes are listed), or a display that is time schedule based (time segment is listed, together with the attribute/event and corresponding program identification).

The event-driven electronic program guide may be generated as a personalized guide, personalized to the particular viewer attributes 1212. The event-driven electronic program guide may be generated as a global listing, containing all attributes, as chosen by the respective video channel providers, or predefined in the centralized control server, or as combined across multiple user preferences, 1211.

Referring to the two embodiments of FIG. 1B and FIG. 2, the indexing data for each of the program channels could be generated in the video indexing modules 115 or in the central control node 220, respectively. The video search engine and channel selection units, at the set-top box 130, alternatively, the server at the central control node 220, identify from the indexing data the

program channels to transmit programs, and the scheduled transmission times thereof, having a match with respect to the specified one or more attributes, to thereby produce a program schedule. The personalized attributes may be input via the remote control handset 121 or user interface in the set-top box 136, or alternatively, the controller 213 at each viewer station 210 could be used for specifying one or more attributes corresponding to desired program content data. The global set of attributes by which a schedule is generated, may be derived at the server 222 in the central control node 220. The global set can be extracted from a set of attributes as chosen by the video content providers, or by collecting attributes from a set of viewers, or by utilizing a history profiling of the viewers, or via some combination logic of the personalized attributes lists.

Generating a viewing history profile for a viewer may include storing a viewer preference database of programs viewer selects or receives, as known in prior art. In this invention, attributes and events are incorporated in the profiling. The handset 120 in FIG. 1B, or the controller 213 in FIG. 2 at the receiver location, may generate and store a viewing-history profile of the programs viewed and the attributes requested at the respective receiver location. Such history profile may be utilized for prioritizing the programs identified, e.g., in the server 222 of the central control node 220 having the attributes specified by the respective user at the receiver location.

In recent years, smart TV, or "time-shifted" TV have been developed which, via recording systems that use hard-drives and computer chips, record and store television programming so that people can watch whatever they want, whenever they wish. With such recording devices, the viewer at home may choose between viewing a selected channel and recording it. The present invention may also be used in such systems to record content-based events from a plurality of channels according to designated events or events based on history-profile preferences.

A yet additional application of the invention is to generate a report of program and event statistics. A professional user may be interested to gather appearance statistics for a particular logo of interest or a particular clip, for

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example. In this scenario. the event of interest is the logo (clip). This event is automatically indexed in the transmitter side and the indexed channel is received by the receiver (FIG. 1B) or by the server at the central control node (FIG. 2). Any indexed event is recorded in the recording device (as known in prior art). At the end of a specified time period (e.g., several hours, one day, night shows etc), statistics may be gathered. Examples are: number of occurrences per channel, overall time allocated in all segments, and so forth.

FIG. 13 is a flow diagram illustrating a method for generating topic-oriented video summaries (block 1310). In this method, video key-frames and video indexing data are processed by a video search engine 1311, and the query results are arranged in a storyboard, multi-frame display 1312. This display allows the viewer to follow. in real time, the video content from a number of channels, such that the content matches specific topics of interest.

The topic summary engine 1310 is similar in implementation to the channel selection method taught by the present invention and includes a query processing module 1313 communicating with a query definition user interface 1314. However, the purpose of the system in FIG. 13 is to allow topic-oriented multi-channel browsing rather than to select a specific channel.

The present invention can thus be applied to various arrangements where the user of viewer can select between multiple video or multimedia programs. Such arrangements include broadcasting, webcasting and other internet-television implementations, telecasting, video on demand, near video on demand, and interactive television.

While the invention has been described with respect to certain preferred embodiments, it will be appreciated that these are set forth merely for purposes of example, and that many other variations, modifications and applications of the invention may be made.

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What is Claimed is:

1. A method of selecting, at a video receiver location, a desired video program channel from a number of program channels transmitting video programs, comprising:

automatically generating, for each of said program channels, indexing data of at least one predetermined attribute based on the video program content of the respective channel;

specifying at least one attribute corresponding to a desired program content;

and identifying, from said indexing data, any program channel having a match with respect to the attribute specified.

2. The method according to claim 1, wherein said indexing data is generated at a remote location, is encoded and transmitted in a separate indexing channel for all said program channels, and is received and decoded at said receiver location; and wherein said at least one attribute corresponding to a desired program is specified at said receiver location.

3. The method according to claim 2, wherein said indexing data from a plurality of channels is multiplexed into a data stream before transmission.

4. The method according to claim 1, wherein said indexing data is generated from selected key-frames of the respective video program.

5. The method according to claim 1, wherein said indexing data is tagged with a channel identification code and with a time tag.

6. The method according to claim 1, wherein said generated indexing data includes both image and audio attributes.

7. The method according to claim 1, wherein one program channel is identified having the best match with respect to the attribute specified, and at least one additional program channel is identified having the next-best match with respect to the specified attribute.

8. The method according to claim 1, wherein, in order to assist specifying at said receiver location said at least one attribute corresponding to a

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desired program content, there is displayed, at said receiver location, a search menu setting forth a plurality of different attributes selectable by the user.

9. The method according to claim 8, wherein there are also displayed "AND", "OR" and "NOT" control functions also selectable by the user.

10. The method according to claim 1, wherein at least one of said attributes is the occurrence of an explosion in the video program, said indexing data including characteristic data indicative of fire-like color distribution in selected frames of the respective video program.

11. The method according to claim 1, wherein the generated indexing data is stored in a web server in the internet.

12. The method according to claim 1, wherein the program channel best matching the specified attribute is displayed as a picture within a picture on the screen of the video receiver.

13. The method according to claim 1, wherein the identification of the program channel matching the specified attribute is displayed on the screen of the video receiver.

14. The method according to claim 1, wherein the program channel matching the specified attribute is recorded.

15. The method according to claim 1, wherein a viewer at the receiver location preselects, via a user interface, whether a program channel identified as having a match with a specified attribute is to be recorded or to be immediately displayed on a video receiver at the receiver location.

16. The method according to claim 1, wherein said at least one predetermined attribute is used for generating a program guide setting forth a program schedule of channels to contain a video program content based on said at least one predetermined attribute.

17. The method according to claim 1, wherein said at least one specified attribute includes a particular event desired to be identified if occurring on any of said program channels.

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18. The method according to claim 1, wherein said indexing data is transmitted in an indexing channel and is received and decoded at said receiver location.

19. The method according to claim 1, wherein said indexing data is used at a central control node for selecting programs to be transmitted to a plurality of viewer stations at a plurality of receiver locations according to the attribute specified at the respective receiver locations.

20. The method according claim 19, wherein said indexing data is transmitted in an indexing channel to said central control node.

21. The method according to claim 19, wherein said central control node also uses said indexing data together with a history-profile of at least some of said viewer stations, for listing the programs to be transmitted to the respective viewer stations.

22. The method according to claim 1, wherein the video receiver location generates and stores a history-profile of programs viewed at said video receiver location, and utilizes said history-profile for prioritizing the identified programs having the attribute specified.

23. The method according to claim 1, wherein the video receiver location or the server at a central control node, generates a statistical report of occurrences of said specified attribute.

24. The method according to claim 1, wherein the specified attribute relates to a particular topic of interest, and said video receiver location or the server at the central control node, generates a summary of occurrences of said topic of interest in the video channels.

25. A method for indicating at a video receiver location, the occurrence of a particular event when occurring on any of a number of program channels transmitting video programs, comprising:

automatically generating at a remote location, for each of said program channels, indexing data of the respective video programs;

encoding and transmitting said indexing data for all said channels;

receiving and decoding said indexing data;

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specifying at said receiver location said particular event; and

identifying from said indexing data each occurrence of the particular event on any of the program channels.

26. The method according to claim 25, wherein said indexing data is transmitted in a separate indexing channel and is received and decoded at said receiver location.

27. The method according to claim 25, wherein said indexing data is used at a central control node for selecting programs to be transmitted to a plurality of viewer stations at a plurality of receiver locations according to the attribute specified at the respective receiver location.

28. A method of selecting, at a plurality of viewer locations, a desired video program from a plurality of video programs transmitted in a plurality of program channels, comprising:

automatically indexing, at a remote location, attributes of each of said video programs transmitted in said program channels;

transmitting said attributes of each of said video programs in said program channels;

receiving, at a central control node, the video programs and the attributes thereof;

specifying, at each of said viewer locations, particular attributes of a video program desired to be viewed at the respective viewer location; and

utilizing, at said central control node, said attributes specified at said viewer location for identifying the video programs matching said specified attributes.

29. The method according to claim 28, wherein said attributes of each of said video programs in said program channels are transmitted in a separate indexing channel.

30. The method according to claim 29, wherein said central control node also uses said attributes transmitted in said indexing channel, together with a history-profile of at least some of said viewer stations, for listing the programs to be transmitted to the respective viewer station.

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31. A method of generating a program schedule of desired video program channels from a number of program channels transmitting video programs of various program contents, comprising:

automatically generating, for each of said program channels, indexing data of at least one predetermined attribute based on the content of the programs to be transmitted on the respective channel, and the scheduled transmission time thereof;

specifying at least one attribute corresponding to a desired program content;

and identifying, from said indexing data, the program channels and the scheduled transmission times thereof, having a match with respect to the specified attribute to thereby produce a program schedule of said program channels.

32. The method according to claim 31, wherein said indexing data is generated at a remote location, and is encoded and transmitted in a separate indexing channel for all said program channels.

33. The method according to claim 31, wherein said indexing data is received, decoded, and utilized at a receiver location for identifying the program channels to transmit programs having a match with respect to the specified attribute, and the scheduled transmission times thereof.

34. The method according to claim 31, wherein said indexing data is received, decoded, and utilized at a central control node for identifying the program channels to transmit programs having a match with respect to the specified attribute, and the scheduled transmission times thereof.

35. The method according to claim 31, wherein a plurality of attributes are specified each corresponding to a desired program content, and each program having a match with a specified attribute is identified and included, together with its scheduled transmission time, in said program schedule.

36. The method according to claim 1, wherein said video receiver is a computer connected to the Internet.

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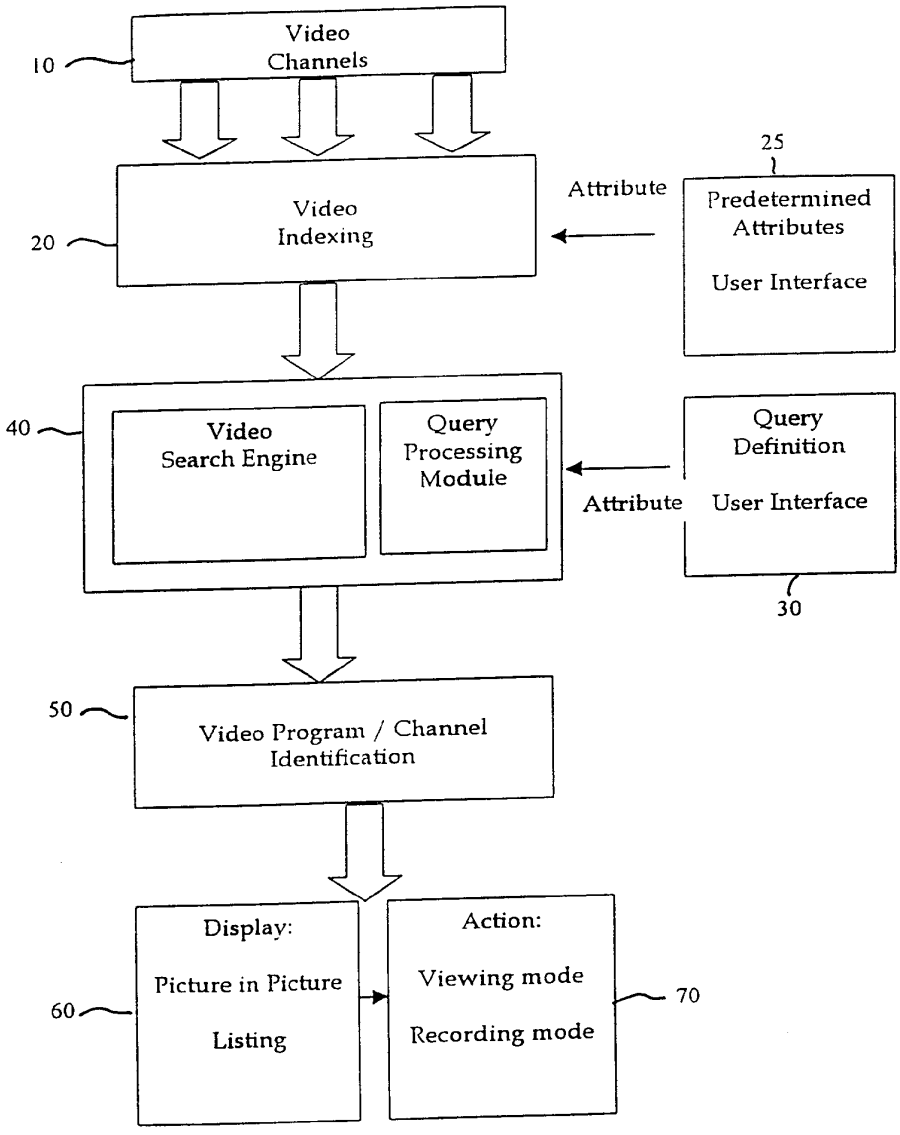


FIG 1-A

EX. 1002
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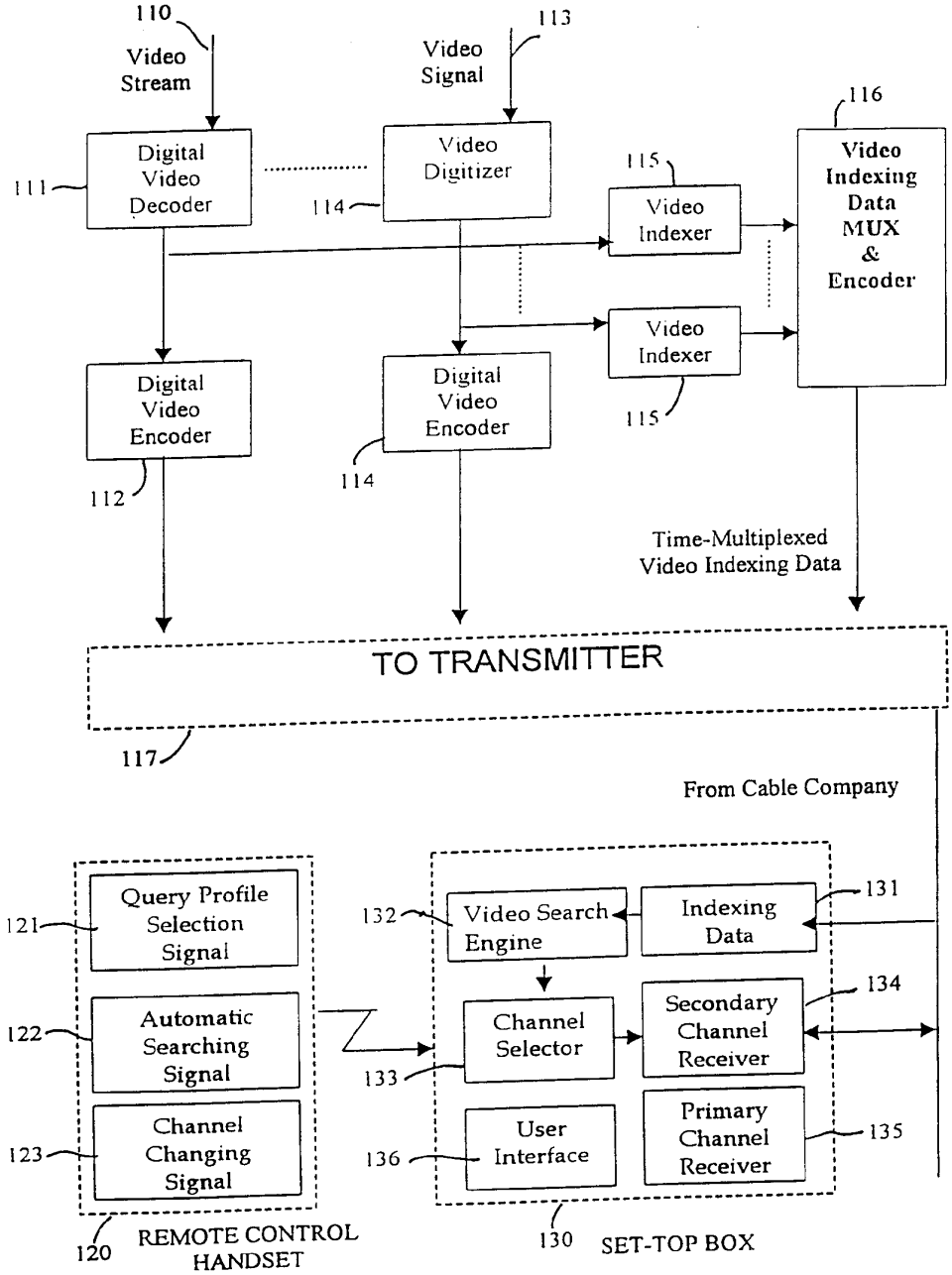

110
Video Stream
113
Video Signal
116
Digital Video Decoder
111
Video Digitizer
114
115
Video Indexer
Video Indexing Data MUX & Encoder
Video Indexer
115
Digital Video Encoder
112
Digital Video Encoder
114
Time-Multiplexed Video Indexing Data
TO TRANSMITTER
117
From Cable Company
Query Profile Selection Signal
121
Automatic Searching Signal
122
Channel Changing Signal
123
REMOTE CONTROL HANDSET
120
132
Video Search Engine
Indexing Data
131
Channel Selector
133
Secondary Channel Receiver
134
User Interface
136
Primary Channel Receiver
135
130
SET-TOP BOX

FIG 1-B

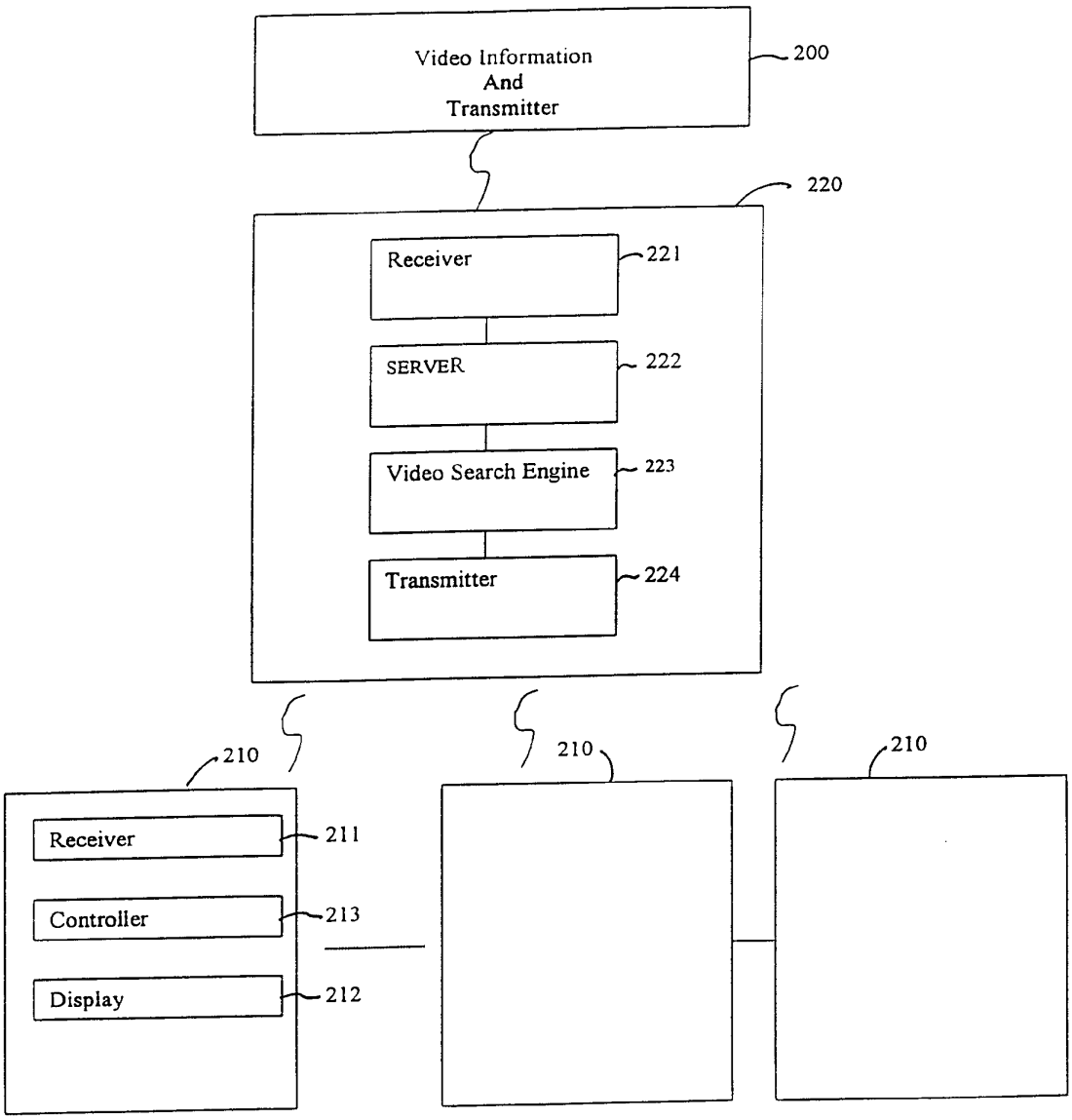

Video Information
And
Transmitter
200
220
Receiver
221
SERVER
222
Video Search Engine
223
Transmitter
224
210
210
210
Receiver
211
Controller
213
Display
212

FIG 2

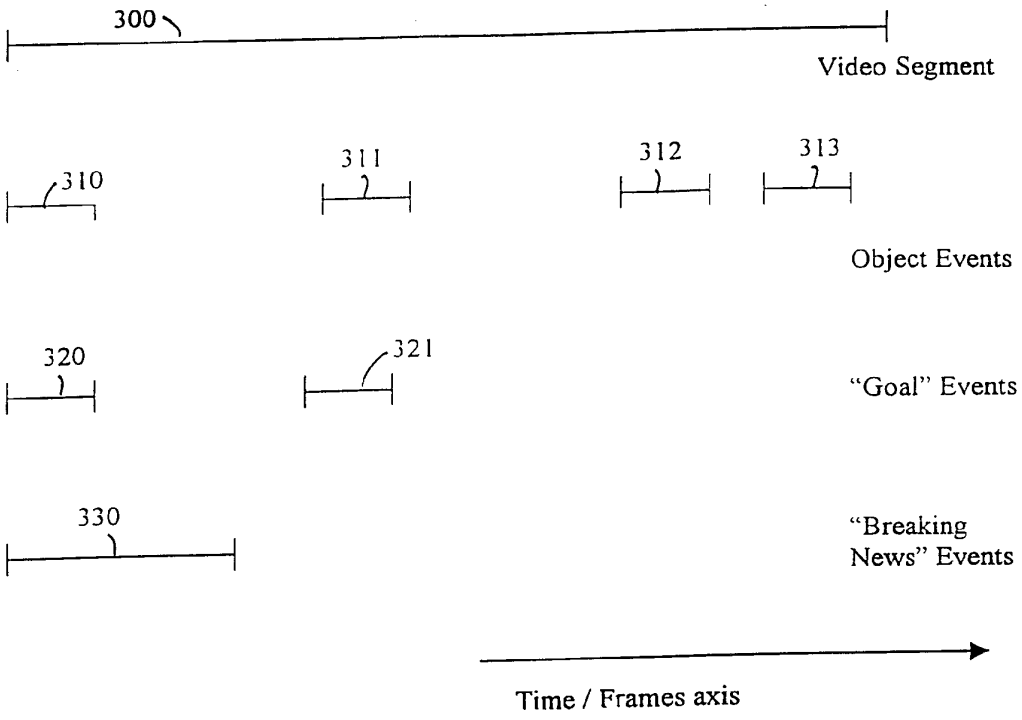

300
Video Segment
310
311
312
313
Object Events
320
321
"Goal" Events
330
"Breaking News" Events
Time / Frames axis

FIG 3-A

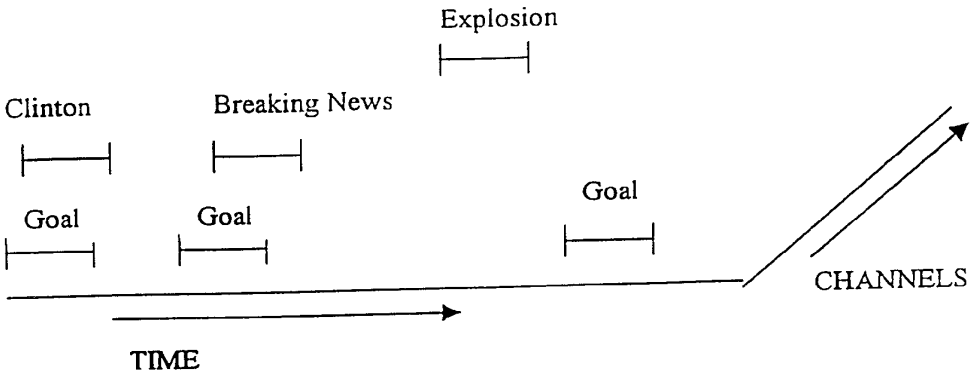

Explosion
Clinton
Breaking News
Goal
Goal
Goal
CHANNELS
TIME

FIG 3-B

5/14

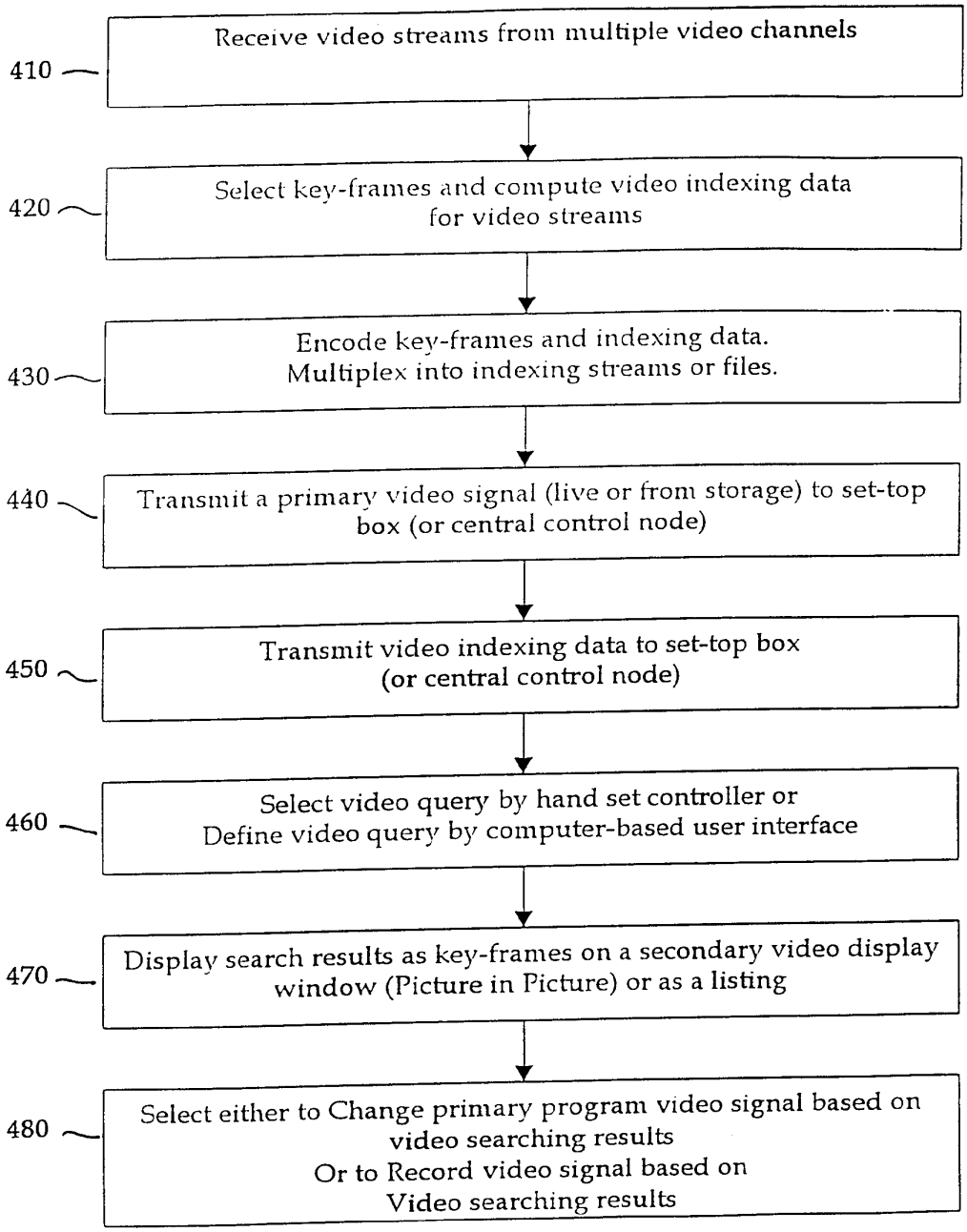


FIG 4

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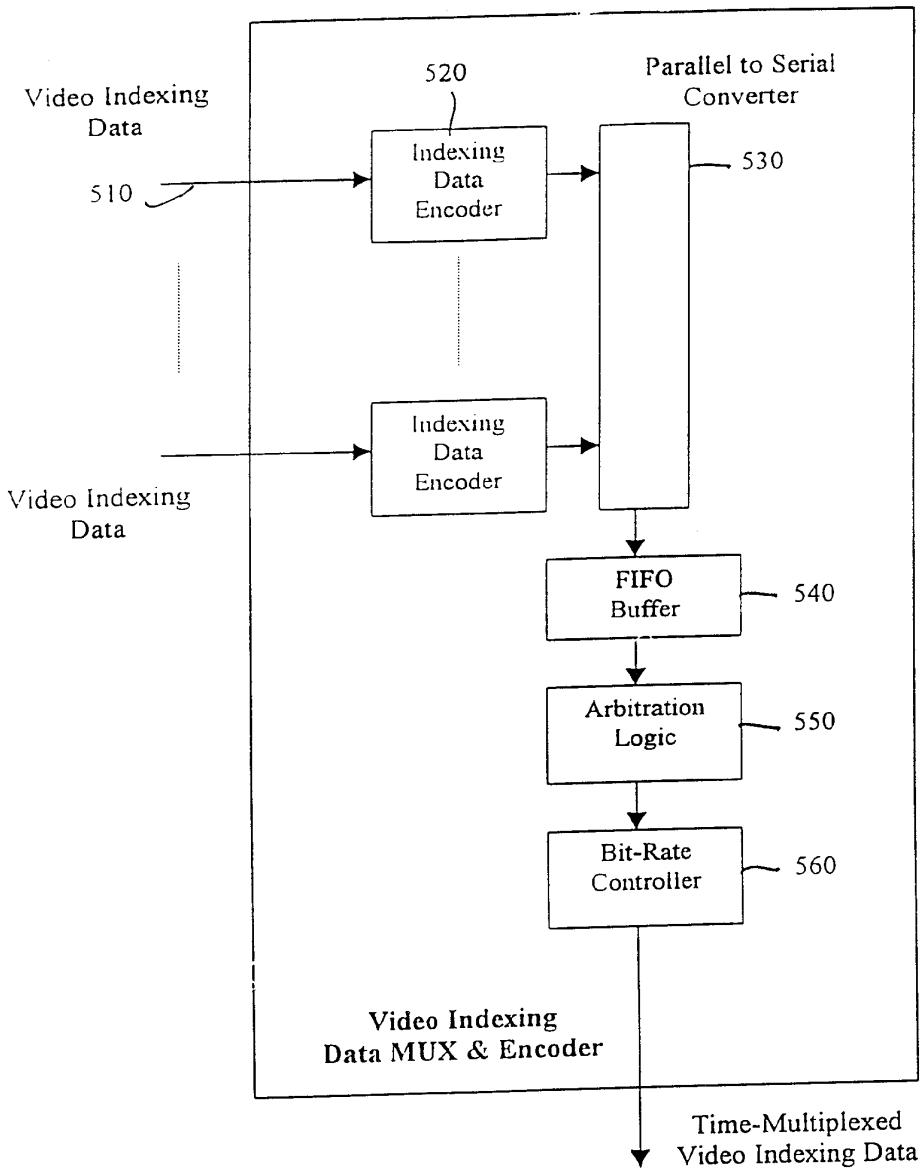

Video Indexing Data
510
520
Indexing Data Encoder
Parallel to Serial Converter
530
Indexing Data Encoder
Video Indexing Data
FIFO Buffer
540
Arbitration Logic
550
Bit-Rate Controller
560
Video Indexing Data MUX & Encoder
Time-Multiplexed Video Indexing Data

FIG 5

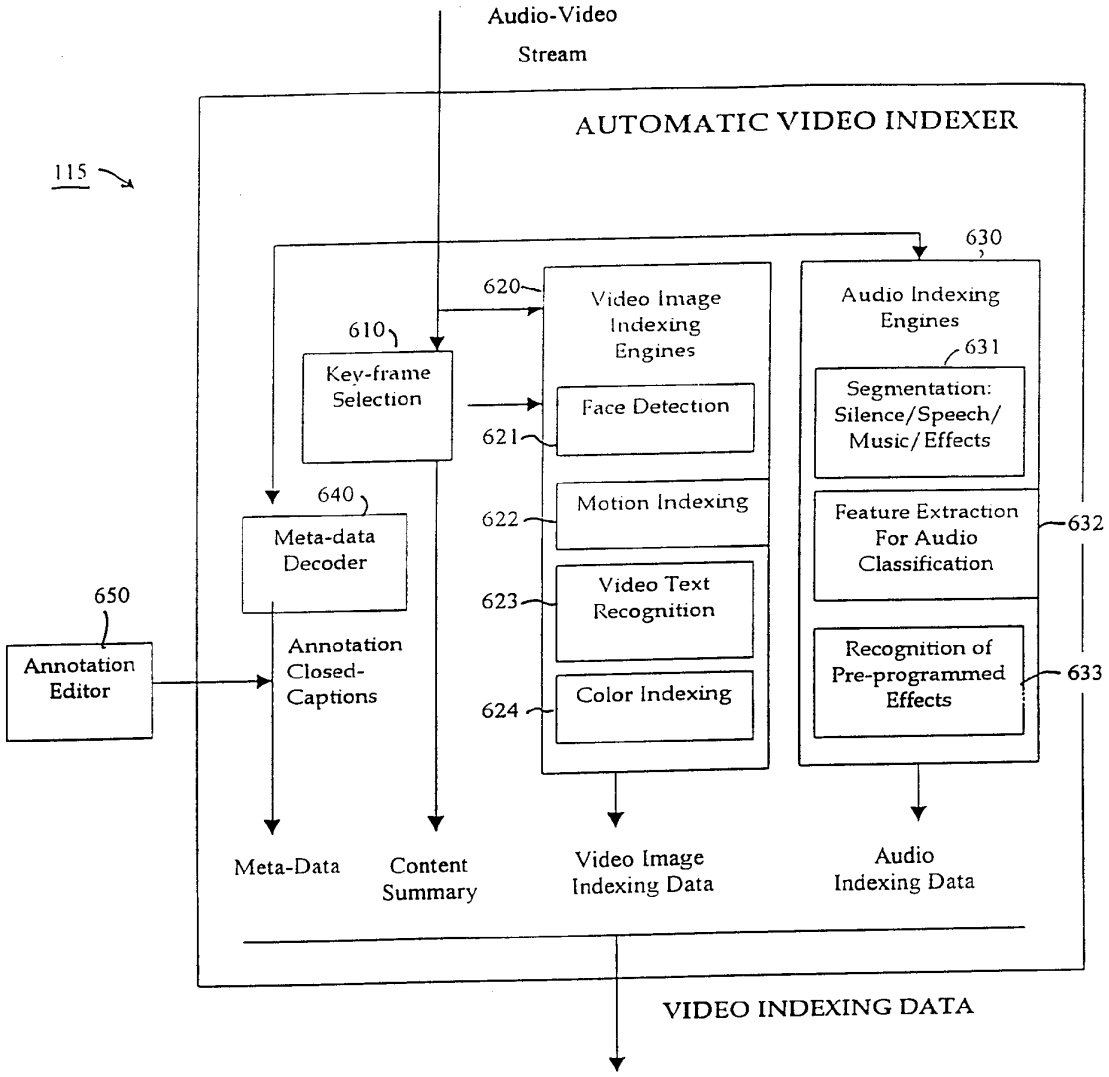

Audio-Video
Stream
AUTOMATIC VIDEO INDEXER
115
630
620
Video Image
Indexing
Engines
Audio Indexing
Engines
631
610
Key-frame
Selection
Face Detection
621
Segmentation:
Silence/Speech/
Music/Effects
640
Meta-data
Decoder
622
Motion Indexing
Feature Extraction
For Audio
Classification
632
650
Annotation
Editor
623
Video Text
Recognition
Annotation
Closed-
Captions
Recognition of
Pre-programmed
Effects
633
624
Color Indexing
Meta-Data
Content
Summary
Video Image
Indexing Data
Audio
Indexing Data
VIDEO INDEXING DATA

FIG 6

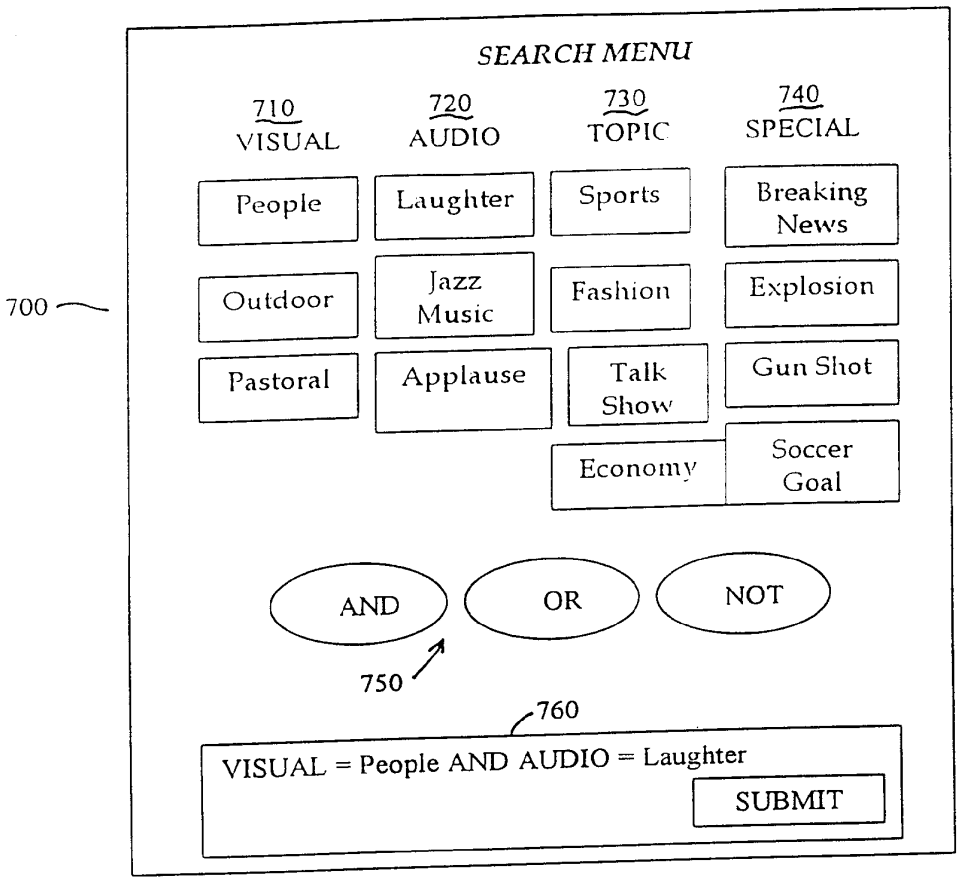

SEARCH MENU
710 VISUAL
720 AUDIO
730 TOPIC
740 SPECIAL
People
Laughter
Sports
Breaking News
Outdoor
Jazz Music
Fashion
Explosion
Pastoral
Applause
Talk Show
Gun Shot
Economy
Soccer Goal
700
AND
OR
NOT
750
760
VISUAL = People AND AUDIO = Laughter
SUBMIT

FIG 7

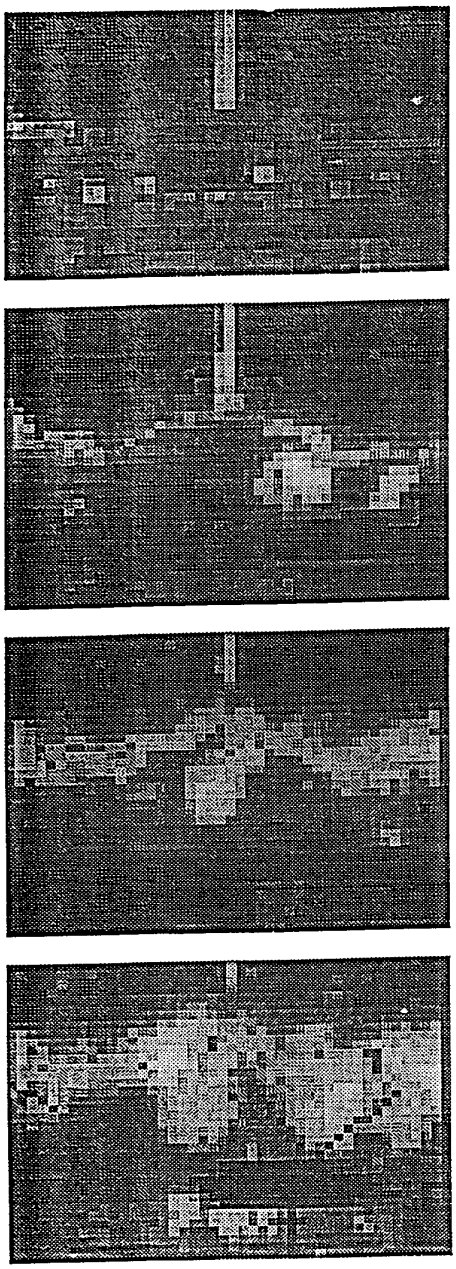


FIG 8

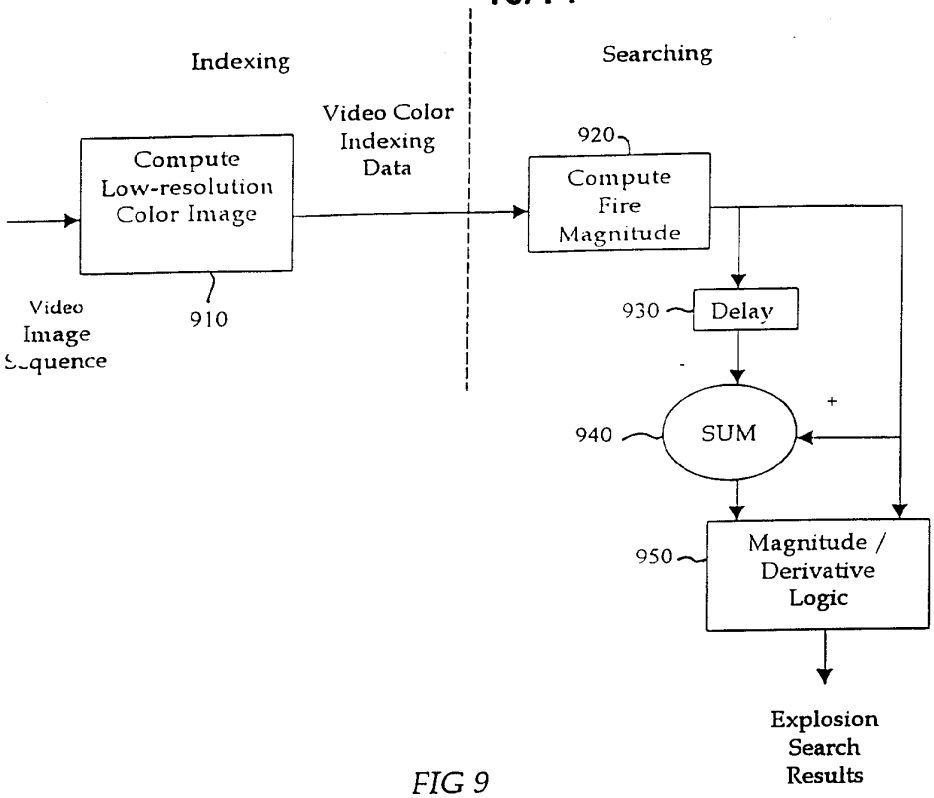

Indexing
Searching
Video Color Indexing Data
Compute Low-resolution Color Image
910
Video Image Sequence
920
Compute Fire Magnitude
930
Delay
940
SUM
+
950
Magnitude / Derivative Logic
Explosion Search Results

FIG 9

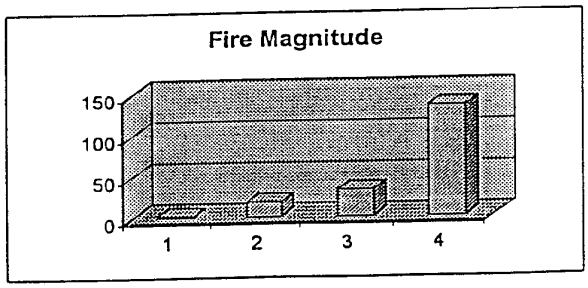

Fire Magnitude
150
100
50
0
1
2
3
4

FIG 10

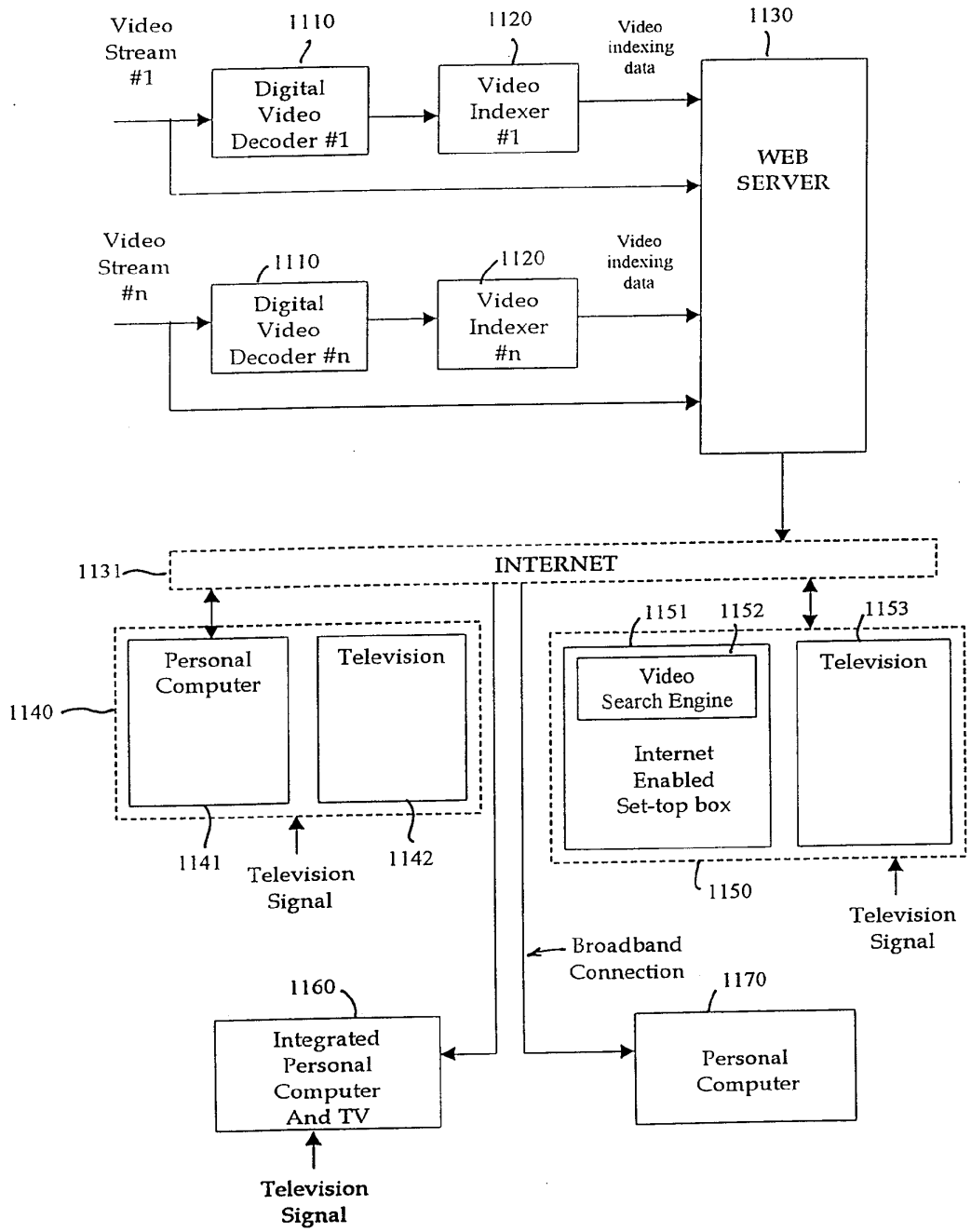

Video Stream #1
1110
Digital Video Decoder #1
1120
Video Indexer #1
Video indexing data
1130
WEB SERVER
Video Stream #n
1110
Digital Video Decoder #n
1120
Video Indexer #n
Video indexing data
1131
INTERNET
1140
Personal Computer
Television
1141
Television Signal
1142
1151
1152
1153
Video Search Engine
Internet Enabled Set-top box
Television
1150
Television Signal
Broadband Connection
1160
Integrated Personal Computer And TV
Television Signal
1170
Personal Computer

FIG 11

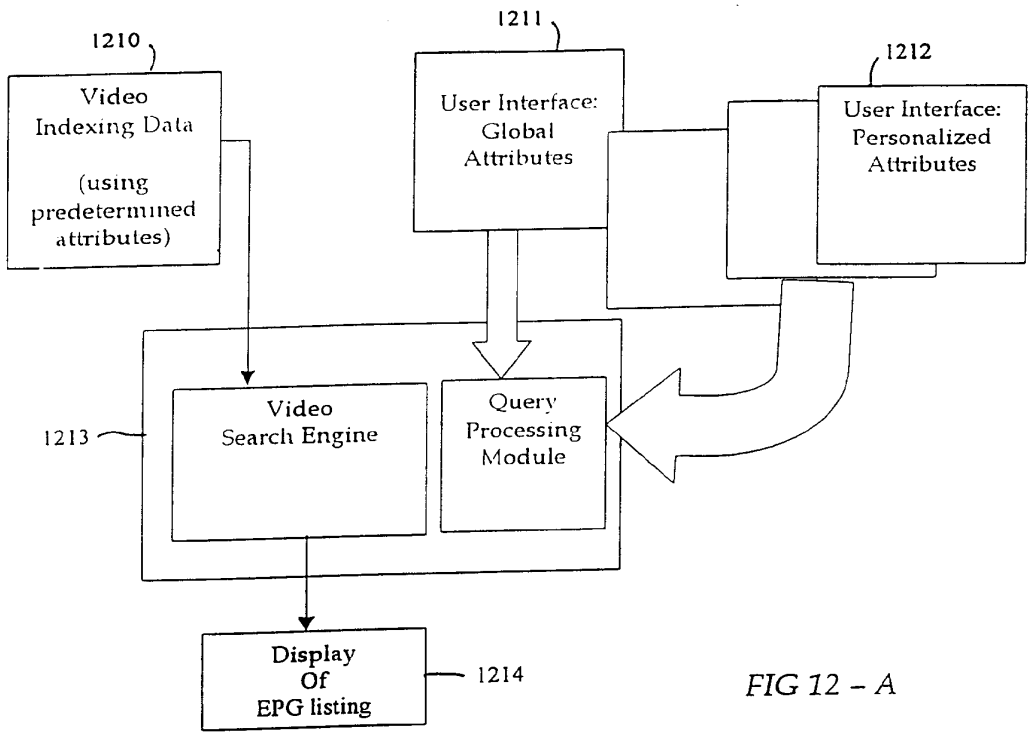


FIG 12 – A

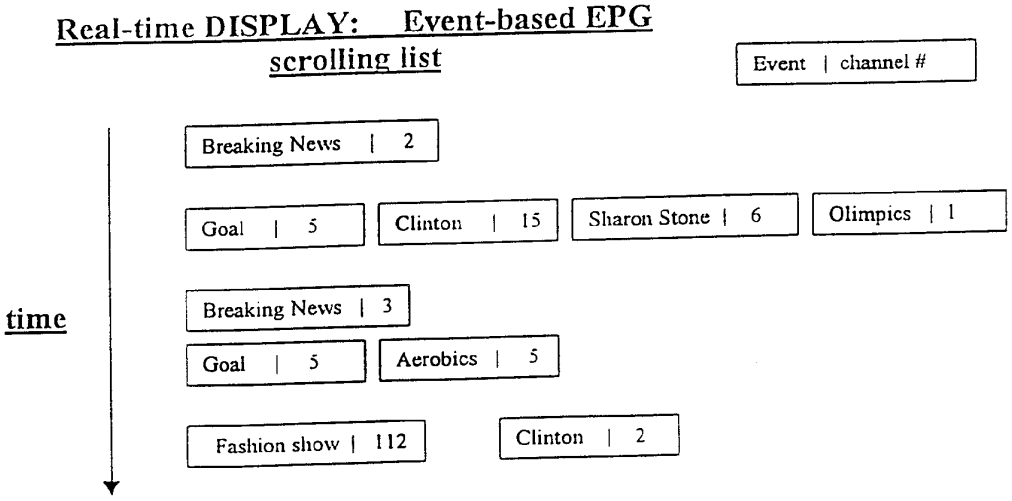


FIG 12 – B

DISPLAY: Channel 5

DATE	TIME	EVENT
4 /17/99	[10:10 - 10:30]	Clinton speech
4 /18/99	[9:25 - 9:40]	Fashion show
4 /20/99	[12:00 - 12:10]	Sharon Stone
4 /20/99	[14:20 - 14:25]	Explosion event

DISPLAY: TIME [10pm-12pm]
DATE April 20

Time segment	Event	Channel #
10:10-10:30	Clinton speech	5
10:30-10:35	Stelone & Shooting	6
11:00 – 11:10	Explosion event	13
11:15 – 11:20	Goal Event	220

FIG 12 – C

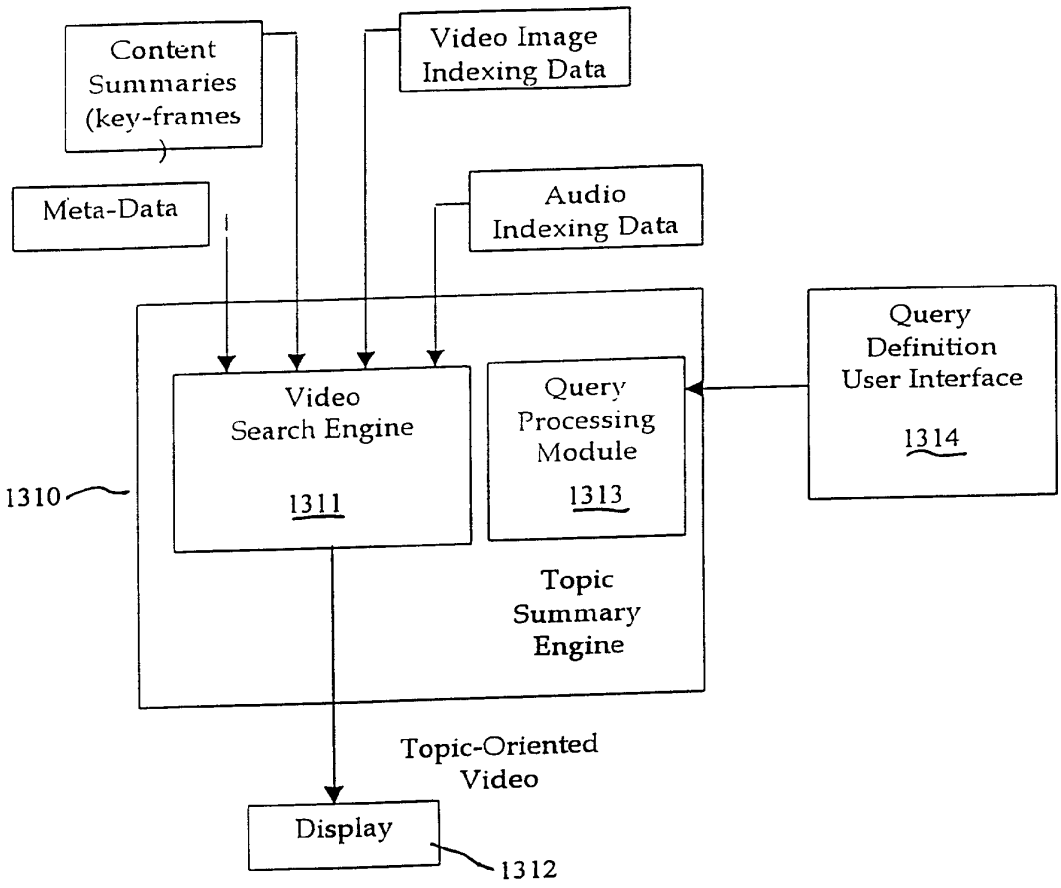

Content Summaries (key-frames
Video Image Indexing Data
Meta-Data
Audio Indexing Data
Query Definition User Interface
1314
Video Search Engine
1311
Query Processing Module
1313
1310
Topic Summary Engine
Topic-Oriented Video
Display
1312

FIG 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL99/00393

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :H04N 7/10
US CL :345/327
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. : 345/327; 348/1, 10, 12, 13; 455/5.1, 6.2, 6.3, 4.2

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)

WEST: AUTOMATICALLY GENERATING, CHANNEL, ATTRIBUTE, INDEXING, MULTICHANNEL, ENCODER, DECODER, EPG , RECEIVING, TRANSMITTING

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	US 5,867,205 A (HARRISON) 02 FEBRUARY 1999, col. 5, line 66 - col. 6, line 5.	1,2,11,14, 16-21, 25-29, 31-34
Y,P	US 5,872,588 A (ARAS et al) 16 FEBRUARY 1999, col. 3, lines 7-27.	1,2,11,14, 16-21, 25-29, 31-34
A,P	US 5,801,747 A (BEDARD) 01 SEPTEMBER 1998, ABSTRACT.	1-36
A,P	US 5,880,768 A (LEMMONS et al) 09 MARCH 1999, ABSTRACT.	1-36

☐ 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

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"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

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"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
02 NOVEMBER 1999

Date of mailing of the international search report
07 DEC 1999

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(25) Filing Language: English

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(74) Agents: PIERRI, Margaret, A. et al.; Fish & Neave, 1251 Avenue of the Americas, New York, NY 10020 (US).

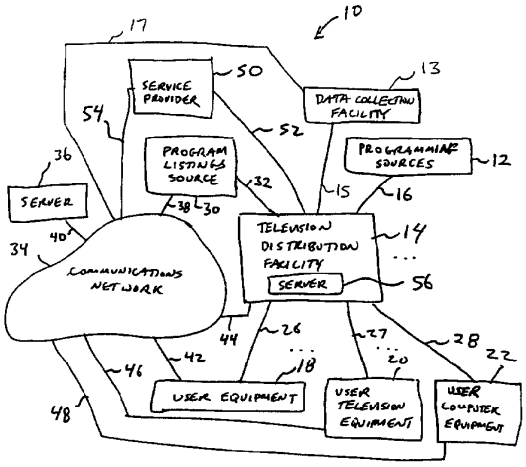
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, 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), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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: INTERACTIVE TELEVISION SYSTEMS WITH DATA COLLECTION



(57) Abstract: A system is provided based on user equipment such as a set-top box or computer on which an interactive television application may be implemented. Information may be collected on the television viewing activities of a user and the user's interactions with the interactive television application. The interactive television application may be an interactive television program guide. The collected information may be transmitted to a data collection facility using e-mail protocols, using the communications capabilities of a web browser, using a stand-alone FTP application, or using the communications capabilities of an operating system installed on the user equipment.

WO 01/06784 A2

INTERACTIVE TELEVISION SYSTEMS WITH DATA COLLECTION

Background of the Invention

This invention relates to television systems, and more particularly, to interactive television systems such as interactive television program guide systems in which data is collected on user activities.

Interactive television program guides are typically implemented on set-top boxes connected to televisions. Such program guides may be used to present screens of interactive television program listings to users.

Program guides may also be used to control which television channels the set-top box tunes to when a user is watching television. For example, a program guide may tune to different television channels in response to channel-changing commands from the user's remote control. Users may also select programs from the program guide for recording or viewing. Additional information may be obtained for a program by selecting the displayed listing for that program with a highlight region. Reminders may be set for programs.

The user's interactions with the program guide and the television programs that the user watches are indicative of the user's interests. These activities may be monitored. The information that is collected on the viewer's interests may be used for marketing purposes. For example, information that is collected on the viewer's interests may be used to target program guide advertisements to the user as described in Knudson et al. U.S. patent application Serial No. 09/034,939, filed March 4, 1998, which is hereby incorporated by reference herein in its entirety. Viewer monitoring is described, for example, in Thomas et al. U.S. patent application Serial No. 09/139,798, filed August 25, 1998, which is hereby incorporated by reference herein in its entirety.

It is an object of the present invention to provide arrangements for collecting information on the viewing habits and other activities of the user.

Summary of the Invention

A system is provided that gathers information on a user's television viewing activities and interactions with an interactive television program guide or other interactive television application.

The user's activities may be monitored by an interactive television program guide or other application. The monitoring software may maintain, for example, information on which channels the user watches, the duration that each channel is watched, and information on which household members are in the room while the television is being viewed. Information may also be collected on the user's interactions with the

interactive television program guide or other interactive television application. For example, information may be collected on which interactive buttons the user selects, which screens the user views, etc.

The user information that is collected may be transmitted to a data collection facility for analysis. Analysis may reveal that certain television programs are more popular than others, that certain program guide screens are more popular than others, etc. Analysis may also reveal the particular interests of a viewer and may reveal data trends. Correlations may be observed between certain viewer interactions with the program guide and certain viewer activities.

The user may participate in a monitoring scheme that requires the user to periodically submit information to a data collection facility for analysis. If desired, user information may be collected and transmitted to the data collection facility automatically and without user intervention.

User data may be transmitted to the data collection facility using e-mail, using the communications capabilities of the user's browser application (e.g., the forms capabilities of such browsers), using communications capabilities associated with the operating system on the user's equipment, using a stand-alone FTP application, etc.

Further features of the invention, its nature and various advantages will be more apparent from the accompanying drawings and the following detailed description of the preferred embodiments.

Brief Description of the Drawings

FIG. 1 is a diagram of an illustrative interactive television system with data collection capabilities in accordance with the present invention.

FIG. 2 is a diagram of illustrative user television equipment in accordance with the present invention.

FIG. 3 is a diagram of additional illustrative user television equipment in accordance with the present invention.

FIG. 4 is a diagram of an illustrative remote control in accordance with the present invention.

FIG. 5 is a diagram of illustrative user computer equipment in accordance with the present invention.

FIG. 6 is a generalized diagram of illustrative user equipment in accordance with the present invention.

FIG. 7 shows an illustrative menu screen in accordance with the present invention.

FIG. 8 shows an illustrative program guide screen in accordance with the present invention.

FIG. 9 is a flow chart of illustrative steps involved in gathering user information and automatically reporting such information to a data collection facility in accordance with the present invention.

FIG. 10 is a flow chart of illustrative steps involved in gathering user information and reporting such information to a data collection facility when authorized by the user in accordance with the present invention.

FIG. 11 shows an illustrative e-mail message that may be presented to the user to allow the user to authorize transmission of a user report to a data collection facility in accordance with the present invention.

FIG. 12 is a flow chart of illustrative steps involved in providing the e-mail message of FIG. 11 in accordance with the present invention.

FIG. 13 shows an illustrative program guide screen containing an interactive prompt that allows a user to decide whether or not to submit a user report in accordance with the present invention.

FIG. 14 shows an illustrative program guide settings screen that may be provided in accordance with the present invention.

FIG. 15 shows an illustrative personalization settings screen that may be provided by a program guide in accordance with the present invention.

Detailed Description of the Preferred Embodiments

An illustrative interactive television system 10 in accordance with the present invention is shown in FIG. 1. Television programming and digital music may be provided from programming sources 12 to television distribution facilities such as television distribution facility 14 using communications path 16. Programming sources 12 may be any suitable sources of television and music programming, such as television and music production studios, etc.

Television distribution facility 14 may be a cable system headend, a satellite television distribution facility, a television broadcast facility,

or any other suitable facility for distributing television and music programming to users. There are typically numerous television distribution facilities 14 in system 10, but only one is shown in FIG. 1 to avoid overcomplicating the drawings.

Communications path 16 may be a satellite path, a fiber-optic path, a cable path, or any other suitable wired or wireless communications paths or combinations of such paths.

Television distribution facility 14 may be connected to various user equipment devices 18. Such user equipment 18 may, for example, be located in the homes of users. User equipment 18 may include user television equipment 20 or user computer equipment 22.

The user equipment may receive television and music programming and other information from television distribution facility 14 over communications paths such as communications paths 26, 27, and 28. The user equipment may also transmit signals to television distribution facility 14 over paths 26, 27, and 28. Paths 26, 27, and 28 may be cables or other wired connections, free-space connections (e.g., for broadcast or other wireless signals), satellite links, etc.

Program listings source 30 may be used to provide the user with television program schedule information such as scheduled broadcast times, titles, channels, ratings information (e.g., parental ratings and critic's ratings), detailed title descriptions, genre or category information (e.g., sports, news, movies, etc.), information on actors and actresses, running times, etc.

Program listings source 30 may provide program schedule information to television distribution facility 14 over communications path 32 for distribution to the associated user equipment over paths 26, 27, and 28. Communications path 32 may be any suitable communications path such as a satellite communications path or other wireless path, a fiber-optic or other wired communications path, a combination of such paths, etc.

User equipment devices such as user television equipment and personal computers may use the program schedule information to display program listings and information on digital music for the user. An interactive television program guide application or other suitable application may be used to display such information on the user's display.

An on-line program guide may be provided by a server connected to communications network 34 such as server 36. Server 36 may receive program schedule information from program listings source 30 via communications path 38, communications network 34, and communications path 40. Paths 38 and 40 may be satellite paths, fiber-optic paths, wired paths, etc. Communications network 34 may be any suitable communications network, such as the Internet, the public switched telephone network, a packet-based network, etc.

User equipment 18 may access the on-line program guide via communications path 42, which may be any suitable communications path such as a wired path, a cable path, fiber-optic path, satellite path, a combination of such paths, or any other suitable path.

User equipment 18 may also access the on-line program guide via communications path 26, television distribution facility 14, and communications path 44. For example, a cable modem or the like may be used by user equipment 18 to communicate with television distribution facility 14. Television distribution facility 14 may communicate with communications network 34 over any suitable path 44, such as a wired path, a cable path, fiber-optic path, satellite path, a combination of such paths, etc.

User equipment such as user television equipment 20 and user computer equipment 22 may access the on-line program guide using similar arrangements. User television equipment 20 may access the on-line program guide using communications path 46 or using path 27, television distribution facility 14, and path 44. User computer equipment 22 may access the on-line program guide using communications path 48 or using path 28, television distribution facility 14, and path 44. Paths 46 and 48 may be any suitable paths, such as wired paths, cable paths, fiber-optic paths, satellite paths, a combination of such paths, etc.

Interactive television applications other than program guide applications may use service providers such as service provider 50. For example, a home shopping service may be supported by a service provider such as service provider 50 that has sales representatives, order fulfillment facilities, account maintenance facilities, and other equipment for supporting interactive home shopping features. A home shopping application that is implemented using the user equipment may be used to access the service provider to

provide these features to the user. The user equipment may access service provider 50 via television distribution facility 14 and communications path 52 or via communications network 34 and communications path 54. Communications paths such as paths 52 and 54 may be any suitable paths, such as wired paths, cable paths, fiber-optic paths, satellite paths, a combination of such paths, etc.

Another example of an interactive television application is a home banking application. A home banking service may be supported using personnel at facilities such as service provider 50. An interactive home banking application that is implemented using the user equipment may access the home banking service via television distribution facility 14 and communications path 52 or via communications network 34 and communications path 54.

If desired, an interactive television application such as a video-on-demand application may be supported using server 56. Videos may be stored on server 56 and provided to the user equipment when requested by users.

If desired, applications such as the interactive television program guide application, a home shopping application, a home banking application, a video-on-demand application, and other applications (e.g., applications related to e-mail and chat or other communications functions, etc.) may be provided as separate applications that are accessed through a navigation shell application (i.e., a menu application with menu options corresponding to the applications). The features of such applications may be combined. For

example, video-on-demand, home shopping, and communications functions may be incorporated into the program guide.

Moreover, the interactive television program guide application, the home banking application, and the home shopping application, the video-on-demand application, the communications application, and the navigation shell application, are only a few illustrative examples of the types of interactive television applications that may be supported by system 10. Other suitable applications that may be supported include, news services, Internet services, interactive wagering services (e.g., for wagering on horse races and the like), communications services (e.g., e-mail, chat, etc.), and any other suitable interactive applications.

These applications may be implemented locally on the user equipment. The applications may also be implemented using a client-server architecture in which the user equipment serves as a client processor and a server such as server 56 at television distribution facility 14 or other suitable location acts as a server processor. Other distributed architectures may also be used if desired. Regardless of the particular arrangement used to implement interactive television features related to program guides, home shopping, home banking, video-on-demand, Internet, communications, etc., the software that supports these features may be referred to as an application.

As the user interacts with the application and as the user watches television on the user equipment, information may be gathered on the user's

activities. For example, information may be gathered regarding which television channels the user tunes to and the times at which the user watches each television channel. Because the programs that are being aired at any given time may be determined from program schedule data, gathering information on the television channels that the user tunes to and the times at which these channels are tuned to allows the viewing habits of the user to be monitored. Information may also be gathered on which selectable on-screen interactive television application options the user selects when interacting with interactive television applications. This may reveal, for example, information on the advertisements that the user responds to, information on the user's favorite genres of television programming, information on other user interests (e.g., sports, news, etc.).

The information that is collected on the user's activities may be reported back to a suitable data collection facility for processing. For example, the information may be collected at user equipment 18 and reported back to computer equipment at data collection facility 13 via communications path 26, television distribution facility 14, and communications path 15 or via communications path 42, communications network 34 (e.g., the Internet), and communications path 17. Communications paths 15 and 17 may be fiber-optic paths, cable or other wired paths, wireless paths, or any other suitable communications paths.

If desired, the data collection facility may be located at television distribution facility 14. Data may, for example, be collected using a server such as server 56. User data may also be collected at a

server connected to the Internet or other communications network. For example, information on the user's activities may be collected using a server such as server 36. These examples are merely illustrative. User information may be collected using any suitable facility.

Moreover, user information may be collected regardless of the type of architecture used to provide television programming and interactive television services to the user. For example, if a client-server arrangement is used to provide program guide services to the user, information that has been gathered on the user at the server may be provided to the data collection facility using a communications path between the server and the data collection facility. Such a path may, for example, involve a communications network such as communications network 34.

Illustrative user television equipment 20 that is based on a set-top box arrangement is shown in FIG. 2. Input/output 60 may be connected to communications paths such as paths 27 and 46. Television programming and other information may be received using input/output 58. Commands and requests and other information from the user may also be transmitted over input/output 58.

Set-top box 60 may be any suitable analog or digital set-top box. Set-top box 60 may contain an analog tuner for tuning to a desired analog television channel. Set-top box 60 may also contain digital decoding circuitry for receiving digital television and music channels. Both analog and digital channels may be handled together if desired. Set-top box 60 also

contains a processor (e.g., a microcontroller or microprocessor or the like) that is used to execute software applications. Set-top box 60 may contain memory such as random-access memory for use when executing applications. Nonvolatile memory may also be used (e.g., to launch a boot-up routine and other instructions). Hard disk storage may be used to back up data and to otherwise support larger databases than may be supported using random-access memory approaches.

Set-top box 60 may have infrared (IR) or other communications circuitry for communicating with a remote control. Set-top box 60 may also have dedicated buttons and a front-panel display. The front-panel display may, for example, be used to display the current channel to which the set-top box is tuned.

Set-top box 60 may also have communications circuitry such as a cable modem for cable communications over a cable, an integrated services digital network (ISDN) modem for ISDN communications, a digital subscriber line (DSL) modem for DSL communications, a telephone modem for communications over telephone lines, paging communications circuitry for paging communications (e.g., wireless radio-frequency transmissions using paging frequencies), cellular telephone communications circuitry (e.g., for digital cellular telephone data communications), and other equipment for communications using other approaches. Such communications may involve the Internet or any other suitable communications networks or paths.

A videocassette recorder 62 or other suitable recording device may be connected to set-top box 60.

This allows videos from set-top box 60 to be recorded. For example, if set-top box 60 is tuned to a given television channel, the video signal for that television channel may be passed to videocassette recorder 62 for recording on a videocassette. If desired, videocassette recorder functions such as start, stop, record, etc. may be controlled by set-top box 60. For example, set-top box 60 may control videocassette recorder 62 using infrared commands directed toward the remote control inputs of videocassette recorder 62.

The output of videocassette recorder 62 may be provided to television 64 for display to the user. If videocassette recorder 62 is not being used, the video signals from set-top box 58 may be provided directly to television 64. If desired, any suitable monitor may be used to display the video.

Another illustrative arrangement for user television equipment 20 is shown in FIG. 3. In the example of FIG. 3, user television equipment 20 includes a digital video recorder 66 (e.g., a personal video recorder (PVR)) and a television 68. Input/output 70 may be connected to communications paths such as paths 27 and 46. Television programming and other information may be received using input/output 70. Commands and requests and other information from the user may be transmitted over input/output 70.

Digital video recorder 66 may be similar to a standard set-top box, except that a hard disk or other suitable storage medium may be used for video storage

in lieu of videocassettes. The hard disk may be internal to digital video recorder 66.

Digital video recorder 66 may contain an analog tuner for tuning to a desired analog television channel. Digital video recorder 66 may also contain digital decoding circuitry for receiving digital television and music channels. If desired, digital video recorder 66 may contain circuitry for handling both analog and digital channels. Digital video recorder 66 also contains a processor (e.g., a microcontroller or microprocessor or the like) that is used to execute software applications. Digital video recorder 66 may contain memory such as random-access memory for use when executing applications. Nonvolatile memory may also be used to store a boot-up routine or other instructions. The hard disk and other storage in digital video recorder 66 may be used to support databases (e.g., program guide databases or interactive television application databases).

Digital video recorder 66 may have IR communications circuitry or other suitable communications circuitry for communicating with a remote control. Digital video recorder 66 may also have dedicated buttons and a front-panel display. The front-panel display may, for example, be used to display the current channel to which the digital video recorder is tuned.

Digital video recorder 66 may also have communications circuitry such as a cable modem, an integrated services digital network (ISDN) modem, a digital subscriber line (DSL) modem, a telephone modem, etc. for communications with other equipment. Such

communications may involve the Internet or any other suitable communications networks or paths.

If desired, digital video recorder 66 of FIG. 3 or set-top box 60 of FIG. 2 may be a satellite receiver or other equipment that has wireless communications circuitry for receiving satellite signals.

Television programming may be recorded on the hard disk of digital video recorder 66. Digital video recorder 66 may record new video while previously recorded video is being played back on television 68. This allows users to press a pause button during normal television viewing. When the pause button is pressed, the current television program is stored on the hard disk of digital video recorder 66. When the user presses play, the recorded video may be played back. This arrangement allows the user to seamlessly pause and resume television viewing.

The set-top box arrangement of FIG. 2 and the digital video recorder set-top box arrangement of FIG. 3 are merely illustrative. Other arrangements may be used if desired. For example, user television equipment may be based on a WebTV box, a personal computer television (PC/TV), or any other suitable television equipment arrangement. If desired, the functions of components such as set-top box 60, digital video recorder 66, a WebTV box, or PC/TV or the like may be integrated into a televison or personal computer or other suitable device.

An illustrative remote control 72 for operating user television equipment 20 is shown in FIG. 4. Remote control 72 may have keys 74 such as channel

up and down keys, a power on/off key, numeric keys, a favorites key (e.g., for setting favorites in a program guide application or other interactive television application), an info key (for requesting that additional information on a selection be displayed), etc. Arrow keys 76 may be used to position an on-screen cursor or highlight region on options of interest. Highlighted options may be selected using OK key 78. Menu key 80 may be used to direct an interactive television application (e.g., a program guide application, a nav shell application, or any other suitable application) to display a menu of available options.

Help key 82 may be used to invoke help functions such as context-sensitive on-screen help, etc.

Illustrative user computer equipment 22 is shown in FIG. 5. In the arrangement of FIG. 5, personal computer 84 may be controlled by the user using keyboard 86 or other suitable user input device, such as a trackball, mouse, touch pad, touch screen, voice recognition system, etc. Television programming and interactive television application content may be displayed on monitor 88. Television programming and other information may be received from paths 28 and 48 (FIG. 1) using input/output 90. The user may also send commands and other information to remote services over input/output line 90.

Personal computer unit 84 may contain a television tuner card for decoding analog and digital television channels. The television tuner card may contain an analog tuner for tuning to a given analog

channel and digital decoding circuitry for filtering out a desired digital television or music channel from a packetized digital data stream.

The user computer equipment arrangement of FIG. 5 is merely illustrative. Any suitable computer equipment arrangement may be used if desired.

Moreover, the user television equipment and user computer equipment arrangements described above are merely illustrative. A more generalized embodiment of illustrative user equipment is shown in FIG. 6.

As shown in FIG. 6, control circuitry 92 is connected to input/output 94. Input/output 94 may be connected to communications paths such as paths 26, 27, 28, 42, 46, and 48 of FIG. 1. Television and music programming may be received via input/output 94 (e.g., from programming sources 12 and television distribution facility 14). Program scheduled information for an interactive television program guide may also be received via input/output 94. Input/output 94 may also be used to receive information for other interactive television applications. The user may use control circuitry 92 to send commands, requests, and other suitable information using input/output 94.

Information that is collected locally on the user such as information on the user's television viewing habits and information on the user's interactions with interactive television applications such as an interactive television program guide application may be sent to a data collection facility via input/output 94. Any suitable technique may be used to transmit the information that is collected about the user. For example, information may be

transmitted using a cable return path in a cable system, using fiber-optic links, using a dial up modem connection (e.g., over a telephone link, a DSL or ISDN link, etc.), using a wireless link (e.g., using a cellular or paging frequency), using combinations of such paths, etc. Information that is collected at a server (e.g., a server used to support a client-server program guide) may be passed from the server to the data collection facility using paths such as these or any other suitable paths.

Control circuitry 94 may be based on any suitable processor such as a microprocessor, microcontroller, etc. Memory or other suitable storage devices may be provided as part of control circuitry 94. Tuning circuitry such as an analog tuner, an MPEG-2 decoder or other digital tuning circuitry, or any other suitable tuning circuits or combinations of such circuits may also be included as part of circuitry 92. The tuning circuitry may be used to tune the user equipment to a particular television or music channel. The state of the tuning circuitry may be monitored by an interactive television application such as an interactive television program guide or may be monitored by a monitoring application, or by monitoring functions embedded in any other suitable application. Monitoring may also involved gathering information on the time of day, whether the user equipment is on or off, the status of various button presses, or any other function or hardware state of the user equipment. The information that is monitored may be stored in storage in control circuitry 92 (e.g., on a hard disk or on random-access memory, etc.).

Television programming and on-screen options and information may be displayed on display 100. Display 100 may be a monitor, a television, or any other suitable equipment for displaying visual images. Speakers 102 may be provided as part of a television or may be stand-alone units. Digital music and the audio component of videos displayed on display 100 may be played through speakers 102.

A user may control the control circuitry using user input interface 96. The user input interface may be any suitable user interface, such as a mouse, trackball, keypad, keyboard, touch screen, touch pad, or any other suitable user input interface. A microphone 98 and video camera 104 may be used to supply audio and video information to control circuitry 92.

A user of user equipment 18 (e.g., a user of user television equipment or a user of user computer equipment, or a user of any other suitable user equipment device) may invoke an interactive television menu by pressing menu button 80 (FIG. 4). An illustrative interactive television navigation shell or menu 106 is shown in FIG. 7. Remote control 72 (FIG. 4) may be used to position highlight region 108 on top of options 110, 112, 114, 116, 118, and 120. If the user selects option 110, a screen of program listings may be displayed. Option 112 may be used to invoke a home shopping application. Option 114 may be selected to display options related to video-on-demand services. If the user selects option 116, the user may be presented with an opportunity to access home banking functions. Selecting Internet option 118 may launch a

web browser or the like. Option 120 may be used to access a settings screen that allows the user to adjust various settings. If desired, the user may use such a menu option to access a program guide settings screen with which the user may adjust program guide settings.

An illustrative program guide screen 122 that may be displayed for the user is shown in FIG. 8. Program guide screen 122 may be displayed, for example, when the user selects program listings option 108 of FIG. 7 or when the user selects a suitable option from within an interactive television program guide application. Program guide screen 122 may contain a grid or list of program listings 124. Program listings 124 may include program titles, channels, scheduled broadcast times, and any other suitable program schedule information. Advertisements may be displayed if desired.

A highlight region such as highlight region 126 may be used to select a desired program listing. If the user presses an OK key when a program listing for a current program is highlighted, the program guide may tune to the channel for that program. If the user presses an OK key when a program listing for a future program is highlighted, the program guide may provide the user with an opportunity to set a reminder for that program. Other functions that the program guide may provide include the ability to set favorite channels and establish other preferences and settings. For example, the user may select a particular channel for the program guide to automatically tune to when the user equipment is powered on. The user may also select favorite programs, favorite channels, etc. The program

guide may provide the user with the ability to establish parental control settings, the ability to search for programming of interest, and the ability to view program descriptions, advertisements, text, graphics, and video, etc. The use of any of these functions by the user may be monitored. Moreover, these are merely illustrative examples of program guide functions that may be provided by an interactive television program application. Any other suitable program guide functions may be provided if desired. The program guide may be invoked from an option such as option 110 of FIG. 7, by pressing a dedicated guide button on a remote control, by selecting any other suitable button or on-screen option, etc.

The user's response to any interactive content in the interactive program guide may be monitored. For example, the user's response to interactive advertisements that are presented by the program guide may be monitored.

Illustrative steps involved in monitoring the user are shown in FIG. 9. At step 128, the program guide or other application may monitor the user's interactions with the program guide or other interactive television application and may monitor other user activities (e.g., which television programs the user is watching, etc.). The television program guide or other interactive television application or a monitoring application or the like may be used to collect information on the user's activities. Information on the televison programs that the user is watching may be gathered by comparing information on the channels and times at which the user is watching

television with information on the programs scheduled to be broadcast at those times on those channels. This comparison may be performed locally (e.g., at user equipment 18) prior to or during monitoring or may be performed remotely (e.g., a the data collection facility after monitoring or at a server or other computer during monitoring). These are merely illustrative examples. Any suitable monitoring techniques may be used if desired. The information that is collected on the television viewing habits of the user and the user's interactions with the interactive program guide or other interactive television application may be gathered using the interactive television program guide or other interactive television application or may be gathered using a monitoring application or any other suitable application.

At step 130, the program guide or other application may automatically transmit the collected user information to the data collection facility (e.g., a data collection facility such as data collection facility 13 of FIG. 1). The user data may be transmitted using an e-mail protocol such as the standard Post Office Protocol (POP) or Simple Mail Transport Protocol (SMPT). The program guide or interactive television application or other monitoring application or the like may access e-mail communications functions such as these through an existing e-mail application or other application or the like that is installed on user equipment 18. Accordingly, with an e-mail transport arrangement a proprietary communications protocol need not be

developed for transmitting collected user data to the data collection facility.

If desired, the gathered information on the user may be reported to the data collection facility using communications functions that are part of an existing web browser implemented on user equipment 18. For example, the gathered information may be sent to the data collection facility using the forms capabilities of a web browser. If desired, such capabilities may be accessed directly by the reporting application (e.g., the program guide) without displaying forms on the display of the user equipment. Alternatively, keystrokes or a clickstream or other inputs for the browser's forms may be generated by the program guide automatically to emulate the commands that would be provided by the user should the user need to use such capabilities.

Another way in which the user information may be transmitted to the data collection facility is using the existing communications capabilities of the operating system installed on user equipment 18. If a web browser or stand-alone file transfer protocol (FTP) application is provided on user equipment 18, the user information may be transmitted to the data collection facility using FTP techniques.

At step 132, after the data collection facility has received the information on the user, the data collection facility may analyze the information on the user and other users. This analysis may be used to determine the rates to charge for interactive advertising in the interactive television program guide, which types of advertisements should be

displayed, whether certain types of interactions with the interactive television program guide are correlated with certain user interests in television programming, or for other marketing or business purposes.

If desired, the user may be notified before information on the user is transmitted to the data collection facility. This is shown in FIG. 10. At step 134, the user's interactions with the interactive television program guide and other activities (e.g., television watching activities) may be monitored.

At step 136, the user may be provided with an opportunity to authorize the submission of a report containing information on the user's interactions with the interactive television program guide an other user activities. If the user does not authorize submission of the report, the report may not be submitted for processing. If, however, the user authorizes submission of the report at step 136, the report may be provided to the data collection facility at step 138 using e-mail protocols, browser communications protocols, FTP protocols, etc.

At step 140, the data collection facility may analyze the information that has been gathered on the user.

One way in which the user may be provided with an opportunity to authorize the release of the information gathered on the user is shown in FIG. 11. In the screen 142 of FIG. 11, the user has been sent an e-mail 144 with an attachment 146. The attachment 146 may be automatically generated and may be a report containing information on the user's monitored interactions with the program guide and other

activities. The e-mail may be generated by the program guide or other application used for monitoring the user (e.g., an application that is installed on the user's set-top box). The reply address in the e-mail may be automatically set to that of the data collection facility. Accordingly, when the user responds to the e-mail on the screen of the user equipment the response may be automatically routed to the data collection facility. The user need not memorize the correct e-mail address for the data collection facility. The ability to place the correct address in the reply address field may be supported by standard e-mail applications. If desired, e-mail 144 may contain text 148 that asks the user to reply.

Illustrative steps involved in sending a report to the data collection device using an arrangement such as shown in FIG. 11 are shown in FIG. 12. At step 150, the program guide may generate an e-mail. Information that has been collected on the user may be embedded into the e-mail or may be attached to the e-mail in the form of a report.

At step 152, the e-mail may be sent to the user using the program guide to access e-mail functions of an e-mail application installed on the user equipment 18 or using the program guide to perform e-mail functions. The reply e-mail address for the e-mail may be automatically set to the e-mail address of the data collection facility.

At step 152, the user may be allowed to reply to the e-mail. For example, a reply button may be provided. The user may select the reply button, which directs an e-mail application on the user equipment or

the program guide to send the e-mail to the data collection facility at step 156. The approach of FIGS. 11 and 12 in which the user is provided with an opportunity to authorize the transmission of the report to the data collection facility may be used, for example, in situations in which the user has agreed with a data collection agency to allow their households data to be monitored (e.g., in return for a fee).

If desired, the program guide may provide the user with a screen 158 containing a notification 160 of the type shown in FIG. 13. If the user responds by selecting yes option 162, the program guide may submit the report to the data collection facility. If the user responds by selecting no option 164, the program guide will not submit the report.

If desired, the user may be provided with an opportunity to adjust data reporting settings using program guide setup screens or the like. For example, if the user selects set up option 120 of FIG. 7, the program guide may display a screen such as program guide settings screen 166 of FIG. 14. Screen 166 may include audio settings option 168 and video settings option 170 that allow the user to adjust the audio and video settings of the program guide or the user's set-top box or other user equipment. Language settings option 172 may be used to change the default language used for program guide text or audio tracks for programs that have multiple audio tracks. The user may select parental control settings option 174 to adjust settings related to program blocking (e.g., based on rating, keyword, etc.) or title blocking (e.g., in the program guide listings grids).

The program guide may also provide an option such as personalization settings 176. If the user selects option 176, the program guide may provide the user with a screen such as screen 178 of FIG. 15. Screen 178 may contain options related to the collection and transmission of data on the user's activities in the program guide. The user may use right and left remote control keys or other suitable user interface arrangement to select between various entries for each option (e.g., the user may press a right remote control arrow key to select an on option and may press a left remote control arrow key to select an off option). The user may use up and down remote control arrow keys or any other suitable user interface to select between various options. A highlight region may be used to indicate the user's current position in the options of screen 178 and other program guide screens.

The user may toggle option 180 to turn the reports collection feature on or off. For example, if the user desires to have information on the user's television viewing activities and other information on the user's activities reported to a data collection facility, the user may turn option 180 on. If the user desires not to have information on the user's television viewing activities and other user activities collected or reported to the data collection facility, the user may turn option 180 off.

If the reports function is turned on, the user may be provided with an opportunity to adjust the frequency with which reports are transmitted to the data collection facility using option 182. The user

may, for example, select between available transmission frequencies of continuously, once per hour, once per day, once per week, etc.

The user may desire to be notified before reports are sent. If the user wishes to receive notifications, the user may use option 184 to turn the program guide's notification capabilities. If the user does not wish to receive notifications, option 184 may be used to turn notification off.

When the user has finished making the selections available on screen 178, the user may select done option 186 (e.g., by navigating a highlight region to done option 186 and pressing a remote control OK key or the like).

Although described primarily in the context of interactive television program guides, the user's interactions with any suitable interactive television applications may be monitored. For example, the user's interactions with a video-on-demand application may be monitored, etc. Moreover, any suitable application (e.g., a program guide, an interactive television application, or a stand-alone monitoring application may be used to provide the monitoring functions of the present invention).

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 invention.

What is Claimed is:

1. A method for collecting information on the television viewing activities of a user at user equipment and providing that information to a data collection facility, comprising:

collecting information on the television viewing activities of the user by monitoring which television channels the user tunes to with the user equipment; and

transmitting the collected information on the viewing activities of the user to the data collection facility using e-mail protocols.

2. The method defined in claim 1 further comprising using an e-mail application to transmit the collected information.

3. The method defined in claim 1 further comprising using the post office protocol to transmit the collected information.

4. The method defined in claim 1 further comprising using the Simple Mail Transport Protocol to transmit the information.

5. The method defined in claim 1 further comprising collecting the information on the television viewing habits of the user with an interactive television program guide.

6. The method defined in claim 1 further comprising:

collecting the information on the television viewing habits of the user with an interactive television program guide; and

transmitting the information on the television viewing habits of the user that were collected with the interactive television program guide to the data collection facility.

7. The method defined in claim 1 further comprising collecting the information on the television viewing habits of the user with an interactive television application.

8. The method defined in claim 1 further comprising:

collecting the information on the television viewing habits of the user with an interactive television application; and

transmitting the information on the television viewing habits of the user that were collected with the interactive television application to the data collection facility.

9. The method defined in claim 1 further comprising collecting information on interactions of the user with an interactive television program guide.

10. The method defined in claim 1 further comprising using an interactive television program guide to collect information on interactions of the user with the interactive television program guide.

11. The method defined in claim 1 further comprising:

collecting information on interactions of the user with an interactive television program guide; and

transmitting the information collected on the interactions of the user with the interactive television program guide to the data collection facility.

12. The method defined in claim 1 further comprising collecting information on interactions of the user with an interactive television application.

13. The method defined in claim 1 further comprising using an interactive television application to collect information on interactions of the user with the interactive television application.

14. The method defined in claim 1 further comprising:

collecting information on interactions of the user with an interactive television application; and

transmitting the information collected on the interactions of the user with the interactive television application to the data collection facility.

15. The method defined in claim 1 further comprising collecting information on what times the user tunes to the television channels.

16. The method defined in claim 1, wherein the user equipment includes a set-top box, the method further comprising allowing the user to use an interactive television program guide to tune the set-top box to a given television channel.

17. The method defined in claim 1, wherein the user equipment includes a digital video recorder, the method further comprising allowing the user to use an interactive television program guide to tune the digital video recorder to a given television channel.

18. The method defined in claim 1, wherein the user equipment includes a personal computer, the method further comprising allowing the user to use an interactive television program guide to tune the personal computer to a given television channel.

19. The method defined in claim 1 further comprising using an interactive television program guide to display program listings on the user equipment for the user.

20. The method defined in claim 1 further comprising displaying an interactive menu on the user equipment that includes options that allow the user to invoke at least an interactive television program guide and a video-on-demand application.

21. The method defined in claim 1 wherein collecting information on the television viewing habits of the user comprises collecting information on the

television viewing habits of the user by monitoring the time and by monitoring the channels tuned to by the user with an interactive television program guide.

22. The method defined in claim 1 wherein collecting information on the television viewing habits of the user comprises storing information on the television viewing habits of the user in storage on the user equipment.

23. The method defined in claim 1, wherein an interactive television program guide is implemented on the user equipment, the user equipment is connected to a television distribution facility by a communications path, and program listings data is provided from a program listings source, the method further comprising:

receiving the program listings data at the television distribution facility from the program listings source; and

providing the program listings data from the television distribution facility to the interactive television program guide on the user equipment over the communications path.

24. The method defined in claim 1, wherein transmitting the collected information comprises transmitting the collected information using paging frequencies.

25. The method defined in claim 1, wherein transmitting the collected information comprises

transmitting the collected information using digital subscriber line communications.

26. The method defined in claim 1, wherein transmitting the collected information comprises transmitting the collected information using cable communications.

27. The method defined in claim 1, wherein transmitting the collected information comprises transmitting the collected information using communications over telephone lines.

28. The method defined in claim 1, wherein transmitting the collected information comprises transmitting the collected information to a server.

29. The method defined in claim 1 further comprising transmitting the collected information to the data collection facility over a wireless path.

30. The method defined in claim 1 further comprising notifying the user before transmitting the collected information to the data collection facility.

31. The method defined in claim 1 further comprising:

notifying the user before transmitting the collected information to the data collection facility; and

providing the user with an opportunity to choose whether to send the collected information to the data collection facility.

32. The method defined in claim 1 further comprising transmitting the collected information in an e-mail attachment.

33. The method defined in claim 1 further comprising transmitting the collected information in the body of an e-mail message.

34. The method defined in claim 1 further comprising:

using a program guide to generate an e-mail message with which to provide the collected information to the data collection facility as a report; and

automatically setting the reply address in the e-mail message to the e-mail address of the data collection facility.

35. The method defined in claim 1 further comprising sending an e-mail message to an in-box associated with the user equipment before transmitting the collected information to the data collection facility.

36. The method defined in claim 1 further comprising providing the user with an opportunity to authorize submission of the collected information

before transmitting the collected information to the data collection facility.

37. The method defined in claim 1 further comprising analyzing the collected information at the data collection facility.

38. The method defined in claim 1 wherein the data collection facility is in communication with a television distribution facility.

39. The method defined in claim 1 wherein the data collection facility is in communication with a cable system headend.

40. The method defined in claim 1 wherein the data collection facility is in communication with a television distribution facility and wherein the user equipment is in communication with the television distribution facility, the method further comprising transmitting the collected information to the data collection facility through the television distribution facility.

41. The method defined in claim 1 further comprising transmitting the collected information to the data collection facility over the Internet.

42. The method defined in claim 1 further comprising allowing the user to authorize transmission of the collected information using a setup option.

43. The method defined in claim 1 further comprising allowing the user to select a desired frequency for transmitting the collected information.

44. The method defined in claim 1 further comprising providing the user with a setup option that allows the user to choose whether to notify the user prior to transmitting the collected information to the data collection facility.

45. A system including user equipment in which information on the television viewing activities of a user at the user equipment is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the television viewing activities of the user by monitoring which television channels the user tunes to with the control circuitry; and

transmit the collected information on the viewing activities of the user to the data collection facility using e-mail protocols.

46. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to use an e-mail application to transmit the collected information.

47. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to use the post office protocol to transmit the collected information.

48. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to use the Simple Mail Transport Protocol to transmit the information.

49. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to collect the information on the television viewing habits of the user with an interactive television program guide.

50. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to:

collect the information on the television viewing habits of the user with an interactive television program guide; and

transmit the information on the television viewing habits of the user that were collected with the interactive television program guide to the data collection facility.

51. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to collect the information on the television viewing habits of the user with an interactive television application.

52. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to:

collect the information on the television viewing habits of the user with an interactive television application; and

transmit the information on the television viewing habits of the user that were collected with the interactive television application to the data collection facility.

53. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to collect information on interactions of the user with an interactive television program guide.

54. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to use an interactive television program guide to collect information on interactions of the user with the interactive television program guide.

55. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to:

collect information on interactions of the user with an interactive television program guide; and

transmit the information collected on the interactions of the user with the interactive

television program guide to the data collection facility.

56. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to collect information on interactions of the user with an interactive television application.

57. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to use an interactive television application to collect information on interactions of the user with the interactive television application.

58. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to:

collect information on interactions of the user with an interactive television application; and

transmit the information collected on the interactions of the user with the interactive television application to the data collection facility.

59. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to collect information on what times the user tunes to the television channels.

60. The system defined in claim 45, wherein the user equipment includes a set-top box, and wherein

the control circuitry, display, and user interface are further configured to allow the user to use an interactive television program guide to tune the set-top box to a given television channel.

61. The system defined in claim 45, wherein the user equipment includes a digital video recorder, and wherein the control circuitry, display, and user interface are further configured to allow the user to use an interactive television program guide to tune the digital video recorder to a given television channel.

62. The system defined in claim 45, wherein the user equipment includes a personal computer, and wherein the control circuitry, display, and user interface are further configured to allow the user to use an interactive television program guide to tune the personal computer to a given television channel.

63. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to use an interactive television program guide to display program listings on the user equipment for the user.

64. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to display an interactive menu on the user equipment that includes options that allow the user to invoke at least an interactive television program guide and a video-on-demand application.

65. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to collect information on the television viewing habits of the user by monitoring the time and by monitoring the channels tuned to by the user with an interactive television program guide.

66. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to store the collected information on the television viewing habits of the user in storage on the user equipment.

67. The system defined in claim 45, wherein an interactive television program guide is implemented on the user equipment, the user equipment is connected to a television distribution facility by a communications path, and program listings data is provided from a program listings source, and the television distribution facility is configured to receive the program listings data at the television distribution facility from the program listings source and provide the program listings data from the television distribution facility to the interactive television program guide on the user equipment over the communications path.

68. The system defined in claim 45, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using paging frequencies.

69. The system defined in claim 45, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using digital subscriber line communications.

70. The system defined in claim 45, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using cable communications.

71. The system defined in claim 45, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using communications over telephone lines.

72. The system defined in claim 45, wherein the control circuitry, display, and user interface are further configured to transmit the collected information to a server.

73. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to transmit the collected information to the data collection facility over a wireless path.

74. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to notify the user before transmitting the collected information to the data collection facility.

75. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to:

notify the user before transmitting the collected information to the data collection facility; and

provide the user with an opportunity to choose whether to send the collected information to the data collection facility.

76. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to transmit the collected information in an e-mail attachment.

77. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to transmit the collected information in the body of an e-mail message.

78. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to:

use a program guide to generate an e-mail message with which to provide the collected information to the data collection facility as a report; and

automatically set the reply address in the e-mail message to the e-mail address of the data collection facility.

79. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to send an e-mail message to an in-box associated with the user equipment before transmitting the collected information to the data collection facility.

80. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to provide the user with an opportunity to authorize submission of the collected information before transmitting the collected information to the data collection facility.

81. The system defined in claim 45 further comprising means for analyzing the collected information at the data collection facility.

82. The system defined in claim 45 wherein the data collection facility is in communication with a television distribution facility.

83. The system defined in claim 45 wherein the data collection facility is in communication with a cable system headend.

84. The system defined in claim 45 wherein the data collection facility is in communication with a television distribution facility, wherein the user equipment is in communication with the television distribution facility, and wherein the control circuitry, display, and user interface are further

configured to transmit the collected information to the data collection facility through the television distribution facility.

85. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to transmit the collected information to the data collection facility over the Internet.

86. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to allow the user to authorize transmission of the collected information using a setup option.

87. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to allow the user to select a desired frequency for transmitting the collected information.

88. The system defined in claim 45 wherein the control circuitry, display, and user interface are further configured to provide the user with a setup option that allows the user to choose whether to notify the user prior to transmitting the collected information to the data collection facility.

89. A method for collecting information on interactions of a user at user equipment with an interactive television application implemented on the

user equipment and providing that information to a data collection facility, comprising:

collecting information on the interactions of the user with the interactive television application; and

transmitting the collected information on interactions of the user with the interactive television application to the data collection facility using e-mail protocols.

90. The method defined in claim 89 further comprising using an e-mail application to transmit the collected information.

91. The method defined in claim 89 further comprising using the post office protocol to transmit the collected information.

92. The method defined in claim 89 further comprising using the Simple Mail Transport Protocol to transmit the information.

93. The method defined in claim 89 further comprising collecting the information with an interactive television program guide.

94. The method defined in claim 89 further comprising collecting information on the television viewing habits of the user with an interactive television program guide and collecting the information on the user's interactions with the interactive

television application using the interactive television program guide.

95. The method defined in claim 89 further comprising:

collecting information on the television viewing activities of the user with an interactive television program guide; and

transmitting the information collected on the television viewing activities of the user to the data collection facility.

96. The method defined in claim 89 further comprising collecting information on the television viewing activities of the user with the interactive television application.

97. The method defined in claim 89 further comprising using an interactive television program guide to collect information on the television viewing habits of the user.

98. The method defined in claim 89 further comprising collecting information on what times the user tunes to television channels.

99. The method defined in claim 89, wherein the user equipment includes a set-top box, the method further comprising allowing the user to use an interactive television program guide to tune the set-top box to a given television channel.

100. The method defined in claim 89, wherein the user equipment includes a digital video recorder, the method further comprising allowing the user to use an interactive television program guide to tune the digital video recorder to a given television channel.

101. The method defined in claim 89, wherein the user equipment includes a personal computer, the method further comprising allowing the user to use an interactive television program guide to tune the personal computer to a given television channel.

102. The method defined in claim 89 further comprising using an interactive television program guide to display program listings on the user equipment for the user.

103. The method defined in claim 89 further comprising displaying an interactive menu on the user equipment that includes options that allow the user to invoke at least an interactive television program guide and a video-on-demand application.

104. The method defined in claim 89 further comprising collecting information on the television viewing habits of the user comprises by monitoring the time and by monitoring the channels tuned to by the user with an interactive television program guide.

105. The method defined in claim 89 wherein collecting the information comprises storing the information in storage on the user equipment.

106. The method defined in claim 89, wherein an interactive television program guide is implemented on the user equipment, the user equipment is connected to a television distribution facility by a communications path, and program listings data is provided from a program listings source, the method further comprising:

receiving the program listings data at the television distribution facility from the program listings source; and

providing the program listings data from the television distribution facility to the interactive television program guide on the user equipment over the communications path.

107. The method defined in claim 89, wherein transmitting the collected information comprises transmitting the collected information using paging frequencies.

108. The method defined in claim 89, wherein transmitting the collected information comprises transmitting the collected information using digital subscriber line communications.

109. The method defined in claim 89, wherein transmitting the collected information comprises transmitting the collected information using cable communications.

110. The method defined in claim 89, wherein transmitting the collected information comprises

transmitting the collected information using communications over telephone lines.

111. The method defined in claim 89, wherein transmitting the collected information comprises transmitting the collected information to a server.

112. The method defined in claim 89 further comprising transmitting the collected information to the data collection facility over a wireless path.

113. The method defined in claim 89 further comprising notifying the user before transmitting the collected information to the data collection facility.

114. The method defined in claim 89 further comprising:

notifying the user before transmitting the collected information to the data collection facility; and

providing the user with an opportunity to choose whether to send the collected information to the data collection facility.

115. The method defined in claim 89 further comprising transmitting the collected information in an e-mail attachment.

116. The method defined in claim 89 further comprising transmitting the collected information in the body of an e-mail message.

117. The method defined in claim 89 further comprising:

using a program guide to generate an e-mail message with which to provide the collected information to the data collection facility as a report; and

automatically setting the reply address in the e-mail message to the e-mail address of the data collection facility.

118. The method defined in claim 89 further comprising sending an e-mail message to an in-box associated with the user equipment before transmitting the collected information to the data collection facility.

119. The method defined in claim 89 further comprising providing the user with an opportunity to authorize submission of the collected information before transmitting the collected information to the data collection facility.

120. The method defined in claim 89 further comprising analyzing the collected information at the data collection facility.

121. The method defined in claim 89 wherein the data collection facility is in communication with a television distribution facility.

122. The method defined in claim 89 wherein the data collection facility is in communication with a cable system headend.

123. The method defined in claim 89 wherein the data collection facility is in communication with a television distribution facility and wherein the user equipment is in communication with the television distribution facility, the method further comprising transmitting the collected information to the data collection facility through the television distribution facility.

124. The method defined in claim 89 further comprising transmitting the collected information to the data collection facility over the Internet.

125. The method defined in claim 89 further comprising allowing the user to authorize transmission of the collected information using a setup option.

126. The method defined in claim 89 further comprising allowing the user to select a desired frequency for transmitting the collected information.

127. The method defined in claim 89 further comprising providing the user with a setup option that allows the user to choose whether to notify the user prior to transmitting the collected information to the data collection facility.

128. A system including user equipment on which an interactive television application is implemented in which information on the interactions of a user at the user equipment with the interactive television application is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the interactions of the user with the interactive television application; and

transmit the collected information on interactions of the user with the interactive television application to the data collection facility using e-mail protocols.

129. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to use an e-mail application to transmit the collected information.

130. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to use the post office protocol to transmit the collected information.

131. The system defined in claim 128 wherein the control circuitry, display, and user interface are

further configured to use the Simple Mail Transport Protocol to transmit the information.

132. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to collect the information with an interactive television program guide.

133. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to collect information on the television viewing habits of the user with an interactive television program guide and collecting the information on the user's interactions with the interactive television application using the interactive television program guide.

134. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to:

collect information on the television viewing activities of the user with an interactive television program guide; and

transmit the information collected on the television viewing activities of the user to the data collection facility.

135. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to collect information on the television viewing activities of the user with the interactive television application.

136. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to collect information on the television viewing habits of the user.

137. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to collect information on what times the user tunes to television channels.

138. The system defined in claim 128, wherein the user equipment includes a set-top box, and wherein the control circuitry, display, and user interface are further configured to allow the user to use an interactive television program guide to tune the set-top box to a given television channel.

139. The system defined in claim 128, wherein the user equipment includes a digital video recorder, and wherein the control circuitry, display, and user interface are further configured to allow the user to use an interactive television program guide to tune the digital video recorder to a given television channel.

140. The system defined in claim 128, wherein the user equipment includes a personal computer, and wherein the control circuitry, display, and user interface are further configured to allow the user to use an interactive television program guide to tune the personal computer to a given television channel.

141. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to use an interactive television program guide to display program listings on the user equipment for the user.

142. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to display an interactive menu on the user equipment that includes options that allow the user to invoke at least an interactive television program guide and a video-on-demand application.

143. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to collect information on the television viewing habits of the user comprises by monitoring the time and by monitoring the channels tuned to by the user with an interactive television program guide.

144. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to store the information in storage on the user equipment.

145. The system defined in claim 128, wherein an interactive television program guide is implemented on the user equipment, the user equipment is connected to a television distribution facility by a communications path, and program listings data is provided from a program listings source, and wherein

the television distribution facility is configured to receive the program listings data at the television distribution facility from the program listings source and provide the program listings data from the television distribution facility to the interactive television program guide on the user equipment over the communications path.

146. The system defined in claim 128, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using paging frequencies.

147. The system defined in claim 128, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using digital subscriber line communications.

148. The system defined in claim 128, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using cable communications.

149. The system defined in claim 128, wherein the control circuitry, display, and user interface are further configured to transmit the collected information using communications over telephone lines.

150. The system defined in claim 128,wherein the control circuitry, display, and user interface are

further configured to transmit the collected information to a server.

151. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to transmit the collected information to the data collection facility over a wireless path.

152. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to notify the user before transmitting the collected information to the data collection facility.

153. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to:

notify the user before transmitting the collected information to the data collection facility; and

provide the user with an opportunity to choose whether to send the collected information to the data collection facility.

154. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to transmit the collected information in an e-mail attachment.

155. The system defined in claim 128 wherein the control circuitry, display, and user interface are

further configured to transmit the collected information in the body of an e-mail message.

156. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to:

use a program guide to generate an e-mail message with which to provide the collected information to the data collection facility as a report; and

automatically set the reply address in the e-mail message to the e-mail address of the data collection facility.

157. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to send an e-mail message to an in-box associated with the user equipment before transmitting the collected information to the data collection facility.

158. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to provide the user with an opportunity to authorize submission of the collected information before transmitting the collected information to the data collection facility.

159. The system defined in claim 128 further comprising means for analyzing the collected information at the data collection facility.

160. The system defined in claim 128 wherein the data collection facility is in communication with a television distribution facility.

161. The system defined in claim 128 wherein the data collection facility is in communication with a cable system headend.

162. The system defined in claim 128 wherein the data collection facility is in communication with a television distribution facility and wherein the user equipment is in communication with the television distribution facility, and wherein the control circuitry, display, and user interface are further configured to transmit the collected information to the data collection facility through the television distribution facility.

163. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to transmit the collected information to the data collection facility over the Internet.

164. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to allow the user to authorize transmission of the collected information using a setup option.

165. The system defined in claim 128 wherein the control circuitry, display, and user interface are

further configured to allow the user to select a desired frequency for transmitting the collected information.

166. The system defined in claim 128 wherein the control circuitry, display, and user interface are further configured to provide the user with a setup option that allows the user to choose whether to notify the user prior to transmitting the collected information to the data collection facility.

167. A method for collecting information on the television viewing activities of a user at user equipment and providing that information to a data collection facility, comprising:

collecting information on the television viewing activities of the user by monitoring which television channels the user tunes to with the user equipment; and

transmitting the collected information on the viewing activities of the user to the data collection facility using a web browser's communications capabilities.

168. The method defined in claim 167 further comprising using the browser's forms capabilities to transmit the collected information.

169. The method defined in claim 167 further comprising transmitting the collected information using the File Transfer Protocol (FTP).

170. The method defined in claim 167 further comprising using an interactive television program guide to access the web browser's communications capabilities.

171. The method defined in claim 167 further comprising using an interactive television program guide to generate inputs for the web browser to emulate user commands.

172. A system including user equipment in which information on the television viewing activities of a user at the user equipment is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the television viewing activities of the user by monitoring which television channels the user tunes to with the control circuitry; and

transmit the collected information on the viewing activities of the user to the data collection facility using a web browser's communications capabilities.

173. The system defined in claim 172 wherein the control circuitry, display, and user interface are further configured to use the browser's forms capabilities to transmit the collected information.

174. The system defined in claim 172 wherein the control circuitry, display, and user interface are further configured to transmit the collected information using the File Transfer Protocol (FTP).

175. The system defined in claim 172 wherein the control circuitry, display, and user interface are further configured to use an interactive television program guide to access the web browser's communications capabilities.

176. The system defined in claim 172 wherein the control circuitry, display, and user interface are further configured to use an interactive television program guide to generate inputs for the web browser to emulate user commands.

177. A method for collecting information on the interactions of a user at user equipment with an interactive television application implemented on the user equipment and providing that information to a data collection facility, comprising:

collecting information on the interactions of the user with the interactive television application implemented on the user equipment; and

transmitting the collected information to the data collection facility using a web browser's communications capabilities.

178. The method defined in claim 177 further comprising using the browser's forms capabilities to transmit the collected information.

179. The method defined in claim 177 further comprising transmitting the collected information using the File Transfer Protocol (FTP).

180. The method defined in claim 177 further comprising using an interactive television program guide to access the web browser's communications capabilities.

181. The method defined in claim 177 further comprising using an interactive television program guide to generate inputs for the web browser to emulate user commands.

182. A system including user equipment in which information is collected on the interactions of a user with an interactive television program guide implemented on the user equipment is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the interactions of the user with the interactive television application implemented on the user equipment; and

transmit the collected information to the data collection facility using a web browser's communications capabilities.

183. The system defined in claim 182 wherein the control circuitry, display, and user interface are further configured to use the browser's forms capabilities to transmit the collected information.

184. The system defined in claim 182 wherein the control circuitry, display, and user interface are further configured to transmit the collected information using the File Transfer Protocol (FTP).

185. The system defined in claim 182 wherein the control circuitry, display, and user interface are further configured to use an interactive television program guide to access the web browser's communications capabilities.

186. The system defined in claim 182 wherein the control circuitry, display, and user interface are further configured to use an interactive television program guide to generate inputs for the web browser to emulate user commands.

187. A method for collecting information on the television viewing activities of a user at user equipment and providing that information to a data collection facility, comprising:

collecting information on the television viewing activities of the user by monitoring which

television channels the user tunes to with the user equipment; and

transmitting the collected information on the viewing activities of the user to the data collection facility using a stand-alone FTP application.

188. A system including user equipment in which information on the television viewing activities of a user at the user equipment is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the television viewing activities of the user by monitoring which television channels the user tunes to with the control circuitry; and

transmit the collected information on the viewing activities of the user to the data collection facility using a stand-alone FTP application.

189. A method for collecting information on the interactions of a user at user equipment with an interactive television application implemented on the user equipment and providing that information to a data collection facility, comprising:

collecting information on the interactions of the user with the interactive

television application implemented on the user equipment; and

transmitting the collected information to the data collection facility using a stand-alone FTP application.

190. A system including user equipment in which information is collected on the interactions of a user with an interactive television program guide implemented on the user equipment is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the interactions of the user with the interactive television application implemented on the user equipment; and

transmit the collected information to the data collection facility using a stand-alone FTP application.

191. A method for collecting information on the television viewing activities of a user at user equipment and providing that information to a data collection facility, comprising:

collecting information on the television viewing activities of the user by monitoring which television channels the user tunes to with the user equipment; and

transmitting the collected information on the viewing activities of the user to the data collection facility using the communications capabilities of an operating system installed on the user equipment.

192. A system including user equipment in which information on the television viewing activities of a user at the user equipment is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the television viewing activities of the user by monitoring which television channels the user tunes to with the control circuitry; and

transmit the collected information on the viewing activities of the user to the data collection facility using the communications capabilities of an operating system installed on the user equipment.

193. A method for collecting information on the interactions of a user at user equipment with an interactive television application implemented on the user equipment and providing that information to a data collection facility, comprising:

collecting information on the interactions of the user with the interactive

television application implemented on the user equipment; and

transmitting the collected information to the data collection facility using the communications capabilities of an operating system installed on the user equipment.

194. A system including user equipment in which information is collected on the interactions of a user with an interactive television program guide implemented on the user equipment is provided to a data collection facility, comprising:

control circuitry;

a display; and

a user input interface, wherein the control circuitry, display, and user interface are configured to:

collect information on the interactions of the user with the interactive television application implemented on the user equipment; and

transmit the collected information to the data collection facility using the communications capabilities of an operating system installed on the user equipment.

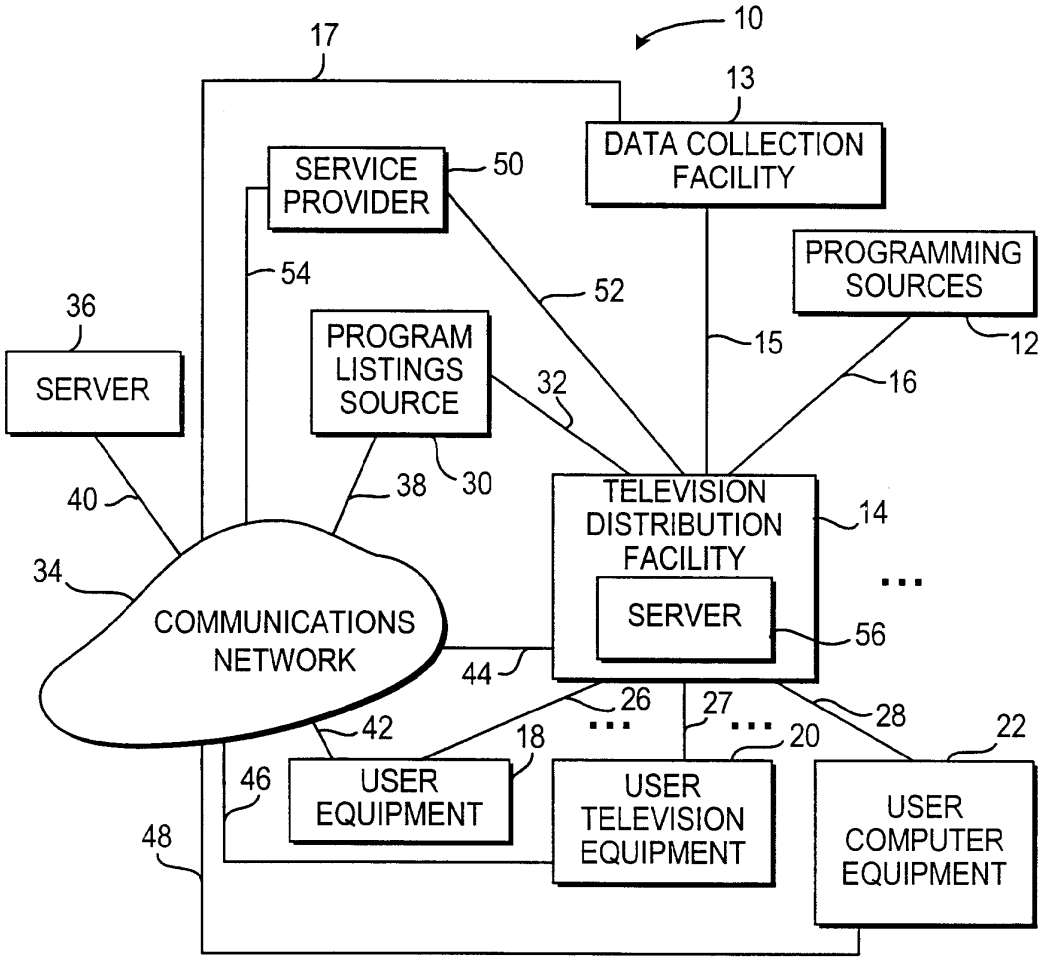

10
17
13
DATA COLLECTION FACILITY
SERVICE PROVIDER
50
54
52
PROGRAMMING SOURCES
12
36
SERVER
PROGRAM LISTINGS SOURCE
32
15
16
40
38
30
TELEVISION DISTRIBUTION FACILITY
14
34
COMMUNICATIONS NETWORK
SERVER
56
44
26
27
28
42
18
20
22
46
USER EQUIPMENT
USER TELEVISION EQUIPMENT
USER COMPUTER EQUIPMENT
48

FIG. 1

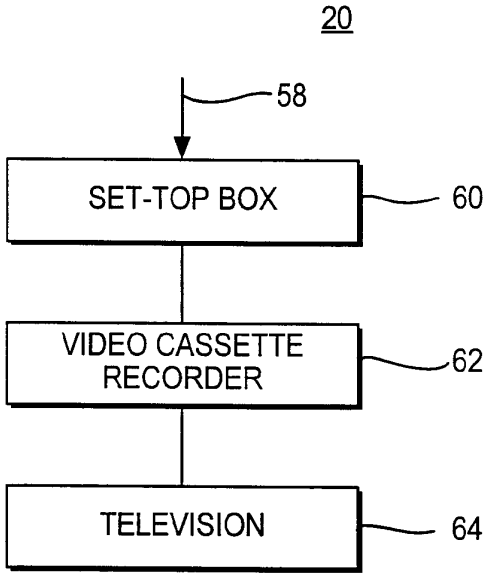

20
58
SET-TOP BOX
60
VIDEO CASSETTE RECORDER
62
TELEVISION
64

FIG. 2

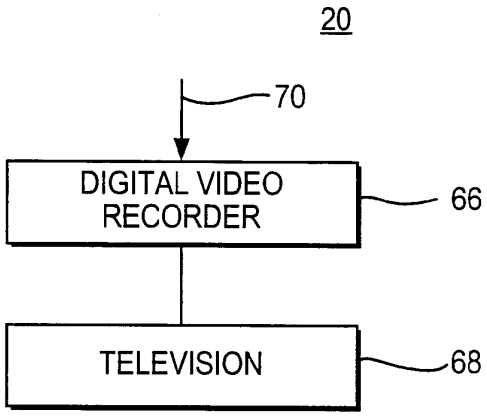


FIG. 3

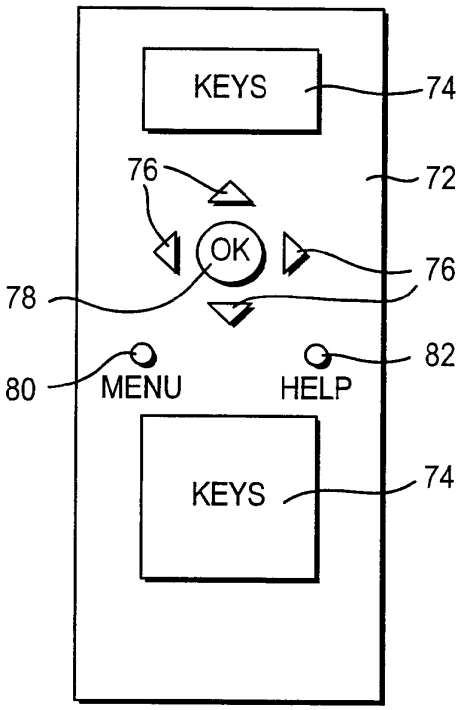


FIG. 4

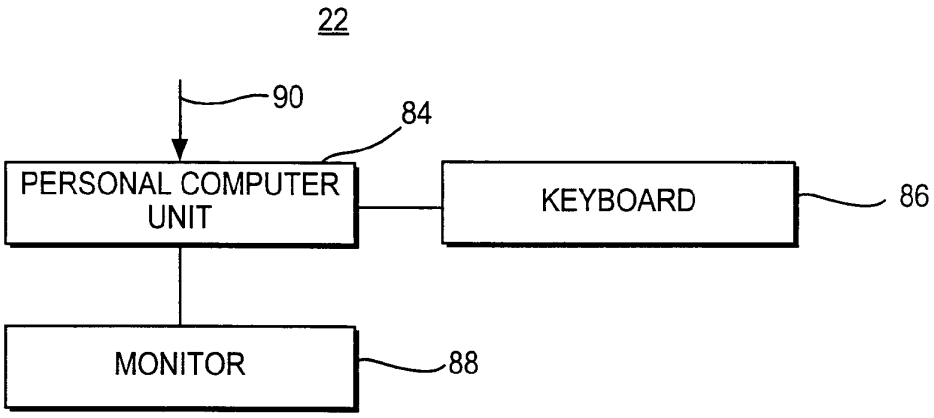


FIG. 5

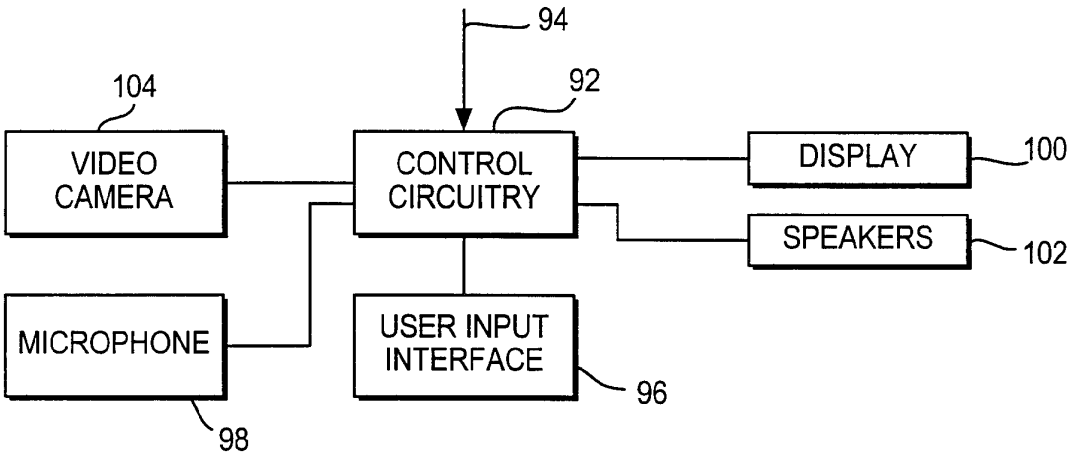

94
104
92
VIDEO CAMERA
CONTROL CIRCUITRY
DISPLAY
100
SPEAKERS
102
MICROPHONE
USER INPUT INTERFACE
96
98

FIG. 6

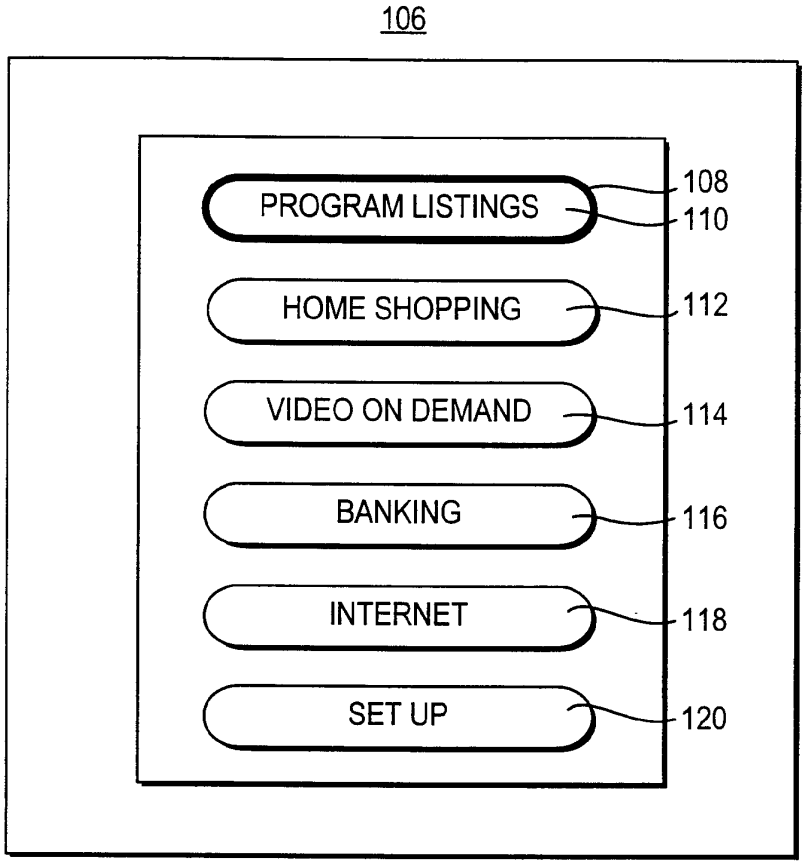

106
PROGRAM LISTINGS
108
110
HOME SHOPPING
112
VIDEO ON DEMAND
114
BANKING
116
INTERNET
118
SET UP
120

FIG. 7

122

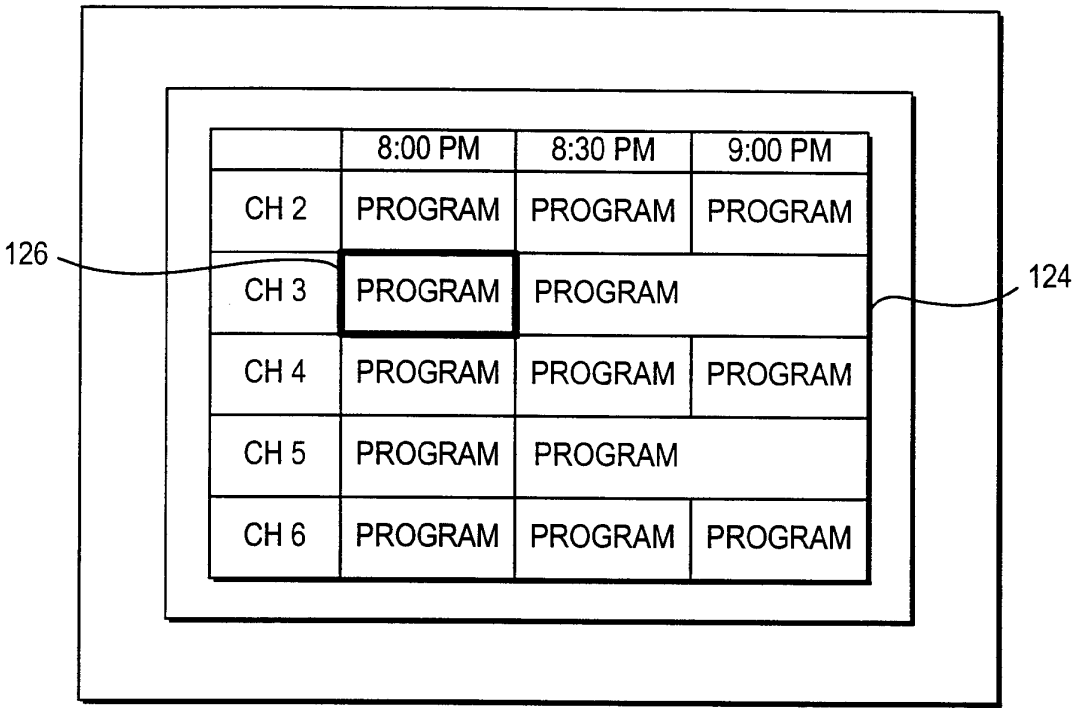

126
124
8:00 PM
8:30 PM
9:00 PM
CH 2
PROGRAM
PROGRAM
PROGRAM
CH 3
PROGRAM
PROGRAM
CH 4
PROGRAM
PROGRAM
PROGRAM
CH 5
PROGRAM
PROGRAM
CH 6
PROGRAM
PROGRAM
PROGRAM

FIG. 8

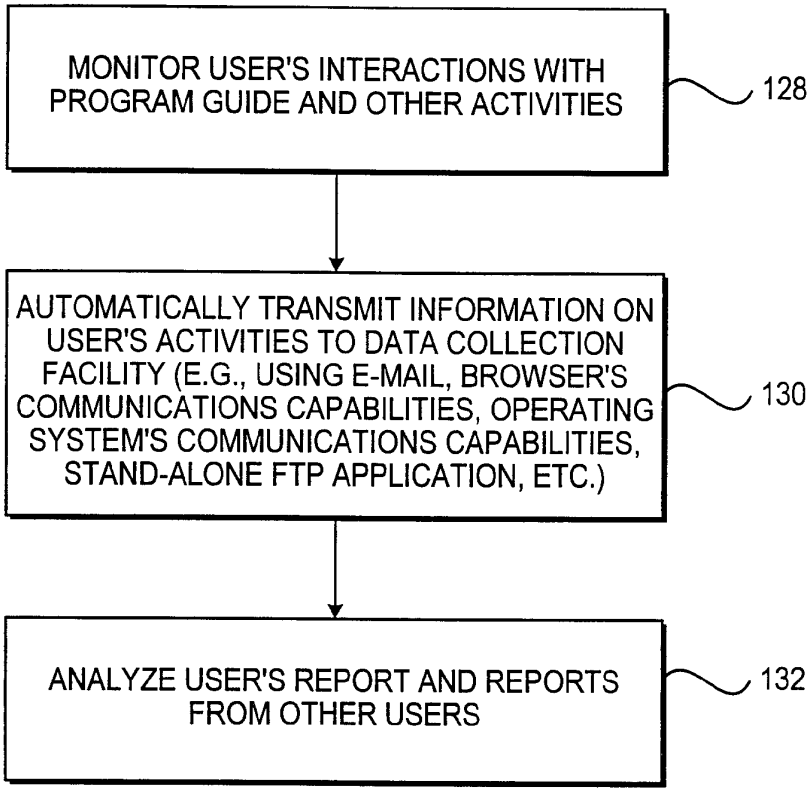

MONITOR USER'S INTERACTIONS WITH PROGRAM GUIDE AND OTHER ACTIVITIES
128
AUTOMATICALLY TRANSMIT INFORMATION ON USER'S ACTIVITIES TO DATA COLLECTION FACILITY (E.G., USING E-MAIL, BROWSER'S COMMUNICATIONS CAPABILITIES, OPERATING SYSTEM'S COMMUNICATIONS CAPABILITIES, STAND-ALONE FTP APPLICATION, ETC.)
130
ANALYZE USER'S REPORT AND REPORTS FROM OTHER USERS
132

FIG. 9

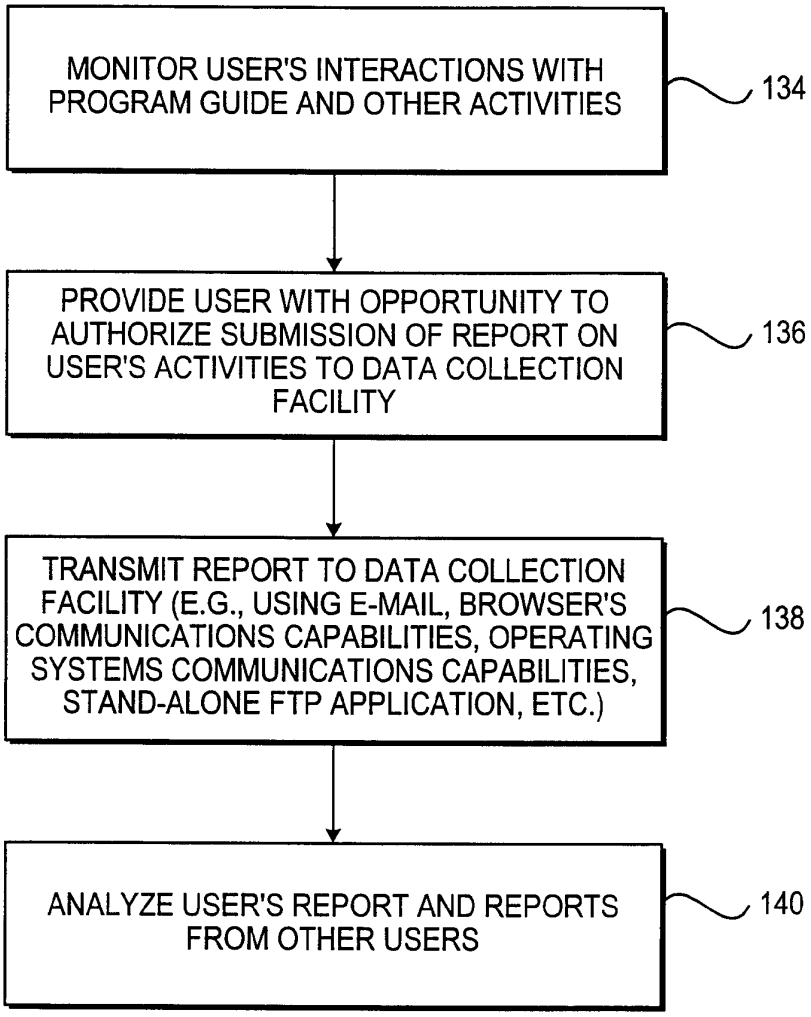

MONITOR USER'S INTERACTIONS WITH PROGRAM GUIDE AND OTHER ACTIVITIES
134
PROVIDE USER WITH OPPORTUNITY TO AUTHORIZE SUBMISSION OF REPORT ON USER'S ACTIVITIES TO DATA COLLECTION FACILITY
136
TRANSMIT REPORT TO DATA COLLECTION FACILITY (E.G., USING E-MAIL, BROWSER'S COMMUNICATIONS CAPABILITIES, OPERATING SYSTEMS COMMUNICATIONS CAPABILITIES, STAND-ALONE FTP APPLICATION, ETC.)
138
ANALYZE USER'S REPORT AND REPORTS FROM OTHER USERS
140

FIG. 10

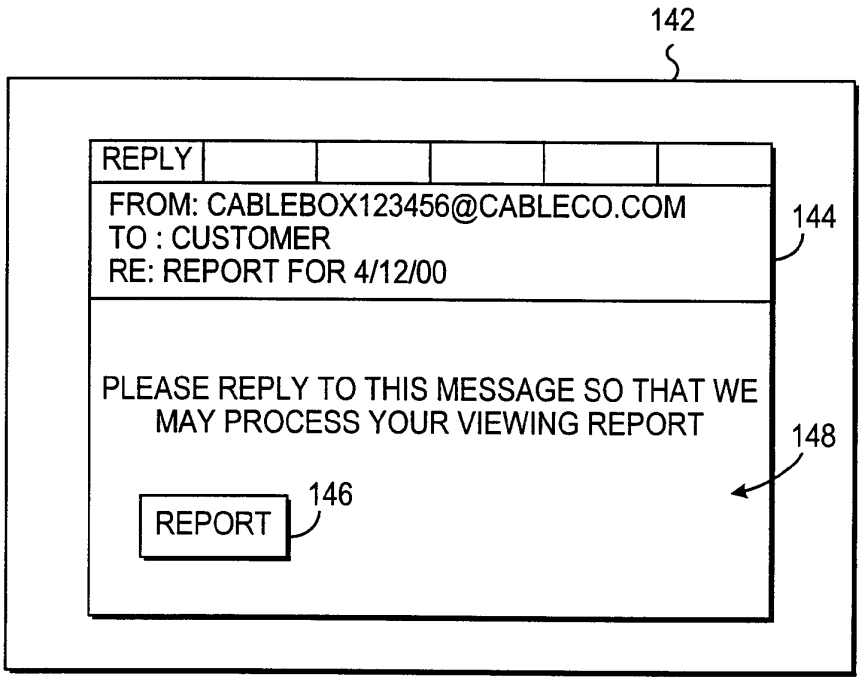

142
REPLY
FROM: CABLEBOX123456@CABLECO.COM
TO : CUSTOMER
RE: REPORT FOR 4/12/00
144
PLEASE REPLY TO THIS MESSAGE SO THAT WE MAY PROCESS YOUR VIEWING REPORT
148
146
REPORT

FIG. 11

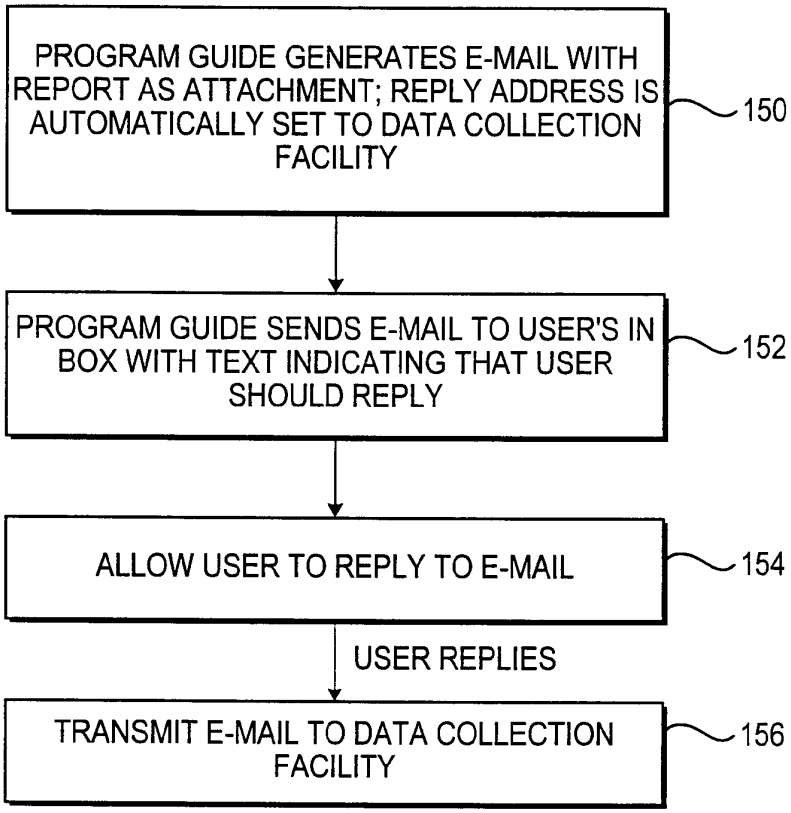

PROGRAM GUIDE GENERATES E-MAIL WITH REPORT AS ATTACHMENT; REPLY ADDRESS IS AUTOMATICALLY SET TO DATA COLLECTION FACILITY
150
PROGRAM GUIDE SENDS E-MAIL TO USER'S IN BOX WITH TEXT INDICATING THAT USER SHOULD REPLY
152
ALLOW USER TO REPLY TO E-MAIL
154
USER REPLIES
TRANSMIT E-MAIL TO DATA COLLECTION FACILITY
156

FIG. 12

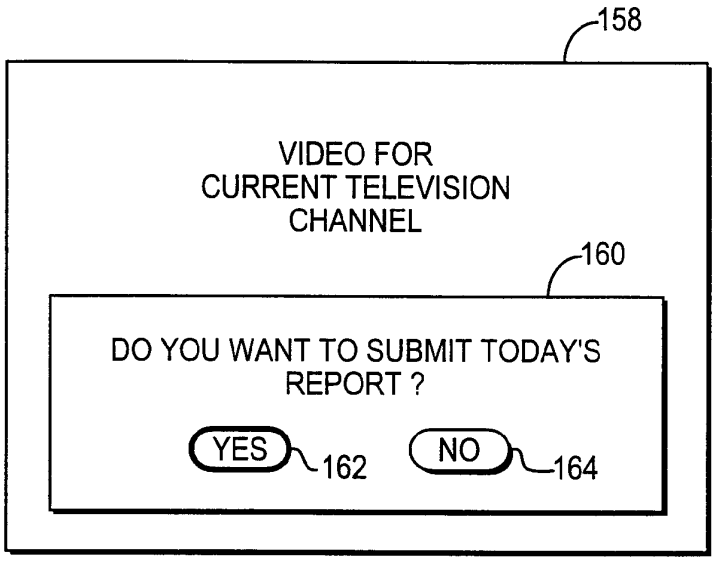

158
VIDEO FOR
CURRENT TELEVISION
CHANNEL
160
DO YOU WANT TO SUBMIT TODAY'S
REPORT ?
YES
162
NO
164

FIG. 13

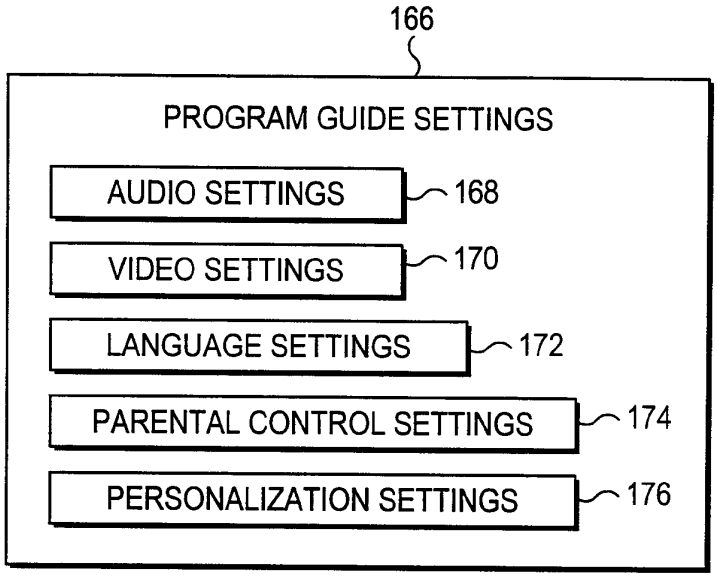

166
PROGRAM GUIDE SETTINGS
AUDIO SETTINGS
168
VIDEO SETTINGS
170
LANGUAGE SETTINGS
172
PARENTAL CONTROL SETTINGS
174
PERSONALIZATION SETTINGS
176

FIG. 14

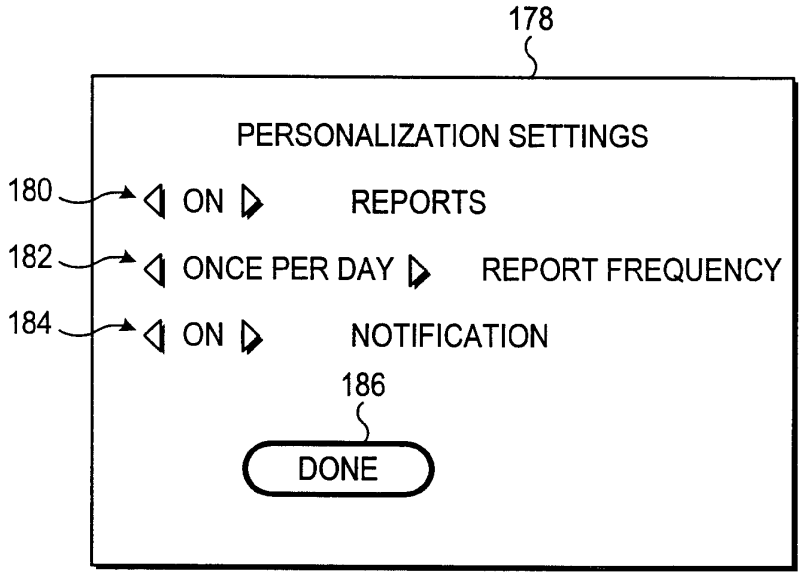

178
PERSONALIZATION SETTINGS
180
ON
REPORTS
182
ONCE PER DAY
REPORT FREQUENCY
184
ON
NOTIFICATION
186
DONE

FIG. 15

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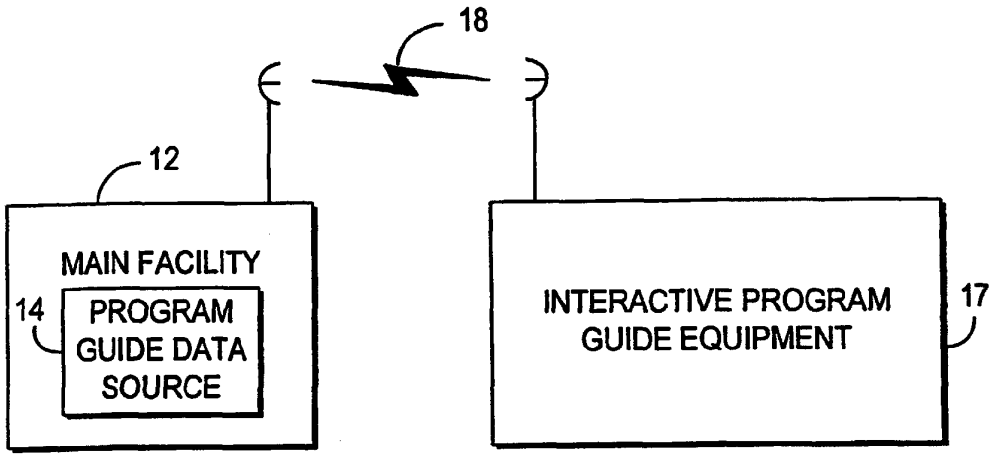
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— *With international search report.*

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(54) Title: INTERACTIVE TELEVISION PROGRAM GUIDE WITH SELECTABLE LANGUAGES



(57) Abstract: An interactive television program guide is provided. The interactive television program guide provides a user with the opportunity to select a language for playing television programming and displaying program guide text. Television program audio in the desired language may be obtained from a SAP or digital audio tract and played in the selected language. Television related information in the desired language may be obtained from a digital tract. If television program audio or related information is not provided in the selected language, the program guide may use a default language. The program guide may coordinate program guide display screen text with languages available for television programs when the programs are broadcast to users.

WO 01/06788 A1

INTERACTIVE TELEVISION PROGRAM GUIDE WITH SELECTABLE LANGUAGES

Background of the Invention

This invention relates to interactive television program guide systems, and more particularly, to interactive television program guide systems in which users may select a desired language for playing television programming and displaying program guide display screen text.

Cable, satellite, and broadcast television systems provide viewers with a large number of television channels. Users have traditionally consulted printed television program schedules to determine the programs being broadcast at a particular time. More recently, interactive television program guides have been developed that allow television program information to be displayed on a user's television.

Interactive television program guides allow the user to navigate through television program listings using a remote control. In a typical program guide, various groups of television program listings

are displayed in predefined or user-defined categories. Listings are typically displayed in a list, grid, or table. Interactive television program guides are typically implemented on set-top boxes located in the homes of users. A typical set-top box is connected to the user's television and videocassette recorder. Program guides that run on personal computers or that allow program guide information to be obtained using the Internet are also available.

Current television programming service providers typically provide television programing to customers that may live across a wide geographical area. It is not uncommon for a television programming service provider to provide television programming to a number of viewers who may not speak the same language, or who prefer speaking in a language different from the primary language of the geographical area in which the viewers live.

Some current interactive television program guides provide users with the ability to select languages for television programming from digital audio tracks on a digital channel. These interactive television program guides provide the user with the opportunity to select a language. The interactive program guide informs firmware in the user's set-top box of the selected language. A digital component selector in the set-top box then instructs a packet filter to filter out unwanted digital audio tracks based on unique packet identifiers ("PIDs") that identify each of the tracks. The audio track with the PID that corresponds to the selected language is played by the set-top box on the user's television.

Current program guides do not provide for activation and deactivation of a secondary audio

program (SAP) based on the language of the audio carried on the SAP. Current program guides also do not allow user to designate a single language for both displaying program guide display screen text (e.g., help text, program listings grid text, button labels, etc.), and for playing audio.

It would therefore be desirable to provide an interactive television program guide that allows a user to select a language for playing analog program audio and for displaying program guide display screen text. It would also be desirable to provide a program guide that allows a user to select a language in which both audio is played and program guide text is displayed. It would also be desirable to coordinate the language in which program guide display screen text is displayed with languages that are available to the user for playing television programming. For example, it would be desirable to have television program listings for a particular program displayed in a user selected language if the program, when actually broadcasted, has audio available in the selected language. Otherwise, the program listing for that program may be displayed and the program played in a default language.

It is therefore an object of the present invention to provide an interactive television program guide system that allows a user to select a language in which both programming audio is played and program guide display screen text is displayed.

It is another object of the present invention to provide an interactive television program guide that allows a user to select languages for playing television program audio provided on analog tracks.

It is another object of the present invention to provide an interactive television program guide that

coordinates the language in which program guide display screen text is displayed with languages available for television programming when the television programming is broadcasted.

It is another object of the present invention to provide an interactive television program guide system in which program guide display screen text in a selected language is downloadable by the program guide.

Summary of the Invention

These and other objects of the present invention are accomplished in accordance with the principles of the present invention by providing an interactive television program guide system having a main facility (e.g., a satellite uplink facility) that provides program guide data from a data source to a number of television distribution facilities (e.g., cable system headends, broadcast distribution facilities, satellite television distribution facilities, or any other suitable television distribution facilities). The program guide data transmitted by the main facility to the television distribution facilities includes television programming data (e.g., titles, channels, descriptions and content information, rating information, or any other information associated with television programming), and additional data for services other than television program listings (e.g., help text, weather information, sports information, associated Internet web links, etc.). The television distribution facilities distribute the program guide data to the interactive television program guides of a number of users.

The interactive television program guide of the present invention is implemented on interactive

program guide equipment that may include user television equipment (e.g., a set-top box and television combination) located at the user's home. The interactive program guide equipment may also include program guide distribution equipment located at a television distribution facility.

Program guide display screens may be used to provide a user with the opportunity to select the language in which television programming is played by the user's television equipment and in which program guide display screen text is displayed using the interactive television program guide. 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. The interactive television program guide may store a language attribute identifying the selected language. A default program guide language attribute may also be stored by the program guide. The default program guide language attribute may, for example, be preprogrammed into the program guide or supplied as program guide data. Default program languages for individual programs may also be supplied as program guide data.

The program guide may also provide users with an opportunity to select an alternate language in which program guide display screen text is displayed and programming audio played. For example, the user may select Spanish as a primary language and English as an alternate language. In another suitable approach, the program guide may pick an alternate language based on the primary language selected by the user. If the user selects Canadian English for the primary language, for

example, the program guide may select U.S. English as an alternate language. As used herein, "selected language" is intended to include a primary language selected by the user, a secondary language selected by the user or the program guide, or any suitable combination thereof.

In practice, the languages available for playing programming audio may not be the same as the languages available for displaying program guide display screen text. When programming audio is not available in the selected language but program guide display screen text is, the program guide may play programming audio in a related language. For example, if a user selects Canadian English as the user's primary language, the program guide may display program guide display screen text in Canadian English and play programming audio in U.S. English when there is nc Canadian English audio track available for the program.

The interactive program guide informs hardware in the user's television equipment of the selected language or languages. The user's television equipment plays television programs with audio from digital or analog audio tracks that contain audio in the selected languages. If audio in the primary or alternate language is not available on any provided digital or analog audio track, the user television equipment plays the television programs in the default program guide language or, if applicable, the default program languages. Data or other information that is provided, for example subtitles, may also be displayed in the selected language.

The interactive television program guide of the present invention may provide a user with the opportunity to request television programs such as in,

for example, a video-on-demand (VOD) system. The interactive television program guide may inform equipment at the television distribution facility of the primary, alternate and default languages (or any suitable combination thereof) when, for example, a request is made by the program guide to the television distribution facility for a program. The television distribution facility may respond by providing the requested television program to the user's television equipment with only a single audio track containing audio in the selected language. Eliminating unnecessary audio tracks may lessen the bandwidth requirements for transmitting programming signals from the television distribution facility to a user's television equipment.

The interactive television program guide of the present invention may also provide program guide display screen text to the user in the selected language. As used herein, interactive program guide display screen text may include help text, program guide data text, program guide text, or any suitable combination thereof. Help text is displayed in response to the user selection of a help feature. Help text may be downloaded as part of the program guide data provided by the main facility or may be part of the program guide.

Program guide data text is text included in the downloaded program guide data and included in program guide display screens. Program guide data text may include, for example, programming information (e.g., titles, channels, descriptions and content information, rating information, or any other text based information associated with television

programming), text for advertisements, or any other suitable text-based information.

Program guide text is text that is programmed into the program guide and that is generally not provided as part of the program guide data. Program guide text may be downloaded when, for example, changing languages of the program guide. Program guide text may include, for example, screen titles, screen element labels (e.g., button labels, program list labels, program grid labels, etc.), text that indicates or otherwise describes program guide functionality, or any other text that may be considered part of the program guide itself and displayed in program guide display screens.

The interactive program guide may filter help text and program guide data text from the program guide data based on the language attributes. Help text and program guide data text in the selected and default program guide languages may be provided to the interactive television program guide by the television distribution facilities using any suitable approach. The text may, for example, be provided continuously by the television distribution facilities in different languages and filtered by the program guide, may be downloaded by the program guide on request (e.g., in a suitable client-server approach), or may be obtained using any other suitable approach.

Program guide text may be changed in any suitable fashion. Program guide text for all available languages may, for example, be compressed using any suitable compression method and stored as part of the program guide application. When a different language is selected by the user, the program guide may, for example, decompress the appropriate program guide text

and display it accordingly. Alternatively, the program guide may, for example, download program guide text on demand from the television distribution facility (e.g., as in a suitable client-server approach) using the stored language attribute. Program guide text may also be provided as part of a continuous data stream and filtered locally. Any suitable combination of these methods may also be used. For example, the program guide may store program guide text in popular languages and may download program guide text when a less popular language is selected. For similar languages, (e.g., Canadian English and U.S. English), the program guide may download program guide text in one language as a reference, and the differences in the second language. Making program guide text downloadable via a continuous data stream, periodic stream, server, or any other source, may allow a single version of the program guide to be distributed over a wide geographical area (e.g., nationally) and the language of the guide to be localized (e.g., apropos to the languages of local residents).

If desired, only portions of the program guide display screen text may be changed by coordinating the language in which program guide display screen text is displayed with the languages available for television programming available to the user. For example, a particular program may not have an audio data track for the selected language. The program may be played and its associated program listings may be displayed, for example, in a default program guide language or default program language, while programs and associated program listings that have audio or data tracks with content in the selected language may be played and displayed in the selected

language. The same may be true for subtitles, music information, programming information, other information included in a digital track, or any other program guide data text or program guide text that may be played by the user's television equipment. The same may be true for television program audio. Programs, their audio, and any associated program data or programming guide data may be recorded in a selected or default language.

Further features of the invention, its nature and various advantages will be more apparent from the accompanying drawings and the following detailed description of the preferred embodiments.

Brief Description of the Drawings

FIG. 1 is a schematic block diagram of an illustrative system in accordance with the present invention.

FIGS. 2a and 2b show illustrative arrangements for the interactive program guide equipment of FIG. 1 in accordance with the principles of the present invention.

FIG. 3 is an illustrative schematic block diagram of the user television equipment of FIGS. 2a and 2b in accordance with the principles of the present invention.

FIG. 4 is a generalized schematic block diagram of portions of the illustrative user television equipment of FIG. 3 in accordance with the principles of the present invention.

FIGS. 5-11 are illustrative program guide display screens in accordance with the principles of the present invention.

FIG. 12 shows an illustrative hierarchy that may be used by the program guide to determine the

language in which program guide display screen text is displayed and audio played.

FIGS. 13-16 are flowcharts of illustrative steps involved in providing an interactive program guide with selectable languages in accordance with the principles of the present invention.

Detailed Description of the Preferred Embodiments

An illustrative system 10 in accordance with the present invention is shown in FIG. 1. Main facility 12 provides program guide data from program guide data source 14 to interactive program guide equipment 17 via communications link 18. There are preferably numerous pieces or installations of interactive program guide equipment 17, although only one is shown in FIG. 1 to avoid over-complicating the drawing.

Link 18 may be a satellite link, a telephone network link, a cable or fiber optic link, a microwave link, an Internet link, a combination of such links, or any other suitable communications link. If it is desired to transmit video signals over link 18 in addition to data signals, a relatively high bandwidth link such as a satellite link may generally be preferred to a relatively low bandwidth link such as a telephone line.

The program guide data transmitted by main facility 12 to interactive program guide equipment 17 may include television programming data (e.g., program times, channels, titles, and descriptions) and other data for services other than television program listings (e.g., help text, pay-per-view information, weather information, sports information, associated

Internet web links, etc.). The program guide data may be compressed if desired.

An interactive television program guide is implemented on interactive program guide equipment 17. Two illustrative arrangements for interactive program guide equipment 17 are shown in FIGS. 2a and 2b. Interactive program guide equipment 17 may include program guide distribution equipment 21 located at television distribution facility 16, and user television equipment 22.

The interactive television program guide may run totally on user television equipment 22 as shown in FIG. 2a, or may run partially on user television equipment 22 and partially on program guide distribution equipment 17 using a suitable client-server or distributed processing approach as shown in FIG. 2b. Television distribution facility 16 may be any suitable distribution facility (e.g., a cable system headend, a broadcast distribution facility, a satellite television distribution facility, or any other suitable type of television distribution facility). Television distribution facility 16 may have program guide distribution equipment 21. Program guide distribution equipment 21 may distribute program guide data that television distribution facility 16 received from main facility 12 to multiple users via communications paths 20.

Program guide distribution equipment 21 of FIGS. 2a and 2b may be any equipment suitable for providing program guide data to user television equipment 22. Program guide distribution equipment 21 may include, for example, suitable transmission hardware for distributing program guide data on a television channel sideband, in the vertical blanking

interval of a television channel, using an in-band digital channel, using an out-of-band digital signal, or by any other suitable data transmission technique. Analog or digital video signals (e.g., television programs) may also be provided by program guide distribution equipment 21 to user television equipment 22 over communications paths 20 on multiple television channels.

Communications path 20 preferably has sufficient bandwidth to allow television distribution facility 16 to distribute television programming to user television equipment 22. There are typically multiple pieces of user television equipment 22 and multiple associated communications paths 20, although only one piece of user television equipment 22 and communications path 20 are shown in FIGS. 2a and 2b to avoid over complicating the drawing. If desired, television programming may be provided over separate communications paths (not shown).

FIG. 2b shows an illustrative arrangement for interactive program guide equipment 17 in a client-server based or distributed interactive program guide system. As shown in FIG. 2b, program guide distribution equipment 21 may include program guide server 25. Program guide server 25 may be any suitable software, hardware, or combination thereof for providing a client-server based program guide. Program guide server 25 may, for example, generate requested program guide display screens as digital frames and distribute the frames to user television equipment 22 for display by an interactive program guide client implemented on user television equipment 22. Program guide systems in which digital frames are distributed to users are described, for example, in Marshall et al.

U.S. patent application Serial No. 09/330,501, filed June 11, 1999, which is hereby incorporated by reference herein in its entirety. Alternatively, program guide server 25 may run a suitable database engine (e.g., SQL Server by Microsoft) and provide program guide data in response to queries generated by a program guide client implemented on user television equipment 22. If desired, program guide server 25 may be located at main facility 12 (not shown).

In still another embodiment, program guide distribution equipment 21 may include suitable hardware (not shown) on which a first portion or version of the interactive television program guide is implemented. A second portion or version of the program guide may be implemented on user television equipment 22. The two versions or portions of the interactive program guide may communicate using any suitable peer-to-peer communications scheme (e.g., messaging, remote procedure calls, etc.) and perform interactive program guide functions distributively between television distribution facility 16 and user television equipment 22.

Television distribution facility 16 may supply programs to user television equipment 22 in response to demands made by the user using user television equipment 22. Any suitable video-on-demand (VOD) approach may be used. Program guide server 25 may receive, along with video demands from user television equipment 22, identifiers that identify the selected language and the default program guide language of the interactive television program guide.

Program guide distribution equipment 21 of FIG. 2b may include digital component selector 61 and

analog audio selector 63. Digital component selector 61 may be any hardware, software, or combination thereof suitable for determining which digital audio, data, or other tracks contain audio, data, or other information in the language selected by the user or, alternatively, in the default language of the interactive program guide. Analog audio selector 63 may be any hardware, software, or combination thereof suitable for determining which analog audio track contains audio in the selected language or, alternatively, in the default program guide language.

Program guide distribution equipment 21 may distribute programs to user television equipment 22 with only an analog audio track (if distributed on an analog channel), or with only digital audio, data, or other information tracks (if distributed on a digital channel), that have audio, data, or other information in the selected or default languages as determined by analog audio selector 63 or digital component selector 61, respectively. Sending audio, data, or other information in only one language requires less bandwidth than would sending the audio, data, or other information in multiple languages and having unwanted languages filtered at user television equipment 22. This approach is especially useful in systems, such as VOD systems, where many users request video over multiple communication paths 20.

Each user has user television equipment 22 for displaying, for example, television programming and program guide display screens using the interactive television program guide. Program guide data may be distributed by program guide distribution equipment 21 to user television equipment 22 using any suitable

scheme. For example, program guide data may be provided in a continuous stream, or may be transmitted periodically at a suitable time interval (e.g., once per hour). If transmitted continuously, it may not be necessary to store the data locally at user television equipment 22. Rather, user television equipment 22 may extract data "on the fly" as it is needed. If desired, television distribution facility 16 may poll user television equipment 22 periodically for certain information (e.g., pay program account information or information regarding programs that have been purchased and viewed using locally-generated authorization techniques). Program guide data provided by program guide server 25 may also be distributed to user television equipment 22 by program guide distribution equipment 21. If desired, the program guide data may be compressed by main facility 12 or television distribution or facility 16, and uncompressed by the program guide.

For clarity, the present invention will be illustrated in connection with a system arrangement in which program guide data is distributed from a main facility to an interactive television program guide implemented on user television equipment via a television distribution facility. Other suitable systems involve arrangements in which data is distributed to a program guide on user television equipment using other suitable distribution schemes, such as schemes involving data transmission over the Internet or the like. If desired, the interactive television program guide application may be implemented using a client-server architecture in which the primary processing power for the application is provided by a server located at, for example, the television

distribution facility or the main facility (e.g., program guide server 25), and user television equipment 22 acts as a client processor, as in, for example, the system shown in FIG. 2b. A suitable distributed approach may also be used.

An illustrative arrangement for user television equipment 22 is shown in FIG. 3. User television equipment 22 of FIG. 3 receives video, audio and data from television distribution facility 16 (FIG. 1) at input 26. During normal television viewing, tuner 51 of set-top box 28 tunes to a desired television channel based on inputs from the user on remote control 40. The signal for that television channel is then provided at video output 30. The signal supplied at output 30 is typically either a radio-frequency (RF) signal on a predefined channel (e.g., channel 3 or 4), or a analog demodulated video signal, but may also be a digital signal provided to television 36 on an appropriate digital bus (e.g., a bus using the Institute of Electrical and Electronics Engineers (IEEE) 1394 standard, (not shown)). The video signal at output 30 is received by optional secondary storage device 32. Set-top box 28 may also have digital component selector 53, packet filter 55, MPEG-2 decoder 57, and analog audio selector 59 (or any suitable combination thereof) for obtaining digital or analog audio from the signal received at input 26.

Secondary storage device 32 can be any suitable type of analog or digital program storage device or player (e.g., a videocassette recorder, a digital versatile disc (DVD) player, etc.). Program recording and other functions may be controlled by set-top box 28 using control path 34. If secondary storage device 32 is a videocassette recorder, for

example, a typical control path 34 involves the use of an infrared transmitter coupled to the infrared receiver in the videocassette recorder that normally accepts commands from a remote control such as remote control 40. Remote control 40 may be used to control set-top box 28, secondary storage device 32, and television 36. Programs and their associated audio may be stored in a selected or default language if desired.

The interactive television program guide may run on set-top box 28, on television 36 (if television 36 has suitable processing circuitry and memory), or on a suitable analog or digital receiver connected to television 36. The interactive television program guide may also run cooperatively on both television 36 and set-top box 28. Interactive television application systems in which a cooperative interactive television program guide application runs on multiple devices are described, for example, in Ellis U.S. patent application Serial No. 09/186,598, filed November 5, 1998, which is hereby incorporated by reference herein in its entirety.

If desired, the user may record programs, associated program data, program guide data, or any suitable combination thereof in digital form on optional digital storage device 31. The programs, audio, associated program data, or program guide data may be stored in a selected or default language. Digital storage device 31 may be a writable optical storage device (such as a DVD player capable of handling recordable DVD discs), a magnetic storage device (such as a disk drive or digital tape), or any other digital storage device. Interactive television program guide systems that have digital storage devices are described, for example, in Hassell et al. U.S.

patent application Serial No. 09/157,256, filed September 17, 1998, which is hereby incorporated by reference herein in its entirety.

Digital storage device 31 can be contained in set-top box 28 or it can be an external device connected to set-top box 28 via an output port and appropriate interface. If necessary, processing circuitry in set-top box 28 formats the received video, audio, and data signals into a digital file format. Preferably, the file format is an open file format such as the Motion Pictures Expert Group (MPEG) MPEG-2 standard. The resulting data is streamed to digital storage device 31 via an appropriate bus (e.g., a bus using the Institute Electrical and Electronics Engineers (IEEE) 1394 standard), and is stored on digital storage device 31.

Television 36 receives video and audio signals from secondary storage device 32 via communications path 38. The signals on communications path 38 may either be generated by secondary storage device 32 when playing back a prerecorded storage medium (e.g., a videocassette or a recordable digital versatile disc), by digital storage device 31 when playing back a pre-recorded digital medium, may be passed through from set-top box 28, may be provided directly to television 36 from set-top box 28 if secondary storage device 32 is not included in user television equipment 22, or may be received directly by television 36. During normal television viewing, the signals provided to television 36 correspond to the desired channel to which the user has tuned with set-top box 28. The signals may also be provided to television 36 by set-top box 28 when set-top box 28 is

used to play back information stored on digital storage device 31.

A more generalized embodiment of user television equipment 22 of FIG. 3 is shown in FIG. 4. As shown in FIG. 4, program guide data from television distribution facility 16 (FIG. 1) is received by control circuitry 42 of user television equipment 22. Control circuitry 42 may include circuitry suitable for tuning to digital or analog television signals as indicated by tuner 51. Control circuitry 42 may also include circuitry suitable for selecting different audio tracks from digital audio television channels, as is indicated by digital component selector 53, packet filter 55, and analog audio selector 59. Decoding circuitry for generating digital video may also be included, as is indicated by MPEG-2 decoder 57. The functions of control circuitry 42 may be provided using the set-top box arrangement of FIG. 3. Alternatively, these functions may be integrated into an advanced television receiver, personal computer television (PC/TV), or any other suitable arrangement. If desired, a combination of such arrangements may be used.

User television equipment 22 may also have secondary storage device 47 and digital storage device 49 for recording programming. Secondary storage device 47 can be any suitable type of analog or digital program storage device (e.g., a videocassette recorder, a digital versatile disc (DVD), etc.). Program recording and other functions may be controlled by control circuitry 42. Digital storage device 49 can be, for example, a writable optical storage device (such as a DVD player capable of handling recordable DVD discs), a magnetic storage device (such as a disk

drive or digital tape), or any other digital storage device. If desired, programs may be recorded remotely at television distribution facility 16 or some other facility, making secondary storage device 47 and digital storage device 49 unnecessary. Systems in which programs are remotely recorded and played back are described, for example, in Ellis et al. U.S. patent application Serial No. 09/332,244, filed June 11, 1999, which is hereby incorporated by reference herein in its entirety. Programs, audio, associated program data, program guide data, or any suitable combination thereof, may be recorded by secondary storage device 47, digital storage device 49, or a remote server in a selected or default language if desired.

The user controls the operation of user television equipment 22 with user interface 46. User interface 46 may be a pointing device, wireless remote control, keyboard, touch-pad, voice recognition system, or any other suitable user input device. To watch television, the user instructs control circuitry 42 to display a desired television channel on display device 45. To access the functions of the program guide, the user instructs the program guide implemented on interactive program guide equipment 17 to generate a main menu or other desired program guide display screen for display on display device 45.

When a user indicates a desire to access the interactive television program guide implemented on interactive program guide equipment 17 (e.g., by using a "menu" key on remote control 40), the program guide generates an appropriate program guide display screen for display on monitor 45. A main menu screen, for example, such as illustrative main menu screen 100 of

FIG. 5, may be generated that provides the user with access to various program guide functions. Main menu screens may also display any suitable graphic or other display screen entity.

Illustrative main menu screen 100 of FIG. 5, for example, may include menu 102 of selectable program guide features 106. If desired, the program guide features 106 may be organized according to feature type. Menu 102, for example, organizes program guide features 106 into three columns wherein the column labeled "TV GUIDE" is for listings related features, the column labeled "MSO SHOWCASE" is for multiple system operator (MSO) related features, and the column labeled "VIEWER SERVICE" is for viewer related features. The interactive television program guide may generate a suitable display screen for a particular program guide feature in response to the user selection of any selectable program guide feature 106.

Main menu screen 100 may also include one or more selectable advertisement graphics 108. Selectable advertisement graphics 108 may, for example, advertise pay-per-view programs. In response to the user selection of a selectable advertisement graphic 108, the program guide may display information (e.g., pay-per-view information) for what is advertised by the graphic. Pure text advertisements may be presented using selectable advertisement graphics 108 if desired, or may be more suitably presented using selectable advertisement banner 110.

Main menu screen 100 may also include other graphics. The brand of the program guide product may be indicated, for example, using a product brand logo graphic such as product brand logo graphic 112. The service provider may be indicated, for example, using a

service provider logo graphic such as service provider logo graphic 114. The current time may be displayed using clock 116. In addition, a suitable indicator such as indicator graphic 118 may be used to indicate to the user that a message is waiting for the user if the program guide provides messaging or a TV-Mail feature.

The interactive program guide may provide the user with the opportunity to view television program listings. A user may indicate a desire to view program listings by, for example, positioning highlight region 120 over a desired program guide feature. Alternatively, the program guide may present program listing in response to the user pressing a key (e.g., a "guide" key) on remote control 40. In response to the user indicating a desire to view television programming information, the program guide may generate an appropriate program listings screen for display on monitor 45. A program listings screen may contain one or more lists of programs organized according to multiple organization criteria and sorted in various ways.

The program listings screen may be overlaid over a program being viewed by the user or overlaid over a portion of the program in a "browse" mode. The program guide may, for example, provide the user with the opportunity to view listings by time, by channel, according to a number of themes (e.g., movies, sports, children, etc.), or may allow the user to search for a listing by title. Program listings may be displayed using any suitable list, table, grid, or other suitable display construct. If desired, program listings display screens may also include selectable advertisement graphics, selectable advertisement

banners, product brand logo graphics, service provider brand graphics, clocks, or any other suitable indicator or graphic.

FIGS. 6a and 6b illustrate the display of program listings by time and by channel, respectively. The program listings display screens 130 and 135 of FIGS. 5a and 5b may include highlight region 151, which highlights the current listing 150. The user may position highlight region 151 by entering appropriate commands with user interface device 52. For example, if user input interface device 52 has a keypad, the user can position highlight region 151 using "up" and "down" keys. Alternatively, a touch sensitive screen, trackball, voice commands, or other suitable device may be used to move highlight region 151 or to select program listings without the use of highlight region 151. In still another approach, the user may speak a television program listing into a voice request recognition system. Any other suitable approach may be used.

The program guide may also provide the user with the opportunity to view listings for other times or channels. The user may indicate a desire to access listings for other times or channels by, for example, pressing "left" and "right" arrows on remote control 40 to change time slots (when listings are presented by time as shown in FIG. 6a), or to change channels (when listings are presented by channel as shown in FIG. 6b). In response to such an indication, the program guide may display listings for a different time slot or channel. The user may also indicate a desire to see additional program listings for a particular time slot (when listings are presented by time as shown in FIG. 6a) or for a particular channel (when listings are

displayed by channel as shown in FIG. 6b) by, for example, pressing "up" and "down" arrow keys on remote control 40. In response to such an indication, the program guide may, for example, scroll or page the program listings to display additional program listings.

After a user selects a program listing (e.g., by position highlight region 151 and pressing an "OK" key on remote control 40), the interactive program guide may provide the user with the opportunity to access a number of program guide functions associated with the listing. For example, the user may access additional information (typically text or graphics, but possibly video and other information) about the listing, set a reminder, schedule an associated program for recording, set parental control features, set and navigate through favorite channels, or any access other suitable program guide function.

FIG. 7a shows an illustrative full information screen 161 that may be displayed when a user indicates a desire to view information for a program. Full information screen 161 may be displayed, for example, when the user presses an "info" key on remote control 40 after highlighting a program listing in a program listings display screen (e.g., program listings display screens 130 and 135 of FIGS. 5a and 5b), while watching a program, or at any other suitable time. Information screens that provide users with an opportunity to access various program guide functions are described, for example, in concurrently filed Rudnick et al. U.S. patent application Serial No. 09/356,268 filed July 16, 1999, which is hereby incorporated by reference herein in its entirety.

Full information screen 161 may include information window 162 in which a brief description of a program may be displayed. Information window 162 may also list the languages available for a program in response to a user indicating a desire to see such a list (e.g., by selecting language option 157). FIG. 7b, for example, shows information window 162 with available languages for "Mad About You." Alternatively, the available languages may be displayed as part of an information window without requiring a user to indicate a desire to access them.

Users may be unfamiliar with some of the functions of the program guide. The interactive program guide may, for example, provide the user with the opportunity to access help information for a function by, for example, pressing a "help" key on remote control 40 while in the display screen of a particular function. FIG. 8 shows illustrative help display screen 200 that may be generated by the program guide in response to a user indication to do so. Help display screen 200 may contain selectable advertisement graphics, advertisement banners, product brand logo graphics, service provider logo graphics, clocks, or any other suitable indicator or graphic. Help display screen 200 may also contain help text panel 202 in which help text 205 is displayed. Help text panel 202 may include other non-help text, such as text 204 that indicates to the user to press HELP to exit.

The program guide of the present invention may provide a user with the opportunity to select a language from a list of languages. The user may, for example, access a list of languages initially by indicating a desire to access a setup function of the program guide by selecting "SETUP" from main menu 102

of FIG. 5. In response to such an indication, the program guide may display a setup display screen, such as illustrative setup display screen 300 of FIG. 9. The setup display screen of FIG. 9 may, for example, provide a user with the opportunity to select a "language" setup option from a list of on-screen features.

In response to the user selection of the "language" setup option the program guide may display, for example, illustrative language setup display screen 310 of FIG. 10. Language setup display screen 310 of FIG. 10 may, for example, display a list of selectable languages that the program guide may use for playing television programming and displaying program guide display screen text. The language listings may be displayed in their respective languages if desired. The program guide may provide the user with an opportunity to select a language and in response to such a selection, the program guide may display illustrative language confirmation screen 320 shown in FIG. 11. Language confirmation screen 320 of FIG. 11 may provide a user with an opportunity to confirm the selected language. If desired, language confirmation screen 320 may be displayed in the selected language before the language is set.

Illustrative language confirmation screen 320 of FIG. 11 indicates to users that there may be a delay of a few minutes to update the guide. Whether or not there is any delay may depend on the chosen approach for providing program guide display screen text in different languages. The message displayed in language confirmation screen 320 may be changed accordingly.

Language setup display screen 310 of FIG. 10 and language confirmation screen 320 of FIG. 11 may

also be displayed by the program guide to provide the user with an opportunity to select an alternate language. The program guide may display program guide display screen text and play audio in the alternate language when text or audio in the primary language (i.e., the language first selected by the user) is not available. In another suitable approach, the program guide may pick an alternate language based on the primary language selected by the user. If the user selects Canadian English, for example, the program guide may select U.S. English as an alternate language. As used herein, "selected language" is intended to include a primary language selected by the user, a secondary language selected by the user or the program guide, or any suitable combination thereof.

In practice, the languages available for playing programming audio may not be the same as the languages available for displaying program guide display screen text. When programming audio is not available in the selected language but program guide display screen text is, the program guide may play programming audio in a related language. For example, if a user selects Canadian English as the user's primary language, the program guide may display program guide display screen text in Canadian English and play programming audio in U.S. English when there is no Canadian English audio track available.

The program guide may store a language attribute identifying the selected language. The program guide may also store a default program guide language attribute identifying a default program guide language. The default program guide language attribute may, for example, be preprogrammed into the program guide or supplied as part of the program guide data,

and may be customized based on a user's location. For example, users in the United States may have their default program guide language set to U.S. English, and users in Mexico may have their default program guide language set to Spanish.

Program guide display screen text may be displayed using the interactive television program guide according to the language attributes. If program guide display screen text in the selected language is not available, text in the default program guide language may be used to display program guide display screen text in the default program guide language. The display of program guide display screen text may include displaying times, dates, currencies, or parental ratings in formats particular to a selected language or country that uses a selected language. Program guide display screen text may include help text, program guide data text, and program guide text, or any suitable combination thereof. Help text is displayed in response to the user selection of a help feature such as text 205 of FIG. 8. Help text may be provided as part of the program guide data provided by the main facility, as part of the application, or using a suitable combination of approaches. Help text may, for example, be initially provided as part of the program guide and later downloaded when the user selects a language.

Program guide data text is text included in the program guide data that is read by the program guide and included in program guide display screens. Program guide data text may include, for example, programming information (e.g., titles, channels, descriptions and content information, rating information, or any other text based information

associated with television programming), text for advertisements, or any other suitable text based information. An example of program guide data text may be the program listings of listings 150 shown in FIGS. 6a and 6b, and the program information displayed on information window 162 of FIG. 7a.

Program guide text is text that is programmed into the program guide and that is generally not provided as part of the program guide data. Program guide text may be downloaded, however, when the user changes languages. Program guide text may include, for example, screen titles, screen element labels (e.g., button labels, program list labels, program grid labels, etc.), text that indicates or otherwise describes program guide functionality, or any other text that may be considered part of the program guide itself for display in program guide display screens. An example of program guide text may be the text of selectable features 106 of main menu 102 (FIG. 5).

The interactive program guide may obtain program guide data containing text that is in the selected or default program guide languages. In one suitable approach, program guide help and data text may be provided continuously by television distribution facility 16 to user television equipment 22 in different languages and filtered by the interactive program guide. The program guide may, for example, filter out data in the data stream containing text that is not in a desired language (e.g., undesirable help or program guide data text) by, for example, comparing a stored language attribute with language attributes contained in a program guide data stream. This comparison and filtering may also be performed by suitable circuitry in control circuitry 42 without

requiring the program guide to do the comparison. In another suitable approach, program guide data in the desired language (e.g., help text and programming video data text) may be downloaded by the program guide by a specific request (e.g., in a suitable client-server approach).

In still another suitable approach, the interactive program guide may indicate the selected and default program guide languages to television distribution facility 16 using any suitable approach. Television distribution facility 16, in turn, may provide program guide data only in the indicated languages. In this approach, television distribution facility 16 may have suitable memory and processing circuitry to store language attributes for a large number of users. Alternatively, the program guide may indicate the selected and default languages with every request.

Program guide text may be changed by the interactive program guide using any suitable approach. Program guide text for all available languages may, for example, be compressed using any suitable compression method, and stored as part of the program guide application. When a user selects a different language, the program guide may, for example, decompress program guide text in the selected language and display it accordingly. Alternatively, the program guide may, for example, download program guide text on demand from the television distribution facility (e.g., as in a suitable client-server approach), or download program guide text from a periodic or continuous data stream.

Television program audio may be provided to user television equipment 22 by television distribution facility 16 on analog audio tracks of analog television

channels. Different audio tracks may be used to provide different languages for television program audio. One suitable analog approach involves using a secondary audio program ("SAP"). SAP track identification may be provided to the interactive television program guide as part of the program guide data stream by main facility 12 or television distribution facility 16. The program guide data stream may, for example, contain a SAP track map database that maps or defines the primary and secondary language types of the SAP for a particular programming entity (e.g., by using a unique source identifier ("ID") to identify NBC, ABC, FOX, etc.), for each channel, or for each program. The SAP track map database may be generated by main facility 12 or television distribution facility 16 and transmitted to user television equipment 22 using any suitable analog or digital in-band or out-of-band approach. The SAP track map database may be included in the program guide data if desired.

The SAP track map database may be stored by the interactive program guide, downloaded on demand, periodically, continuously or using any other suitable approach. When necessary, the interactive program guide may pass track identifiers to analog audio selector 59 (FIG. 4). The program guide may, for example, pass track identifiers to analog audio selector 59 each time the user changes channels, each time a new program is broadcast, or after any other suitable event that may require analog audio selector 59 to select a different audio track. Alternatively, the program guide may pass the SAP track map database and track identifiers to analog audio selector 59. Analog audio selector 59 may in turn dynamically choose

between the SAP audio tracks based on the language identifiers and the SAP map, without requiring activity by the program guide.

Television program audio, data, and other information may be provided to user television equipment 22 on digital tracks that are provided as part of digital television channels. A digital channel may include, for example, a video track, a number of audio tracks, and a number of data or other suitable text tracks (e.g., a subtitle track, digital music information track (e.g., title, artist, and track information), etc.). If desired, data may be transmitted out-of-band and not included as an additional track. Digital video, audio, and data are transmitted in packets on the digital television channel. The packets also contain packet identifiers ("PIDs") identifying the track that each packet belongs to.

A PID map database may be provided by main facility 12 to television distribution facility 16 as part of the program guide data. Alternatively, television distribution facility 16 may insert a PID map database into the program guide data that was generated by television distribution facility 16 or another source. If desired, the PID map database may be distributed by television distribution facility 16 to user television equipment 22 separate from the program guide data. The PID map database defines which languages correspond to the digital tracks of the digital channels. The PID map database may define, for example, which languages correspond to which tracks for each television program, for each channel, or for each television distribution facility 16.

The interactive television program guide implemented on interactive program guide equipment 17 may receive the PID map database. The PID map database may be used by the interactive program guide to determine which audio, data, or other track has audio, data, or other information in the selected, default program guide, and default program languages. This may be determined, for example, each time the user changes the selected language, each time new television programming is broadcasted, each time the channel is changed, in any suitable combination thereof, or after any other event that may require selecting different digital tracks to obtain audio, data, or other information in the applicable languages. The PIDs for the tracks on which the selected or default language audio, data, or other information is provided are passed by the interactive program guide to packet filter 55 located in user television equipment 22. Packets without the passed IDs are filtered out by packet filter 55. The remaining packets, along with the digital video signal of the channel, may be passed from tuner 51 to decoder 57 for decoding, and all are played for the user by user television equipment 22.

The PID map database may also be forwarded to digital component selector 53. The interactive television program guide may pass the stored language attributes to digital component selector each time the user selects a different language using the program guide. Digital component selector 55 may in turn pass PIDs to the packet filter for audio, data, and other tracks that contain audio, data, and other information in the selected or default languages, based on the PID map. Packets without the indicated IDs are filtered out by packet filter. The remaining audio and data

packets, along with the digital video signal on the channel, may be passed from tuner 51 to decoder 57 for decoding, and are all played for the user by user television equipment 22. In this approach, the interactive program guide may "sleep" and allow digital component selector 53 to detect events which would require sending different PIDs to packet filter 55 (e.g., the user flipping a channel).

If desired, only portions of the program guide display screen text may change by coordinating the language in which program guide display screen text is displayed with the languages available for television programming available to the user. A particular program may, for example, not have an audio track (digital or analog) for a primary selected language (e.g., U.S. English). The program may be played and its associated program listings and other information may be displayed, for example, in any other applicable language (e.g., an alternate, the default program language, or the default program guide language), while programs and associated program listings that have the desired audio track may be displayed in the primary selected language. The same may be true for subtitles, music information, programming information, other data or information included in digital tracks, or any other program guide display screen text that is presented to the user by the program guide.

A particular program may not, for example, have an audio track in the selected language. When the user indicates to the interactive program guide a desire to access a program guide function that involves, for example, displaying program guide data text (e.g., previewing program listings, program

information, ordering pay-per-view programs, etc.), the program guide determines if the program guide data text displayed as part of the function includes television programming information (e.g., titles, broadcast times, descriptions and content information, rating information, etc.). As the program guide generates program guide display screens containing the television program information, the program guide determines if the television program associated with the television program information has audio, data, or other information in the selected language, based on the PID map database or the SAP map database. If so, the program guide displays program guide display screen text associated with the program in the selected language. If, however, the television program audio, data, or other information is not available in the selected language, the program guide may display the program guide display screen text in the default language.

In still another suitable approach, main facility 12 may provide program guide display screen 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 display screen 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.

One example of when the program guide may coordinate the language in which program guide display screen text is displayed with languages available for television programming is when a user indicates a desire to view program listings. The program guide may

also coordinate languages, for example, when a user indicates a desire to access other program information, pay-per-view ordering information, or any other information related to television programs.

An illustrative hierarchy of the language in which program guide display screen text is displayed and audio played is shown in FIG. 12. Preferably, the program guide uses the primary language selected by the user. Program guide text and help text may normally be displayed in the primary language unless, for example, the text cannot be downloaded by the program guide after a user changes the primary language. If audio is not available, it may be played in an alternate language selected either by the user or by the program guide. If program guide data text is not available in the primary selected language, the program guide may obtain program guide data text in an alternate language selected by the user or by the program guide. Program guide data text for particular programs may be coordinated with the language in which audio will be played according, for example, to the hierarchy of FIG. 12.

Programs may have default program languages. A default program language may be set by, for example, main facility 12 or television distribution facility 16, and distributed to user television equipment 22 as part of the program guide data. If programming audio is not available in the primary or alternate language, it may be played in the default program language. Program guide data text for programs may be coordinated accordingly and displayed in the default program language. If none of the above languages are available, programming audio may be played and related

program guide data text displayed in the default program guide language.

FIGS. 13-16 are flowcharts of illustrative steps involved in providing a program guide with selectable languages in accordance with the principles of the present invention. The steps illustrated in the flowcharts are illustrative and may be performed in any suitable order. FIG. 13 shows illustrative steps involved in operating an interactive television program guide system that provides a user with the opportunity to select languages in which program guide display screen text is displayed.

At step 400, the interactive program guide implemented on interactive program guide equipment 17 may provide the user with the opportunity to select a language. Step 400 may include substeps 405, 410, and 415 as shown. At substep 405, a setup screen, such as illustrative setup display screen 300 of FIG. 8, may be provided to the user to provide the user with the opportunity to access the language selection feature of the program guide. At substep 410, the program guide may provide the user with a language setup display screen, such as illustrative language setup display screen 410 of FIG. 10, to provide the user with the opportunity to select a language from a list of languages. At substep 415, the program guide may provide the user with the opportunity to confirm the language selection by, for example, providing the user with language confirmation screen 320 of FIG. 11. Step 400 may be repeated to provide the user with an opportunity to select an alternate language. Alternately, the program guide may select an alternate language according to the primary language (step 417).

The program guide may store language attributes for the selected languages at step 420. A language attribute for the default program guide language may have been pre-programmed into the program guide, or may also be stored at step 420 (e.g., by downloading it from a data stream or server). At step 430, the program guide may ready program guide display screen text for display in the selected or default languages. More specifically, help text, program guide data text, and program guide text may be readied by the program guide at steps 440, 450, and 460, respectively.

Program guide display screen text may be readied by the program guide using any suitable approach. In practice, however, the way in which program guide display screen text is readied by the program guide may depend on the type of text and how the text is provided to the program guide. Help text and program guide data text may, for example, be continuously provided in multiple languages by television distribution facility 16 to user television equipment 22. Alternatively, help text and program guide data text in different languages may be provided on demand. In either of these approaches, the program guide may filter out unwanted help text or program guide data text at steps 442 and 452, respectively. Help text and program guide data text may also be downloaded in only the selected, default program guide, or default program languages by the program guide, as indicated by steps 444 and 454. In still another approach, the program guide may indicate the selected or default program guide language to television distribution facility 16. Television distribution facility 16 may in turn provide help text or program guide data text or any suitable combination of these

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.

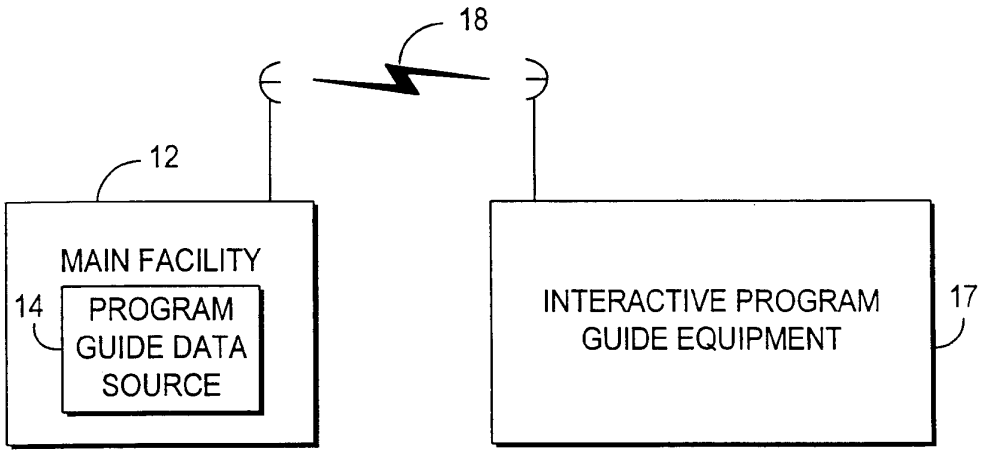

10
18
12
MAIN FACILITY
14
PROGRAM GUIDE DATA SOURCE
INTERACTIVE PROGRAM GUIDE EQUIPMENT
17

FIG. 1

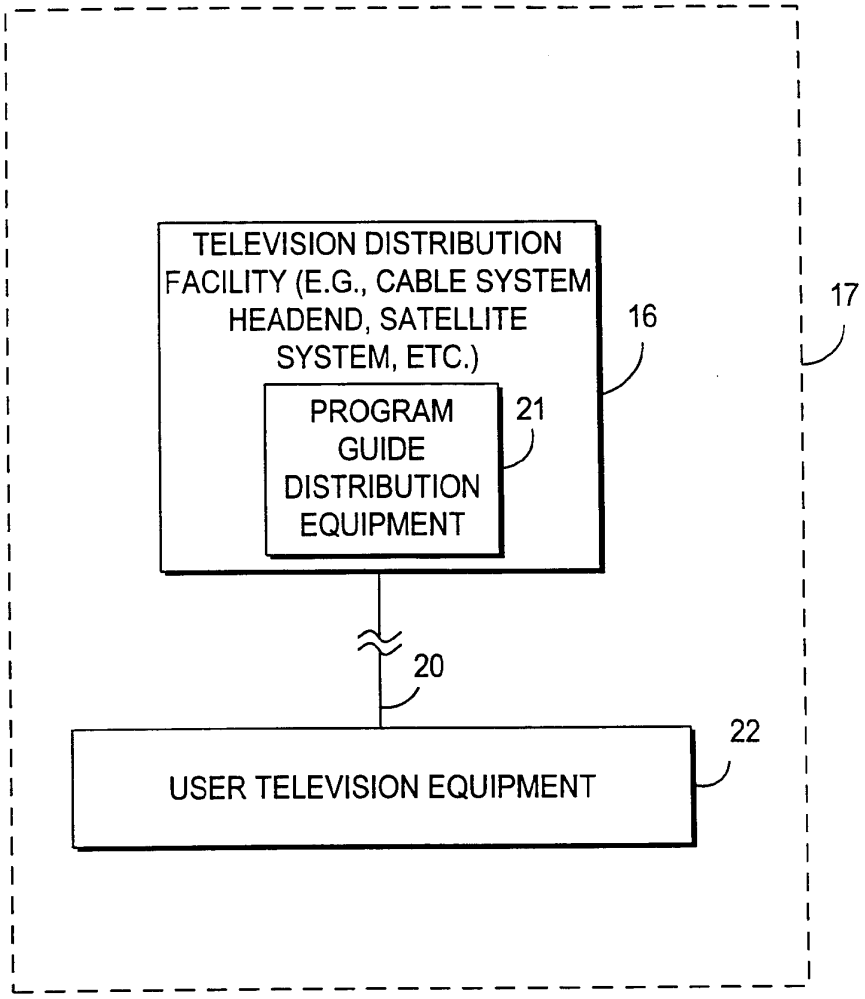

TELEVISION DISTRIBUTION FACILITY (E.G., CABLE SYSTEM HEADEND, SATELLITE SYSTEM, ETC.)
16
17
PROGRAM GUIDE DISTRIBUTION EQUIPMENT
21
20
22
USER TELEVISION EQUIPMENT

FIG. 2a

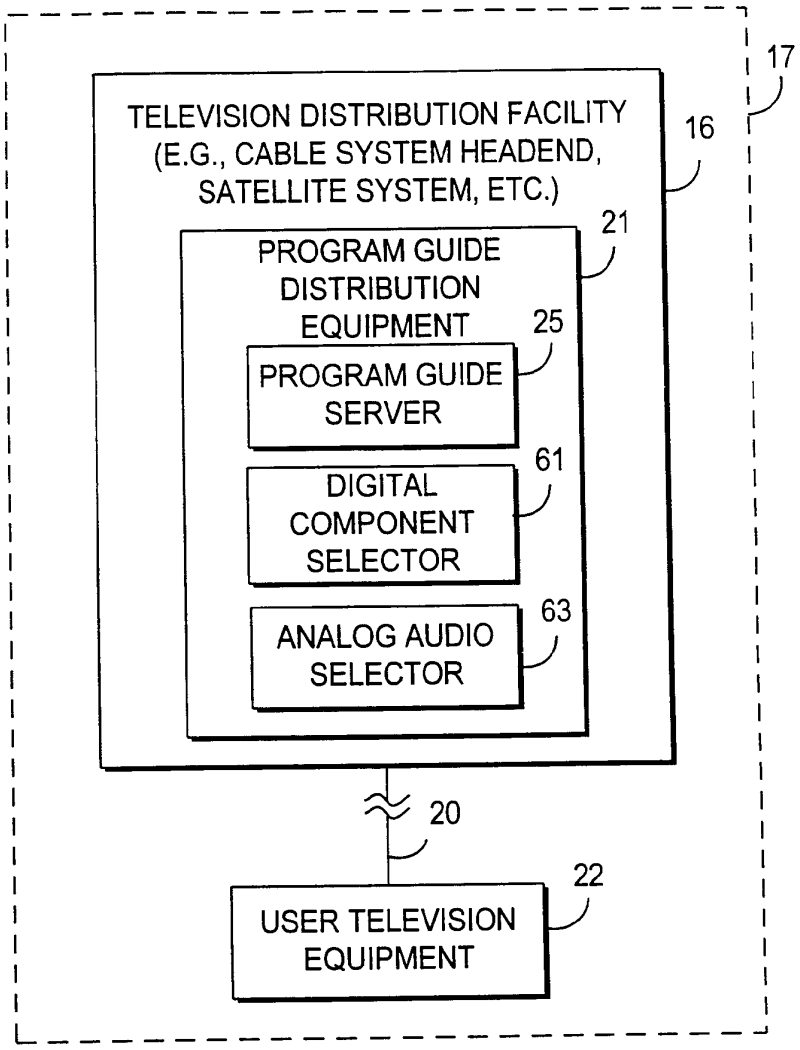

17
TELEVISION DISTRIBUTION FACILITY
(E.G., CABLE SYSTEM HEADEND,
SATELLITE SYSTEM, ETC.)
16
21
PROGRAM GUIDE
DISTRIBUTION
EQUIPMENT
25
PROGRAM GUIDE
SERVER
61
DIGITAL
COMPONENT
SELECTOR
63
ANALOG AUDIO
SELECTOR
20
22
USER TELEVISION
EQUIPMENT

FIG. 2b

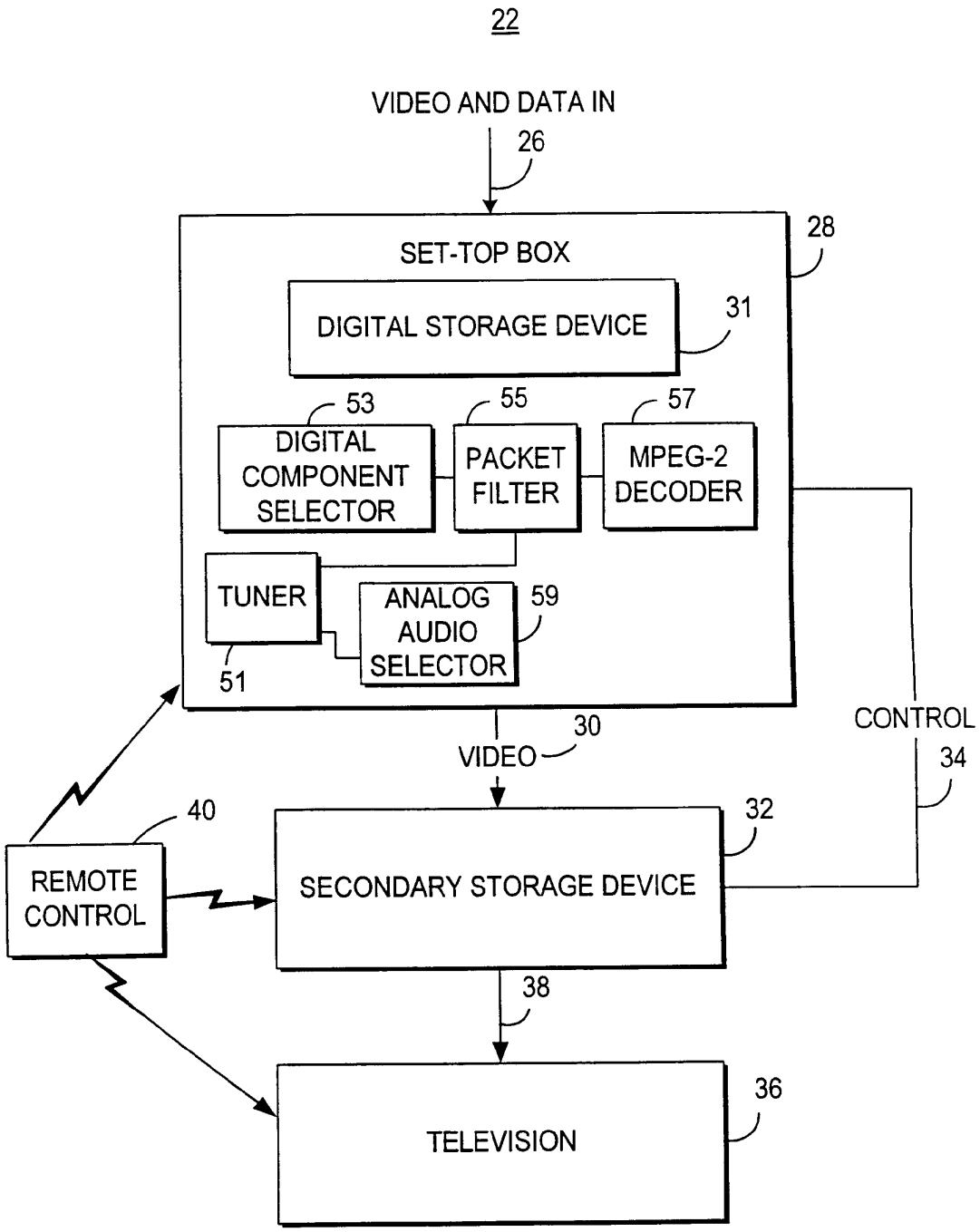

22
VIDEO AND DATA IN
26
SET-TOP BOX
28
DIGITAL STORAGE DEVICE
31
53
55
57
DIGITAL COMPONENT SELECTOR
PACKET FILTER
MPEG-2 DECODER
TUNER
ANALOG AUDIO SELECTOR
59
51
CONTROL
34
30
VIDEO
40
32
REMOTE CONTROL
SECONDARY STORAGE DEVICE
38
36
TELEVISION

FIG. 3

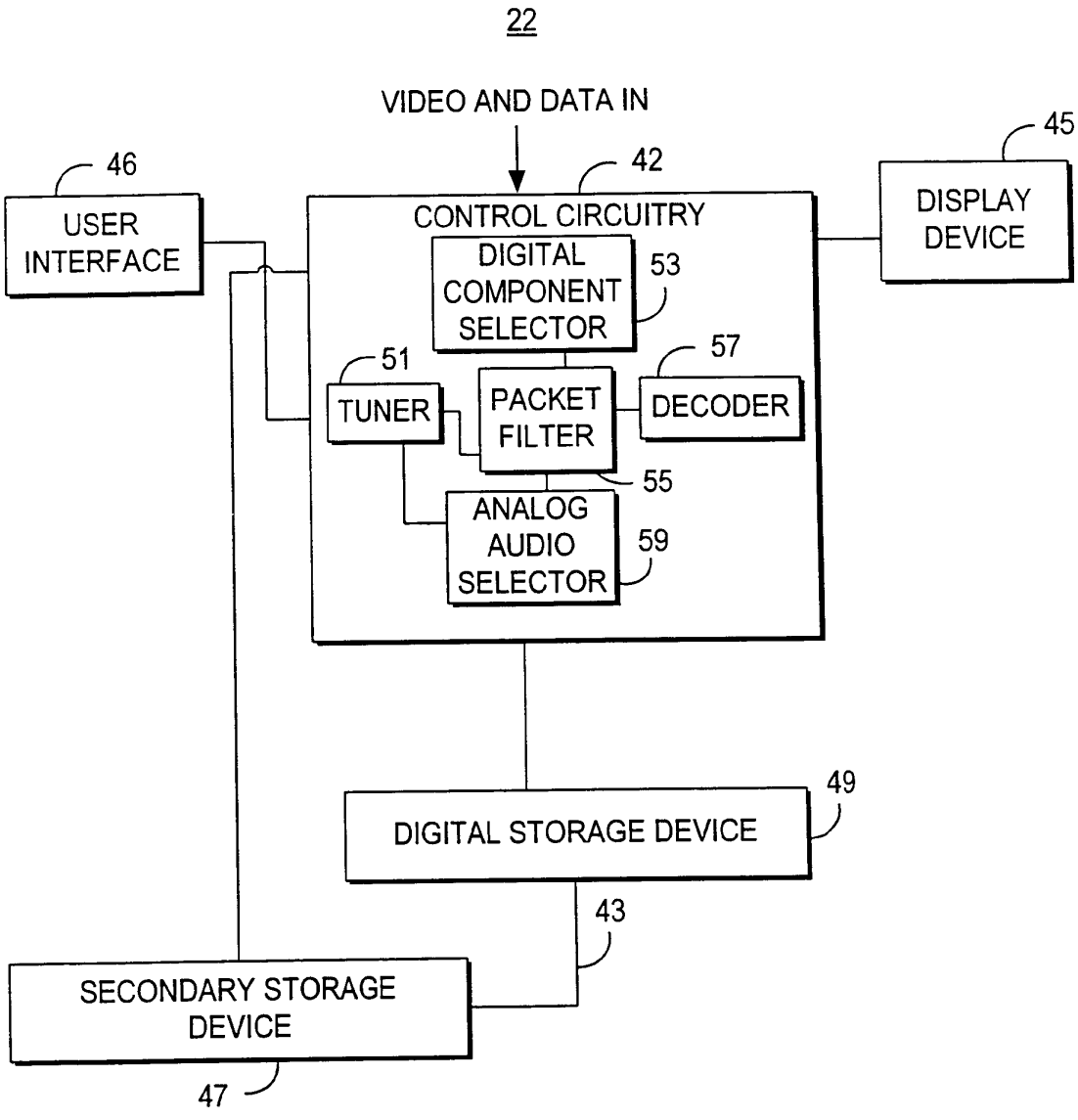

22
VIDEO AND DATA IN
46
USER INTERFACE
42
CONTROL CIRCUITRY
DIGITAL COMPONENT SELECTOR
53
51
TUNER
PACKET FILTER
57
DECODER
55
ANALOG AUDIO SELECTOR
59
45
DISPLAY DEVICE
49
DIGITAL STORAGE DEVICE
43
SECONDARY STORAGE DEVICE
47

FIG. 4

100

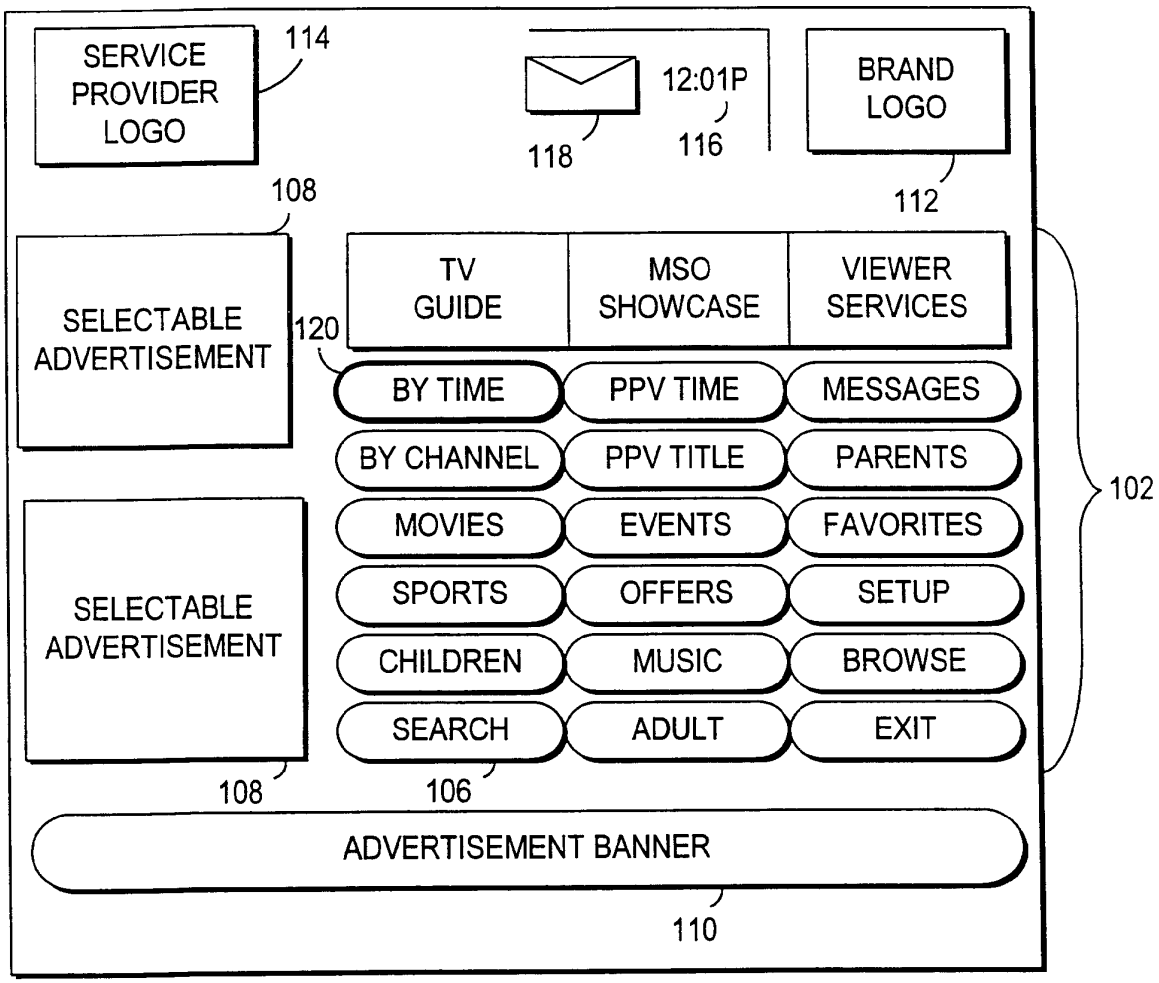

SERVICE PROVIDER LOGO
114
12:01P
118
116
BRAND LOGO
112
108
SELECTABLE ADVERTISEMENT
120
TV GUIDE
MSO SHOWCASE
VIEWER SERVICES
BY TIME
PPV TIME
MESSAGES
BY CHANNEL
PPV TITLE
PARENTS
MOVIES
EVENTS
FAVORITES
SPORTS
OFFERS
SETUP
CHILDREN
MUSIC
BROWSE
SEARCH
ADULT
EXIT
102
SELECTABLE ADVERTISEMENT
108
106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

FIG. 5

130

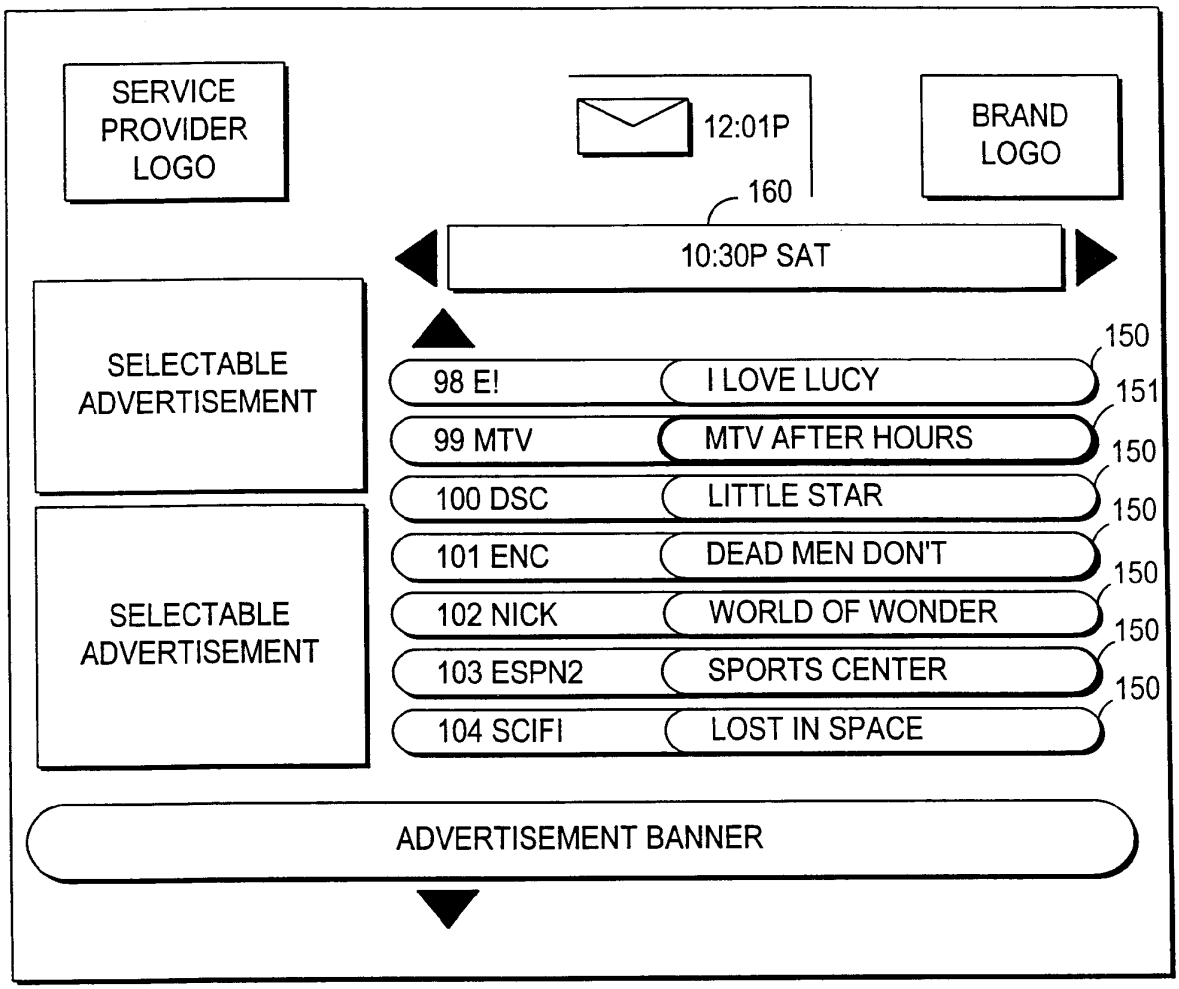

SERVICE PROVIDER LOGO
12:01P
BRAND LOGO
160
10:30P SAT
SELECTABLE ADVERTISEMENT
SELECTABLE ADVERTISEMENT
150
98 E!
I LOVE LUCY
151
99 MTV
MTV AFTER HOURS
150
100 DSC
LITTLE STAR
150
101 ENC
DEAD MEN DON'T
150
102 NICK
WORLD OF WONDER
150
103 ESPN2
SPORTS CENTER
150
104 SCIFI
LOST IN SPACE
ADVERTISEMENT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

FIG. 6a

135

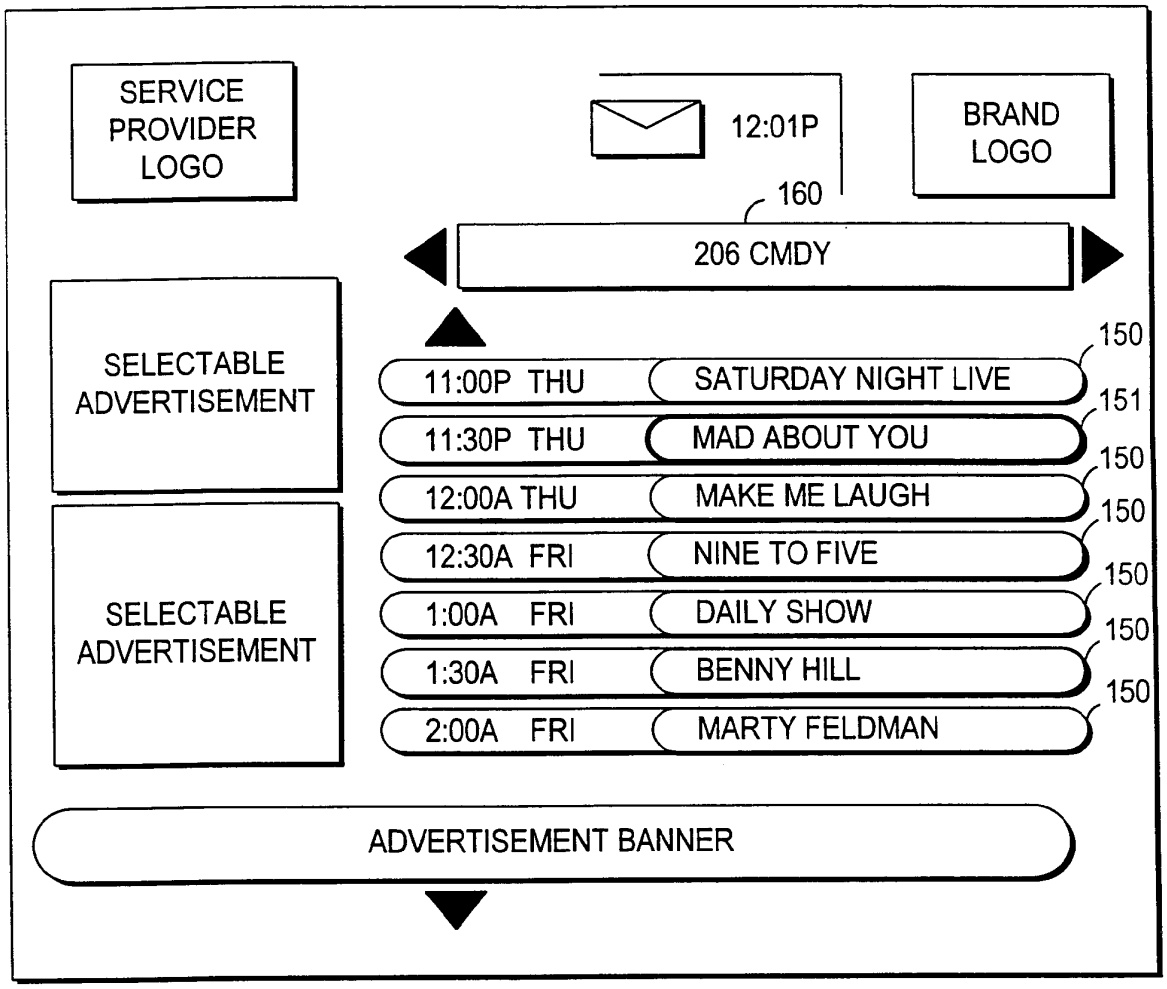

SERVICE PROVIDER LOGO
12:01P
BRAND LOGO
160
206 CMDY
SELECTABLE ADVERTISEMENT
SELECTABLE ADVERTISEMENT
150
11:00P THU
SATURDAY NIGHT LIVE
151
11:30P THU
MAD ABOUT YOU
150
12:00A THU
MAKE ME LAUGH
150
12:30A FRI
NINE TO FIVE
150
1:00A FRI
DAILY SHOW
150
1:30A FRI
BENNY HILL
150
2:00A FRI
MARTY FELDMAN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

FIG. 6b

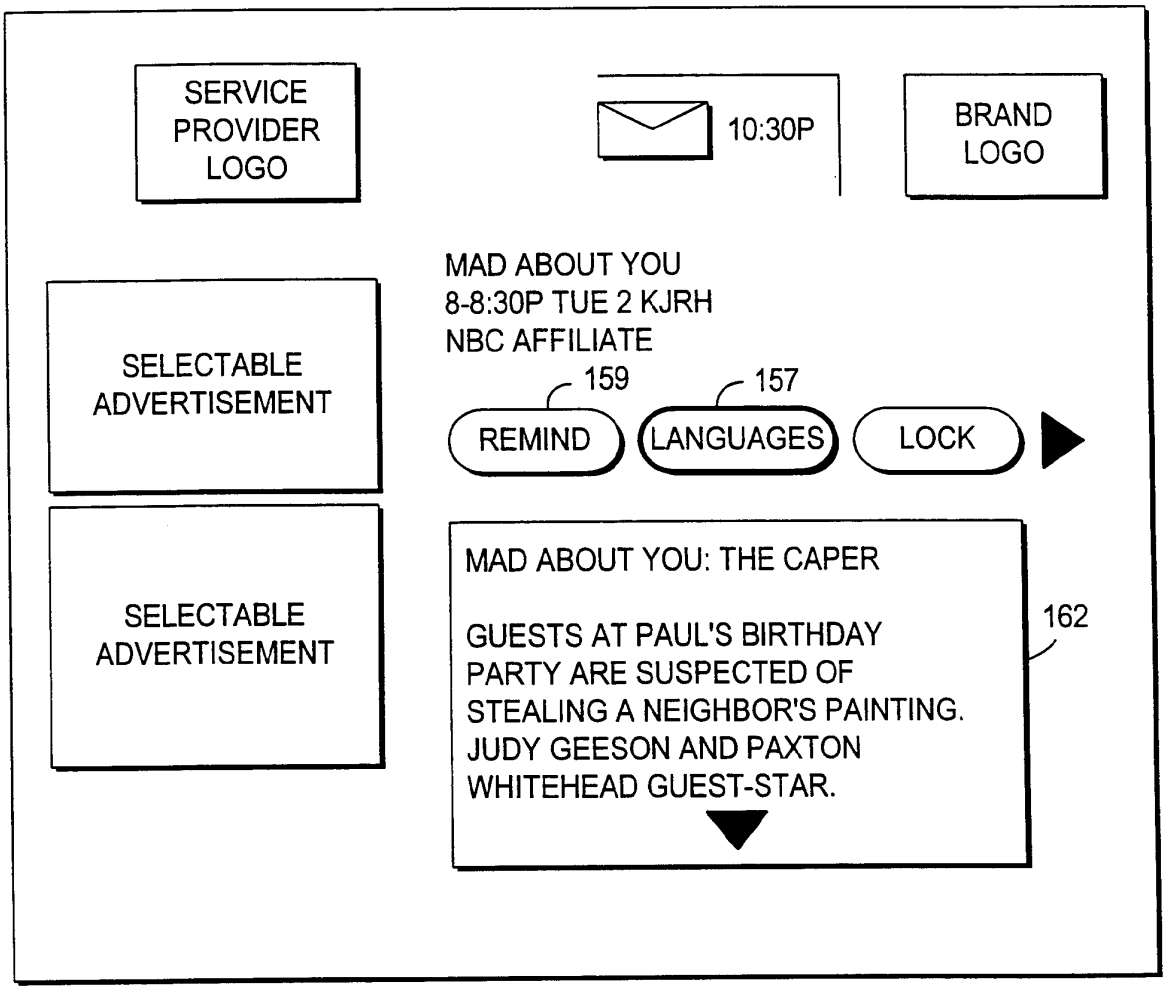

161
SERVICE PROVIDER LOGO
10:30P
BRAND LOGO
MAD ABOUT YOU
8-8:30P TUE 2 KJRH
NBC AFFILIATE
159
157
REMIND
LANGUAGES
LOCK
SELECTABLE ADVERTISEMENT
SELECTABLE ADVERTISEMENT
MAD ABOUT YOU: THE CAPER
GUESTS AT PAUL'S BIRTHDAY PARTY ARE SUSPECTED OF STEALING A NEIGHBOR'S PAINTING. JUDY GEESON AND PAXTON WHITEHEAD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

FIG. 7a

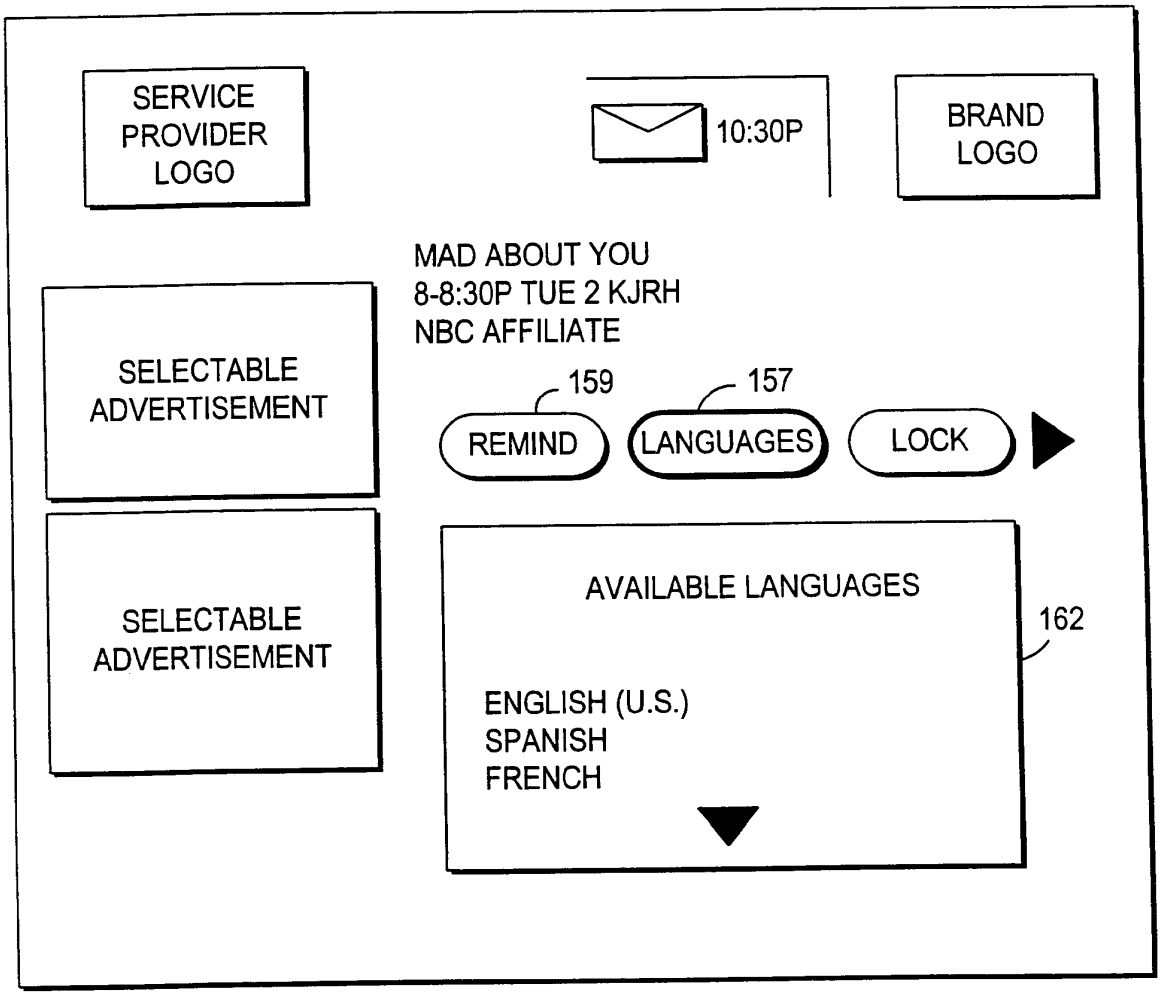

161
SERVICE PROVIDER LOGO
10:30P
BRAND LOGO
MAD ABOUT YOU
8-8:30P TUE 2 KJRH
NBC AFFILIATE
SELECTABLE ADVERTISEMENT
159
157
REMIND
LANGUAGES
LOCK
SELECTABLE ADVERTISEMENT
AVAILABLE LANGUAGES
162
ENGLISH (U.S.)
SPANISH
FRENCH

FIG. 7b

200

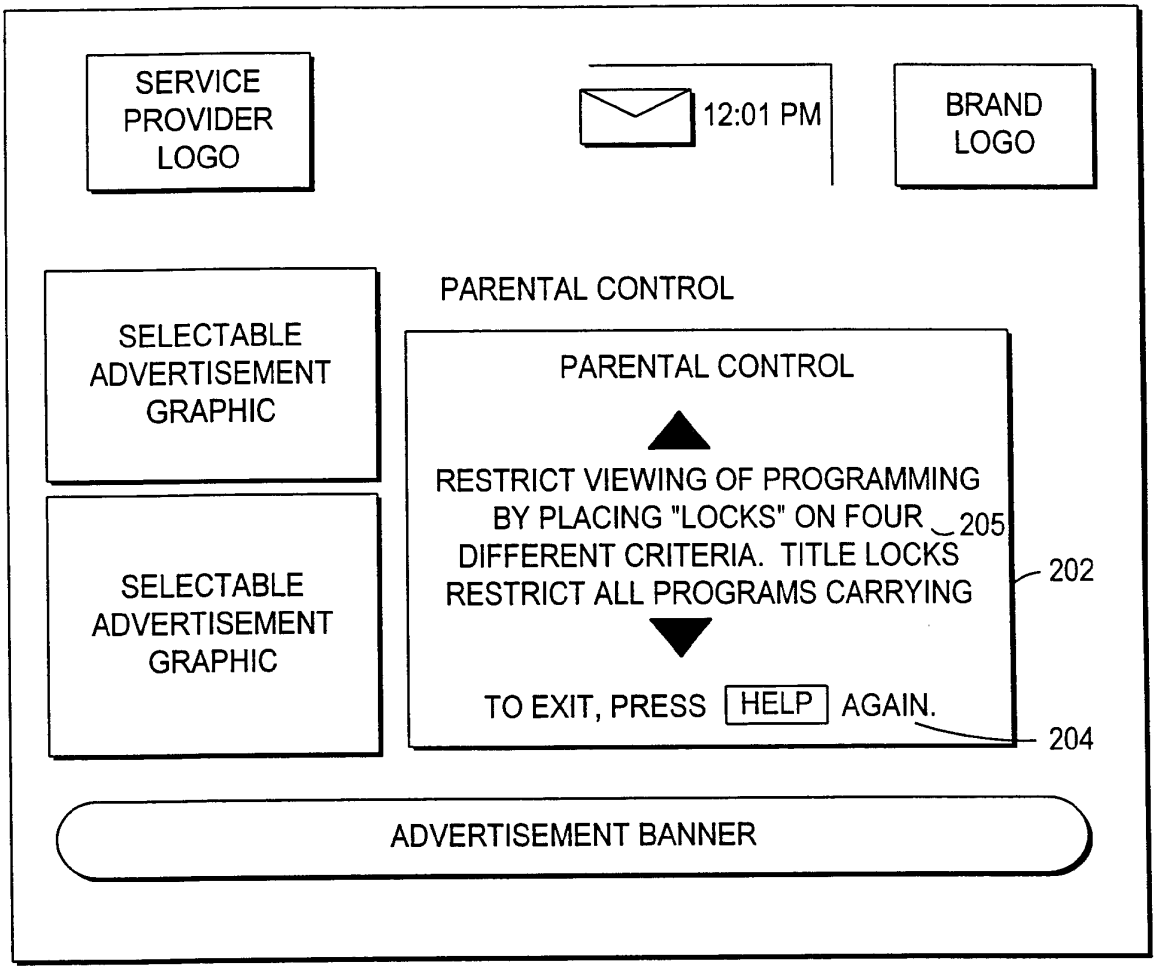

SERVICE PROVIDER LOGO
12:01 PM
BRAND LOGO
PARENTAL CONTROL
SELECTABLE ADVERTISEMENT GRAPHIC
SELECTABLE ADVERTISEMENT GRAPHIC
PARENTAL CONTROL
RESTRICT VIEWING OF PROGRAMMING BY PLACING "LOCKS" ON FOUR DIFFERENT CRITERIA. TITLE LOCKS RESTRICT ALL PROGRAMS CARRYING
205
202
TO EXIT, PRESS HELP AGAIN.
204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

FIG. 8

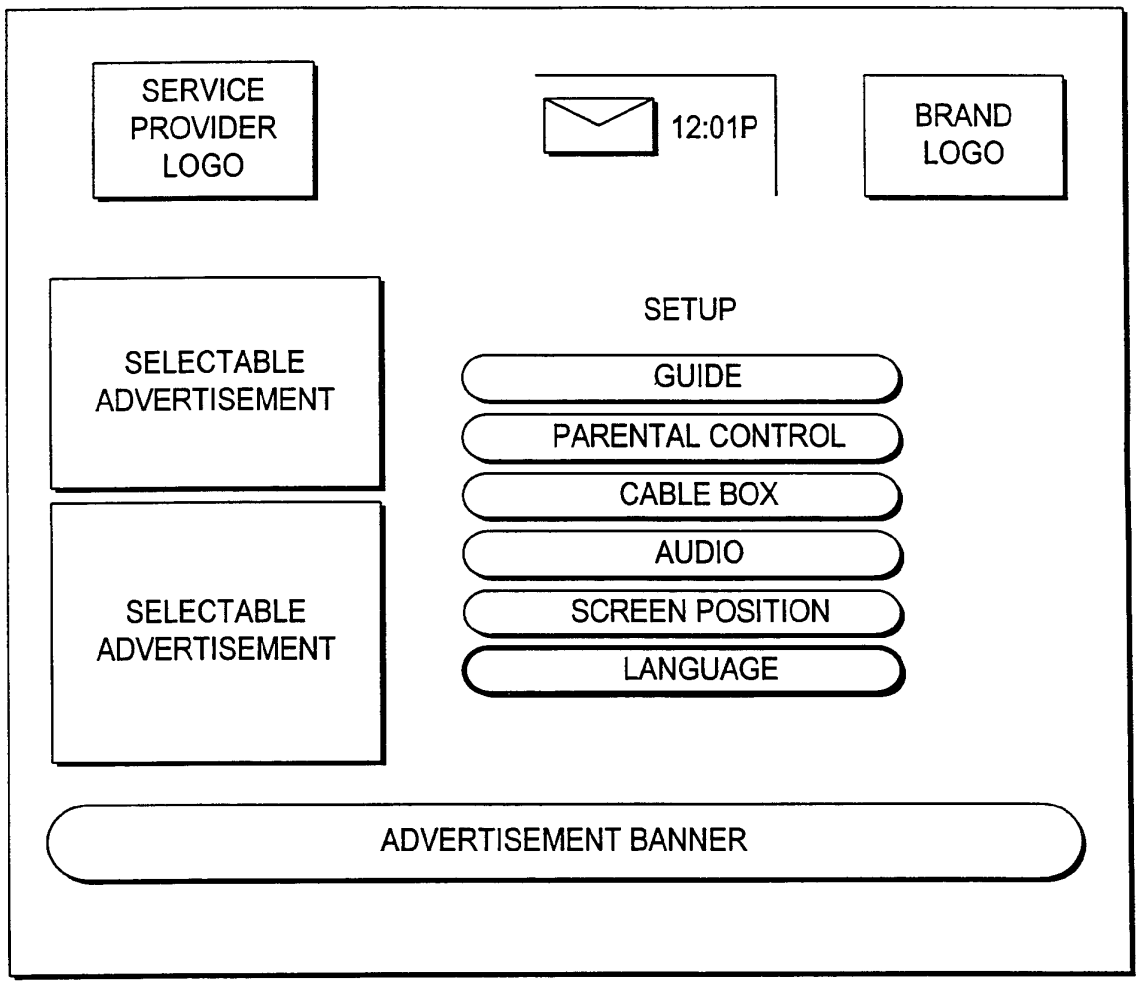

300
SERVICE PROVIDER LOGO
12:01P
BRAND LOGO
SELECTABLE ADVERTISEMENT
SELECTABLE ADVERTISEMENT
SETUP
GUIDE
PARENTAL CONTROL
CABLE BOX
AUDIO
SCREEN POSITION
LANGUAGE
ADVERTISEMENT BANNER

FIG. 9

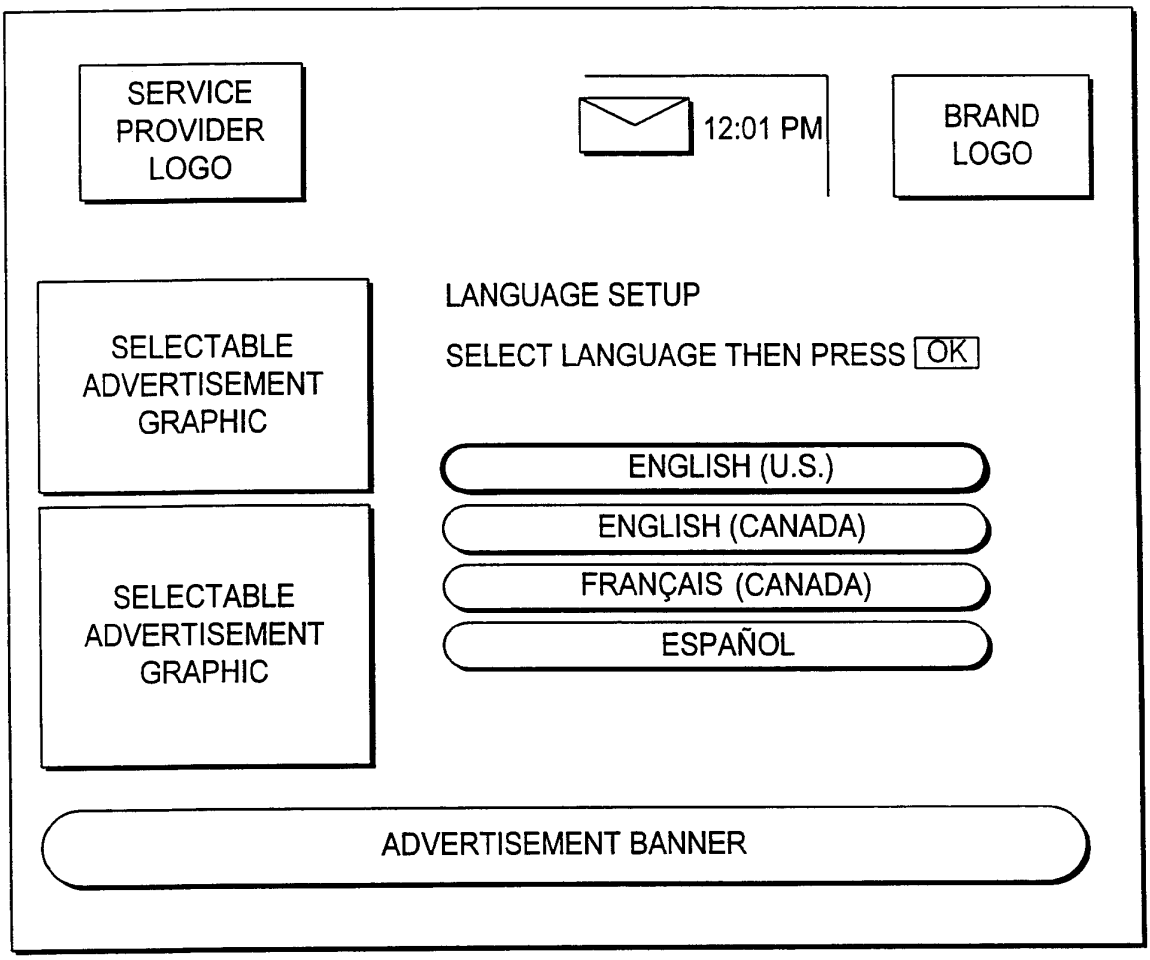

310
SERVICE PROVIDER LOGO
12:01 PM
BRAND LOGO
SELECTABLE ADVERTISEMENT GRAPHIC
LANGUAGE SETUP
SELECT LANGUAGE THEN PRESS OK
ENGLISH (U.S.)
ENGLISH (CANADA)
FRANÇAIS (CANADA)
ESPAÑOL
SELECTABLE ADVERTISEMENT GRAPHIC
ADVERTISEMENT BANNER

FIG. 10

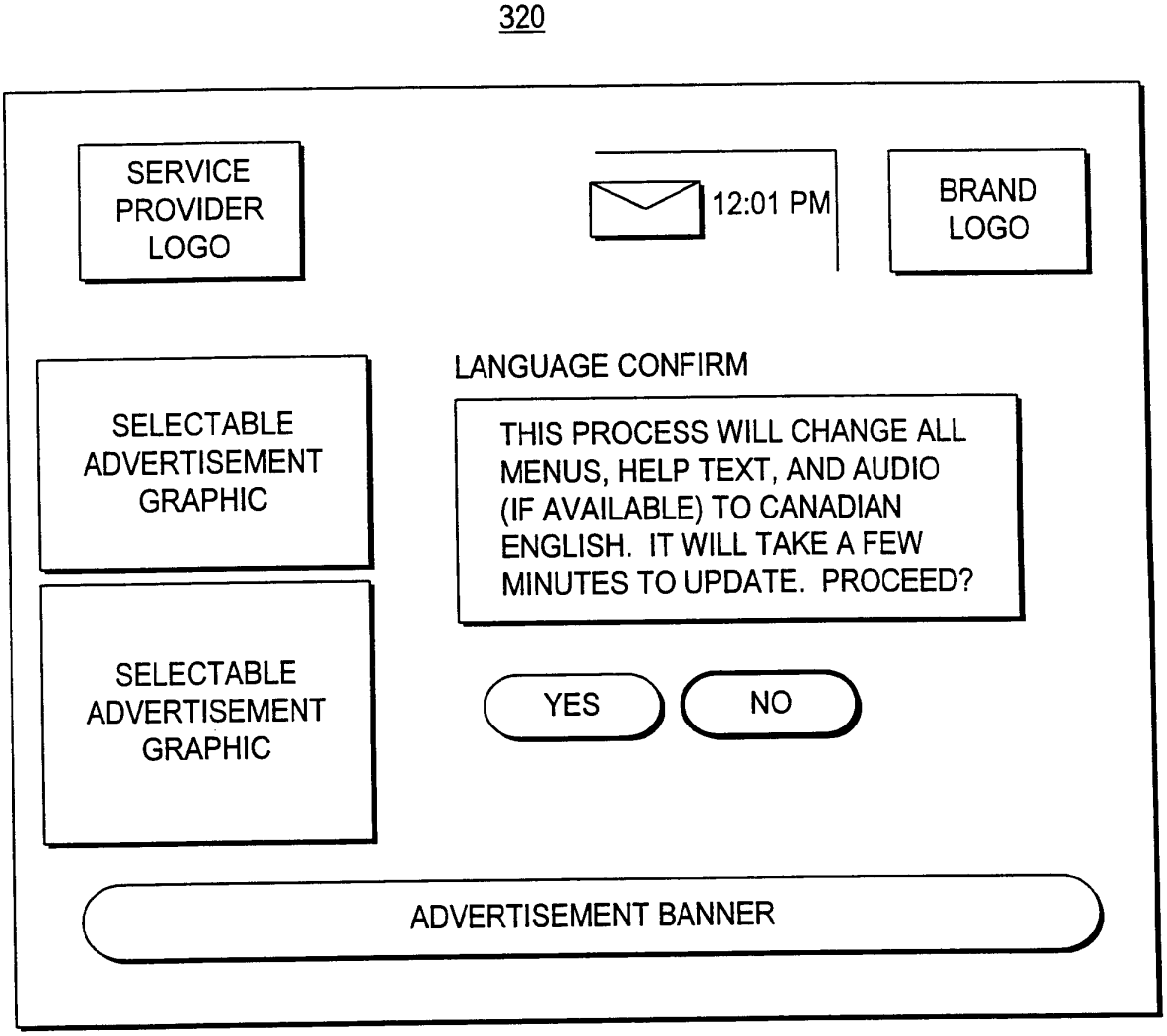

320
SERVICE PROVIDER LOGO
12:01 PM
BRAND LOGO
LANGUAGE CONFIRM
SELECTABLE ADVERTISEMENT GRAPHIC
THIS PROCESS WILL CHANGE ALL MENUS, HELP TEXT, AND AUDIO (IF AVAILABLE) TO CANADIAN ENGLISH. IT WILL TAKE A FEW MINUTES TO UPDATE. PROCEED?
SELECTABLE ADVERTISEMENT GRAPHIC
YES
NO
ADVERTISEMENT BANNER

FIG. 11

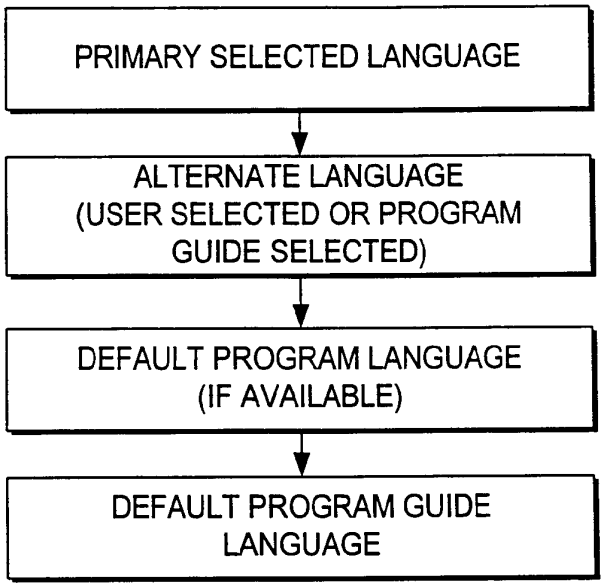

PRIMARY SELECTED LANGUAGE
ALTERNATE LANGUAGE (USER SELECTED OR PROGRAM GUIDE SELECTED)
DEFAULT PROGRAM LANGUAGE (IF AVAILABLE)
DEFAULT PROGRAM GUIDE LANGUAGE

FIG. 12

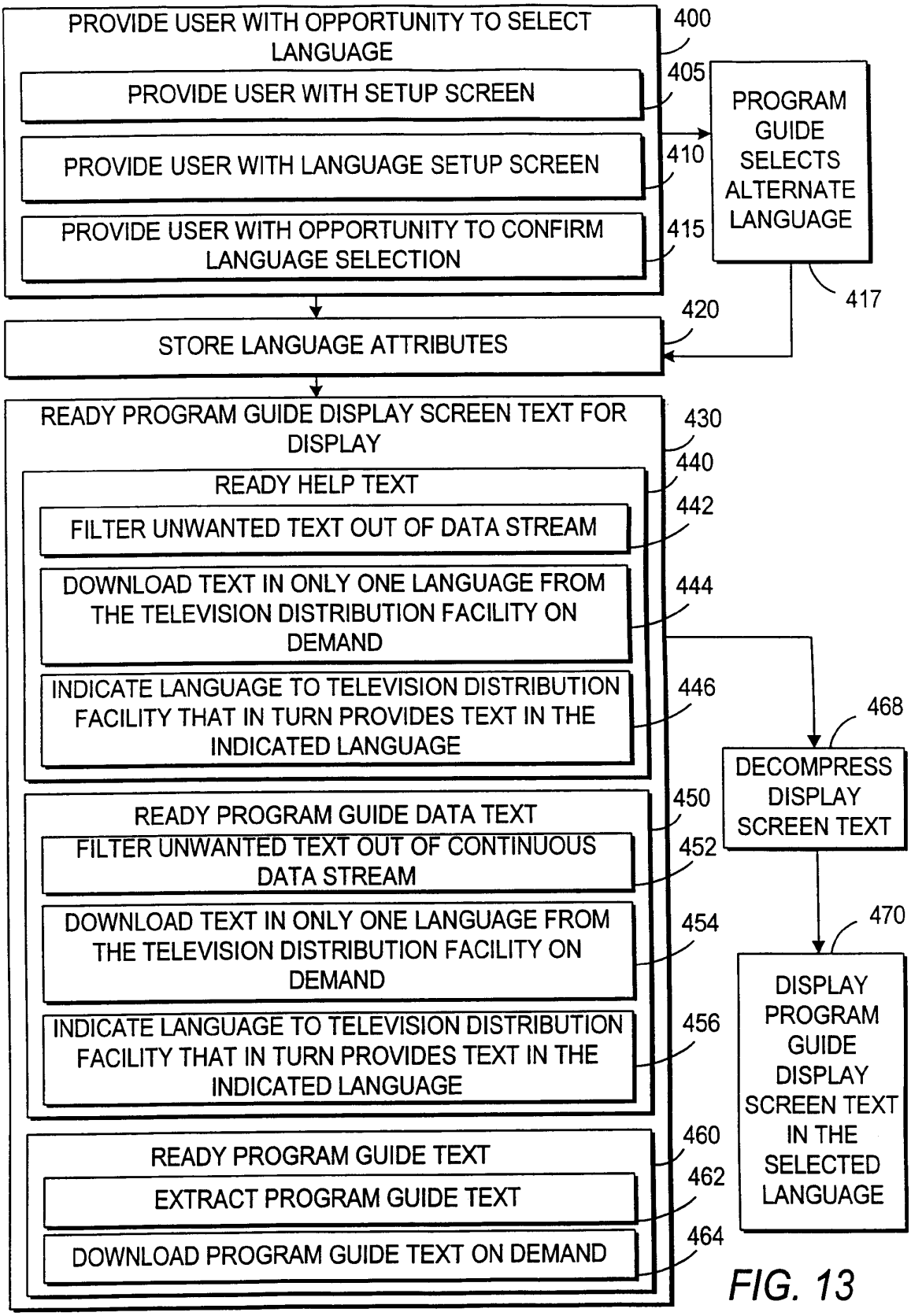

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
400
PROVIDE USER WITH SETUP SCREEN
405
PROVIDE USER WITH LANGUAGE SETUP SCREEN
410
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
415
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
STORE LANGUAGE ATTRIBUTES
420
READY PROGRAM GUIDE DISPLAY SCREEN 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

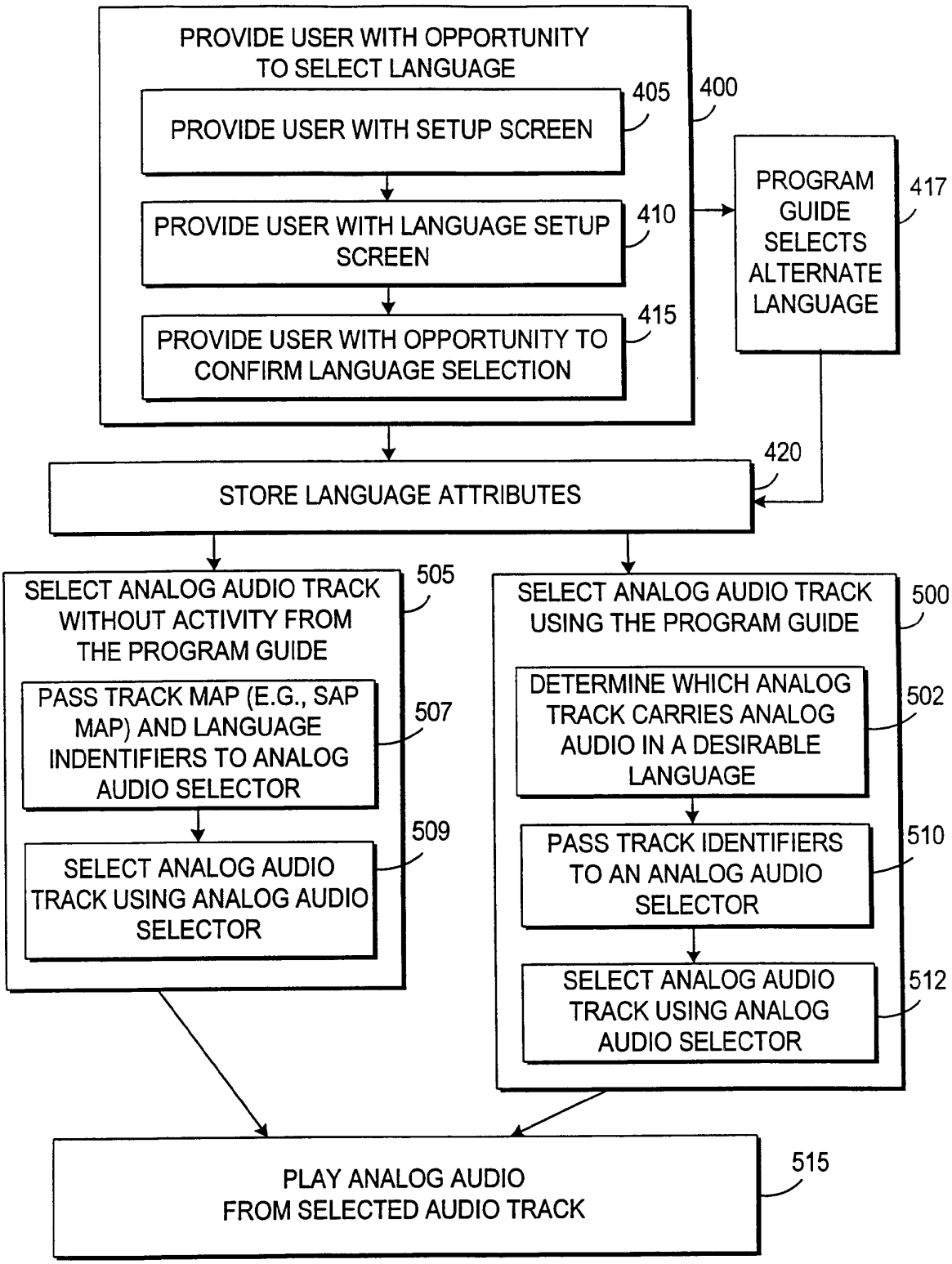

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
400
PROVIDE USER WITH SETUP SCREEN
405
PROVIDE USER WITH LANGUAGE SETUP SCREEN
410
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
415
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
STORE LANGUAGE ATTRIBUTES
420
SELECT ANALOG AUDIO TRACK WITHOUT 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

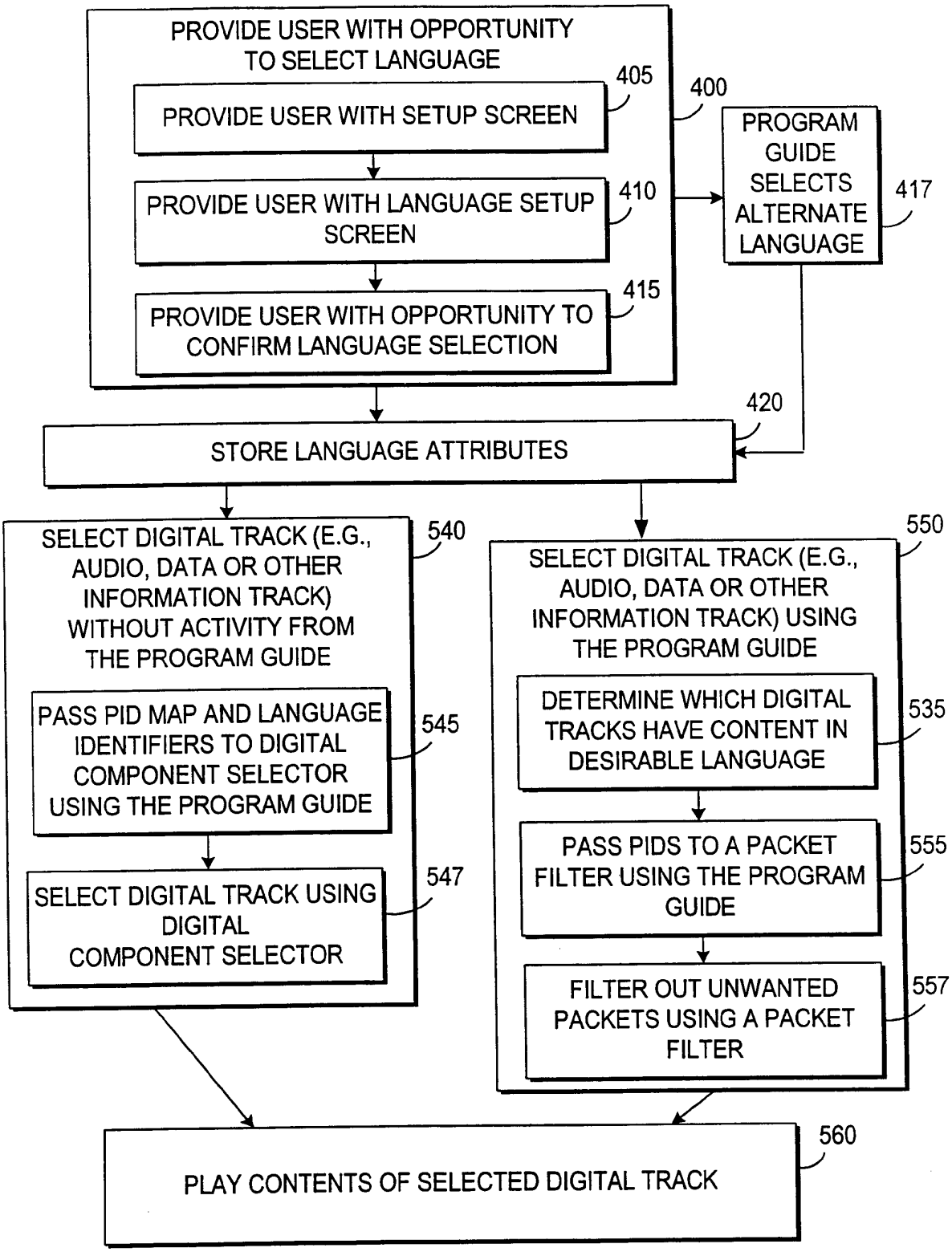

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
405
PROVIDE USER WITH SETUP SCREEN
410
PROVIDE USER WITH LANGUAGE SETUP SCREEN
415
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
400
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
420
STORE LANGUAGE ATTRIBUTES
SELECT DIGITAL TRACK (E.G., AUDIO, 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

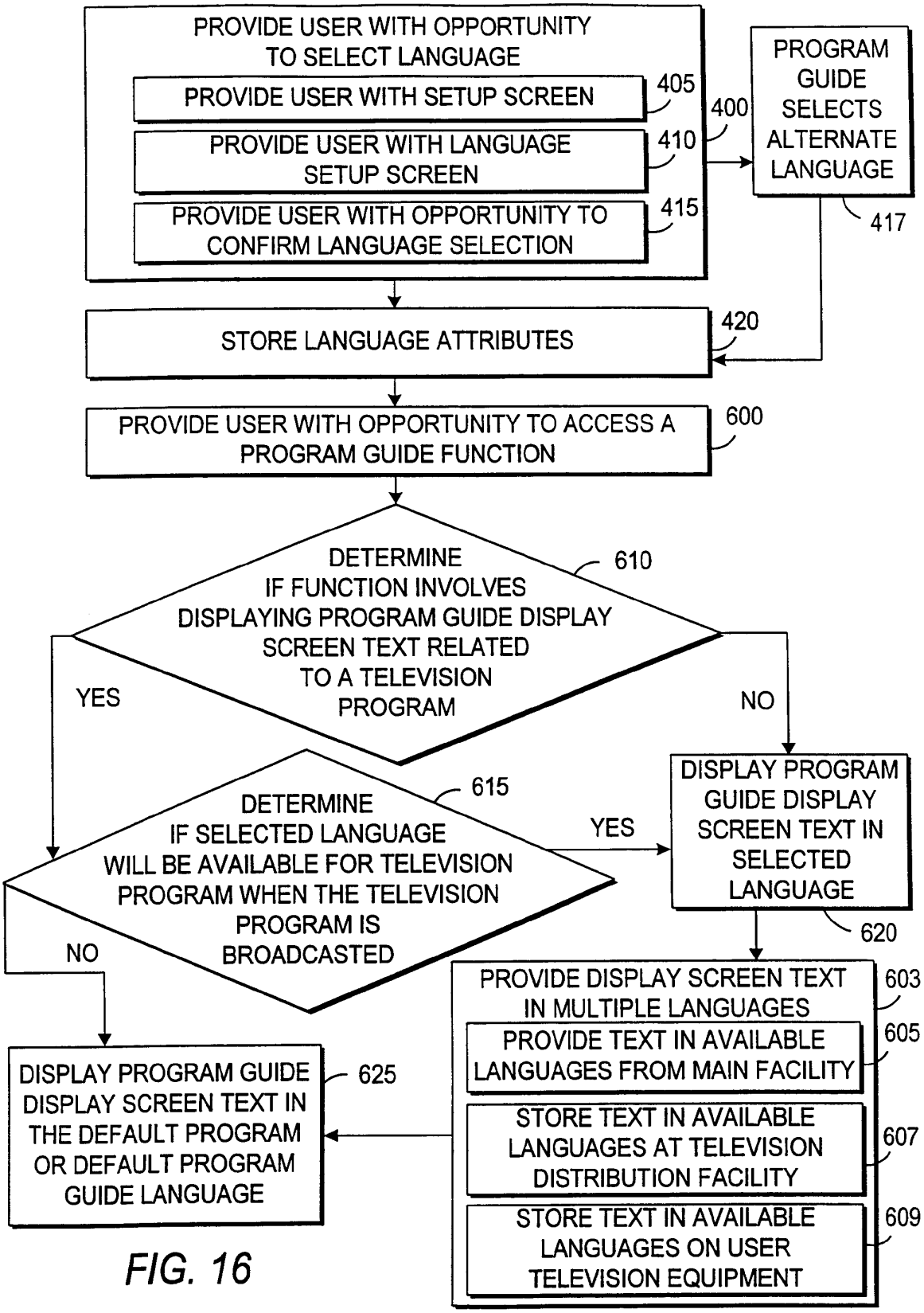

PROVIDE USER WITH OPPORTUNITY TO SELECT LANGUAGE
PROVIDE USER WITH SETUP SCREEN
405
PROVIDE USER WITH LANGUAGE SETUP SCREEN
410
PROVIDE USER WITH OPPORTUNITY TO CONFIRM LANGUAGE SELECTION
415
400
PROGRAM GUIDE SELECTS ALTERNATE LANGUAGE
417
STORE LANGUAGE ATTRIBUTES
420
PROVIDE USER WITH OPPORTUNITY 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.
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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
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-/--

[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

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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.
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1

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

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

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

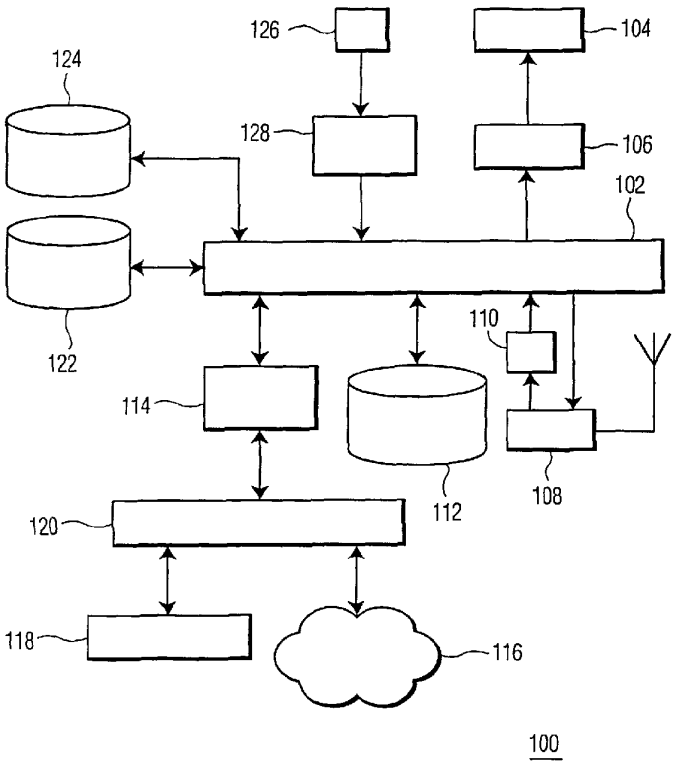
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: 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.

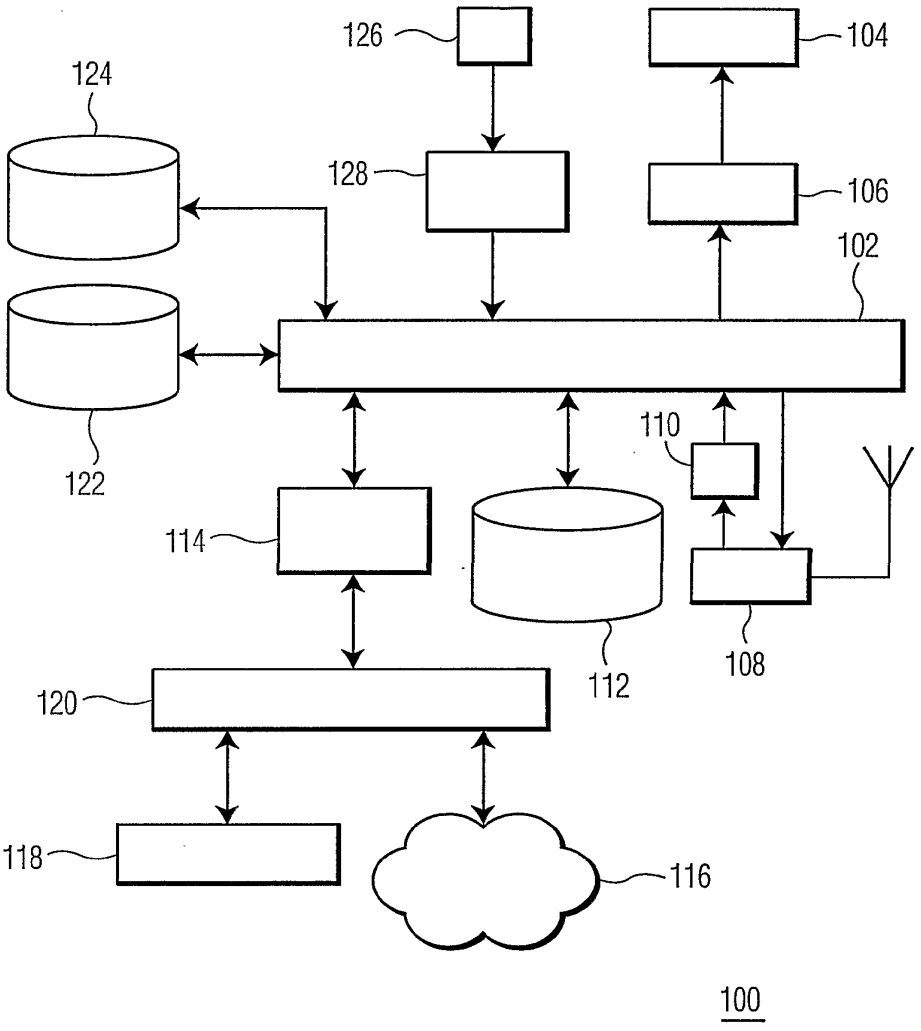


FIG. 1

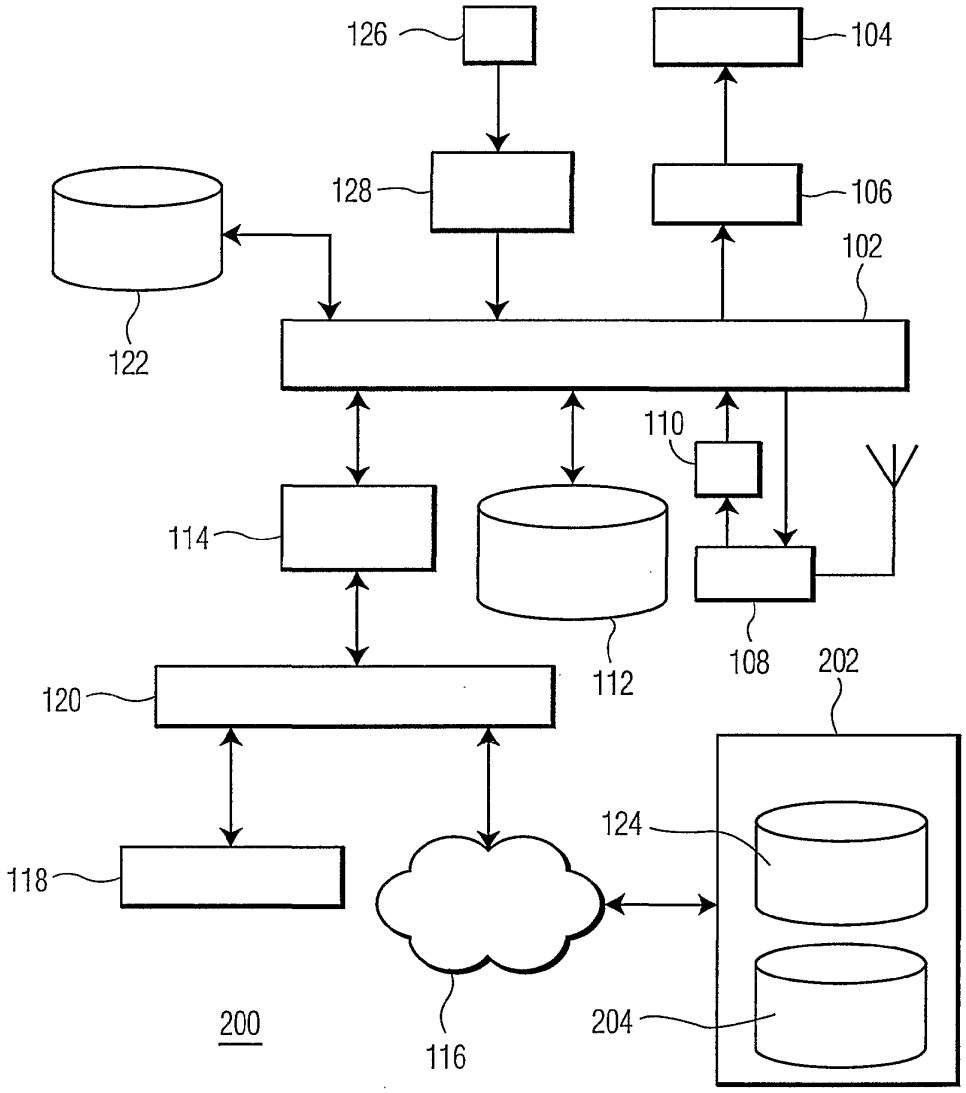

126
104
128
106
102
122
110
114
112
108
202
120
124
118
200
116
204

FIG. 2

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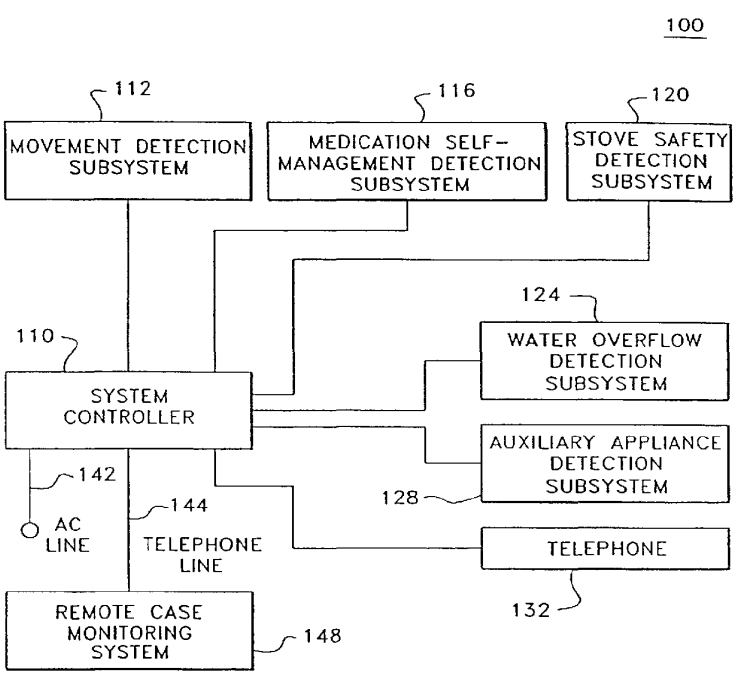
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[Continued on next page]

(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.

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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.

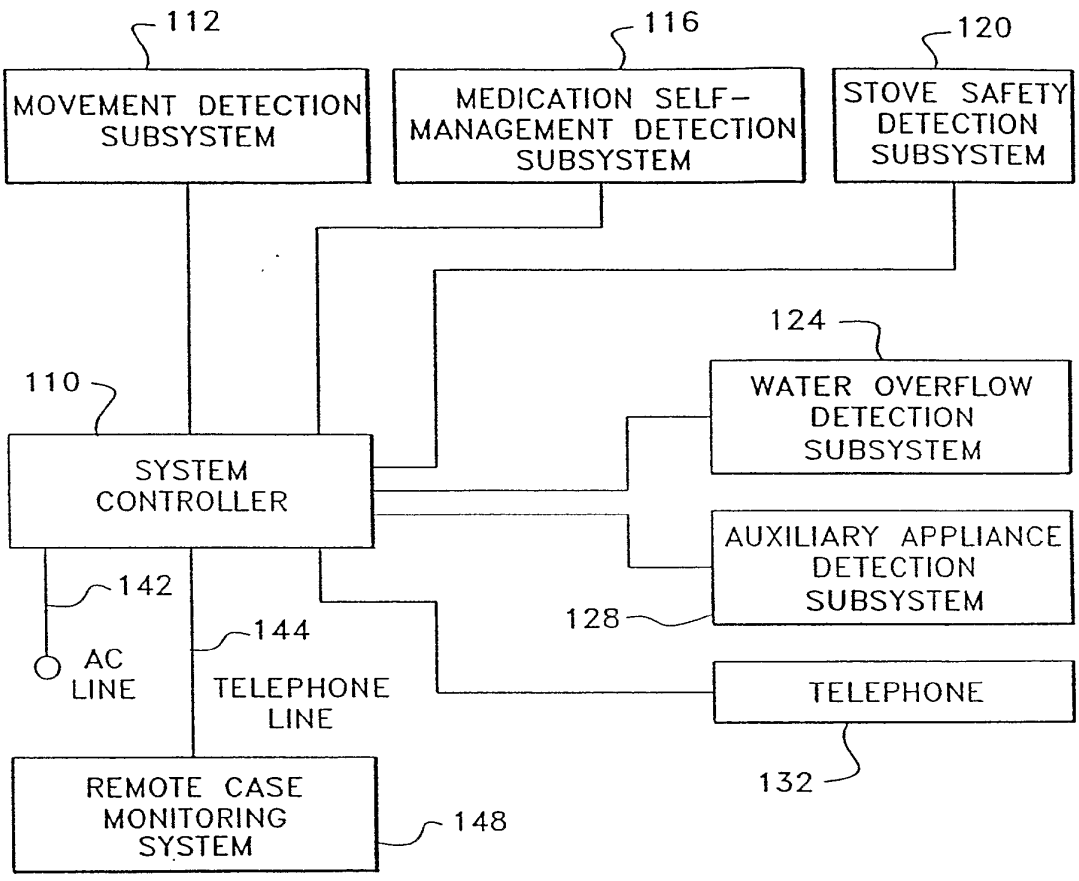

100
112
MOVEMENT DETECTION SUBSYSTEM
116
MEDICATION SELF-MANAGEMENT DETECTION SUBSYSTEM
120
STOVE SAFETY DETECTION SUBSYSTEM
124
WATER OVERFLOW DETECTION SUBSYSTEM
110
SYSTEM CONTROLLER
AUXILIARY APPLIANCE DETECTION SUBSYSTEM
128
142
AC LINE
144
TELEPHONE LINE
TELEPHONE
132
REMOTE CASE MONITORING SYSTEM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

FIG. 1

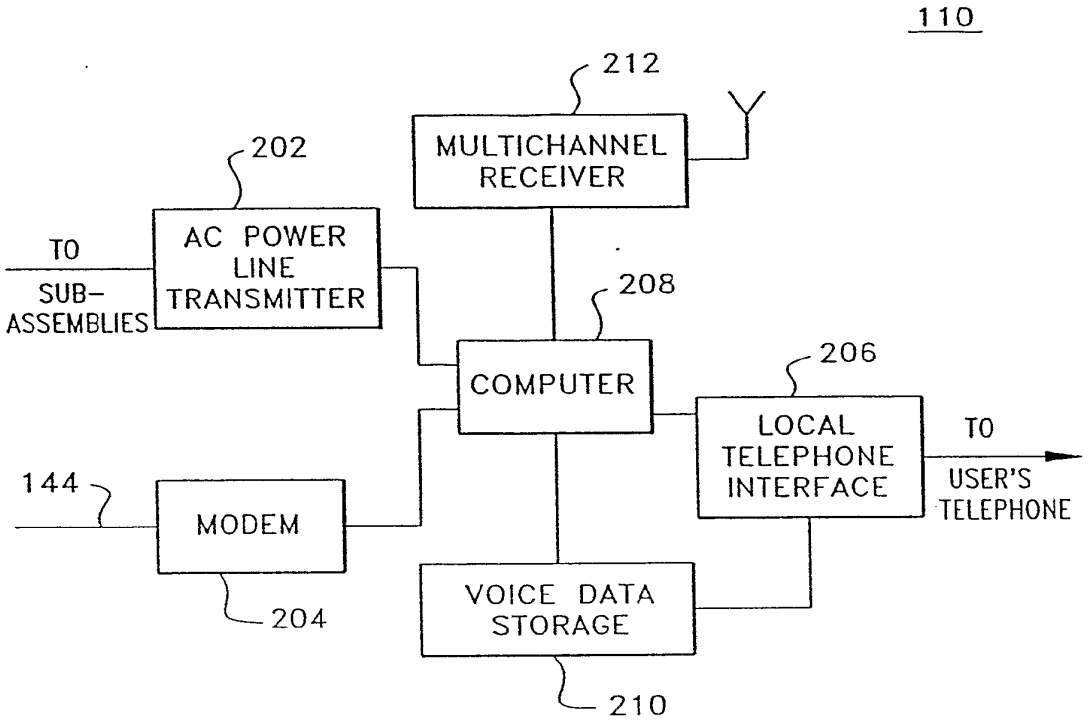

110
212
MULTICHANNEL RECEIVER
202
AC POWER LINE TRANSMITTER
TO SUB-ASSEMBLIES
208
COMPUTER
206
LOCAL TELEPHONE INTERFACE
TO USER'S TELEPHONE
144
MODEM
204
VOICE DATA STORAGE
210

FIG. 2

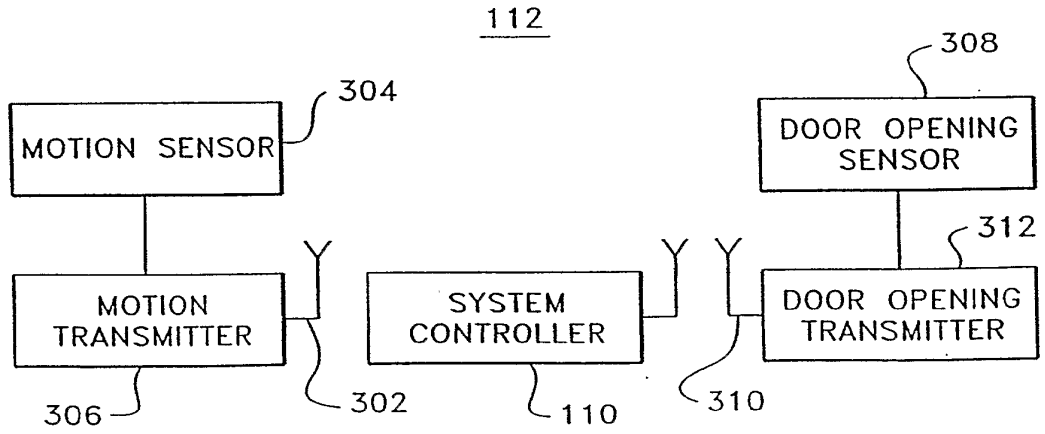

112
308
304
MOTION SENSOR
DOOR OPENING SENSOR
312
MOTION TRANSMITTER
SYSTEM CONTROLLER
DOOR OPENING TRANSMITTER
306
302
110
310

FIG. 3

116

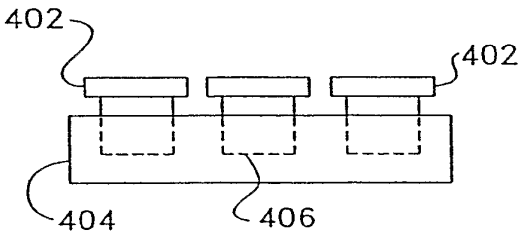


FIG. 4A

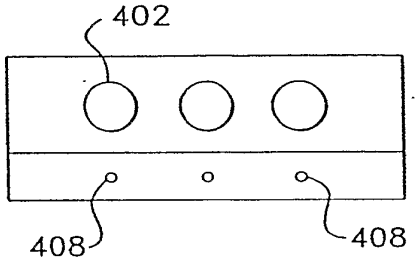


FIG. 4B

115

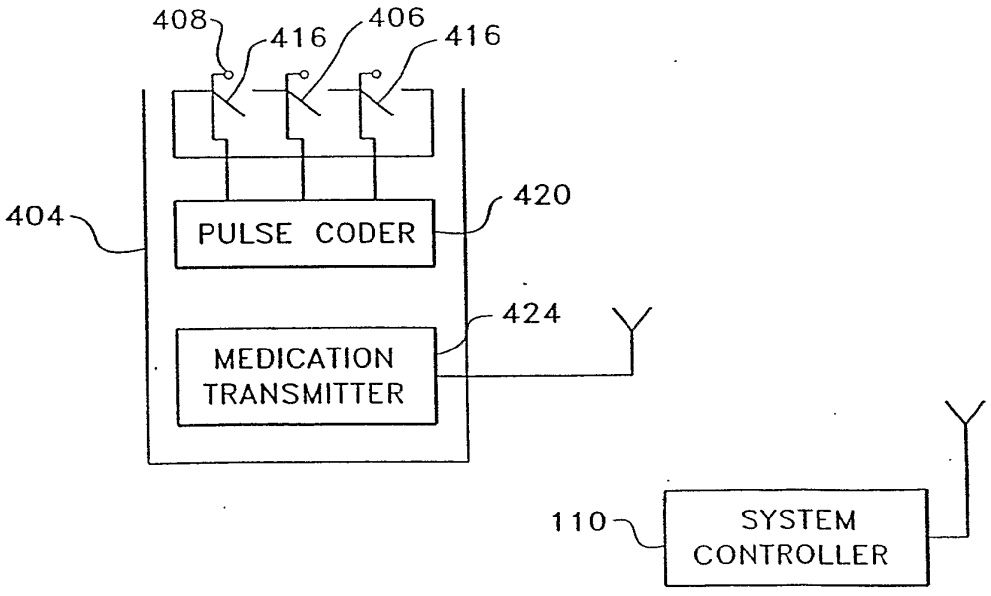


FIG. 5

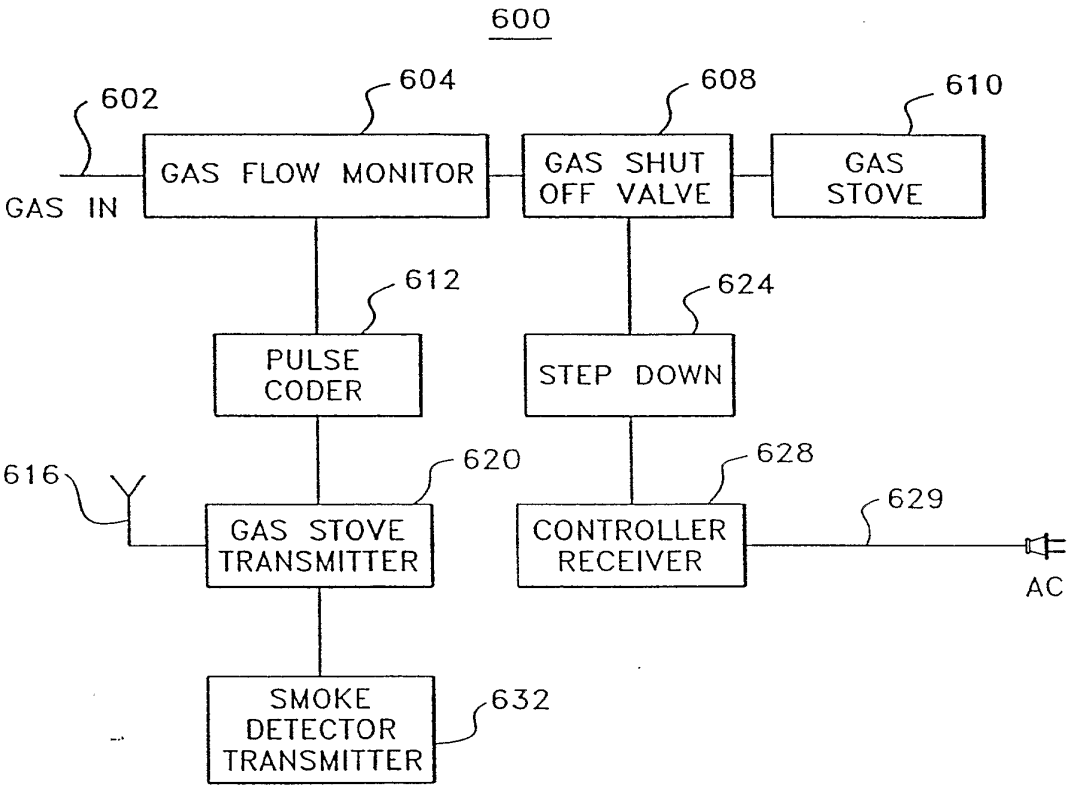

600
602
604
608
610
GAS IN
GAS FLOW MONITOR
GAS SHUT OFF VALVE
GAS STOVE
612
624
PULSE CODER
STEP DOWN
616
620
628
629
GAS STOVE TRANSMITTER
CONTROLLER RECEIVER
AC
SMOKE DETECTOR TRANSMITTER
632

FIG. 6

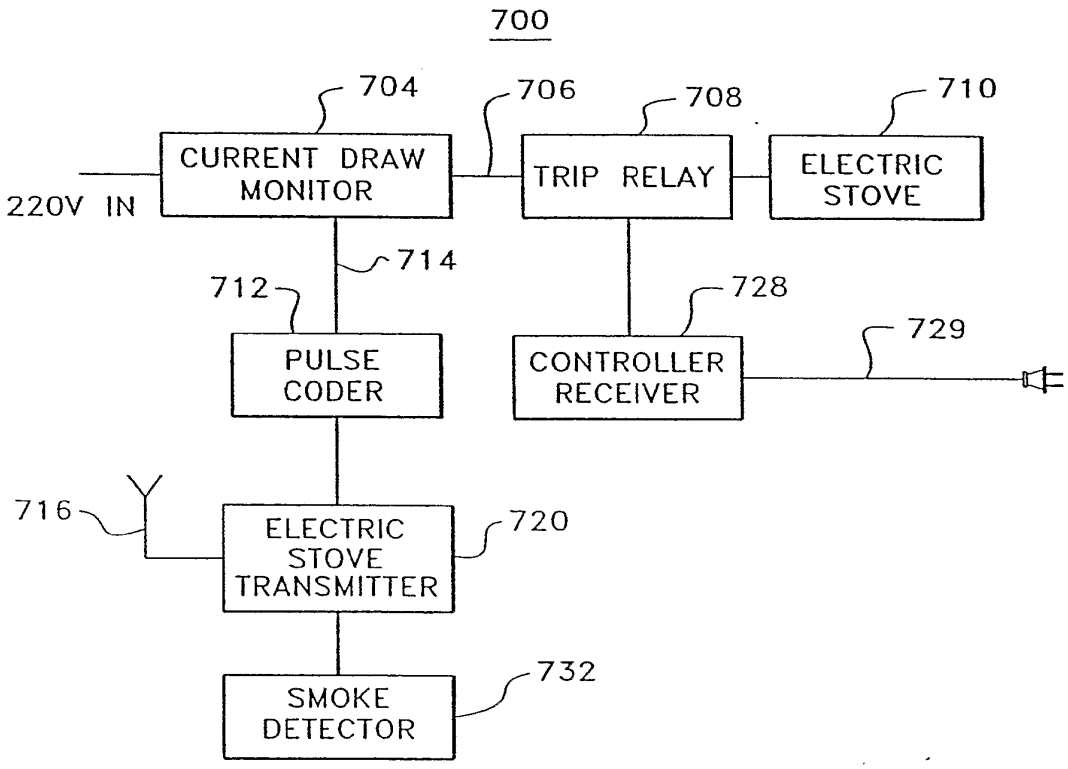

700
704
706
708
710
CURRENT DRAW MONITOR
TRIP RELAY
ELECTRIC STOVE
220V IN
714
712
728
729
PULSE CODER
CONTROLLER RECEIVER
716
ELECTRIC STOVE TRANSMITTER
720
SMOKE DETECTOR
732

FIG. 7

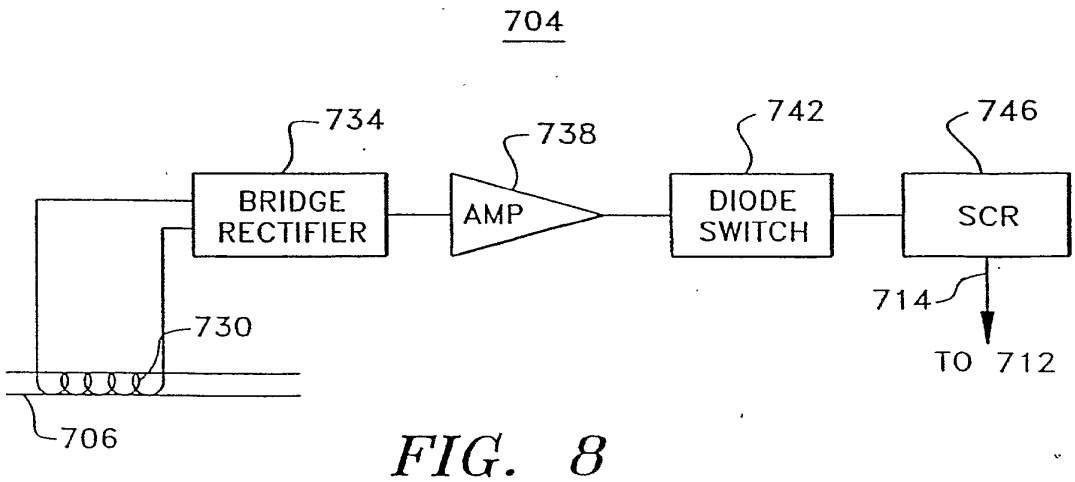

704
734
738
742
746
BRIDGE RECTIFIER
AMP
DIODE SWITCH
SCR
714
TO 712
730
706

FIG. 8

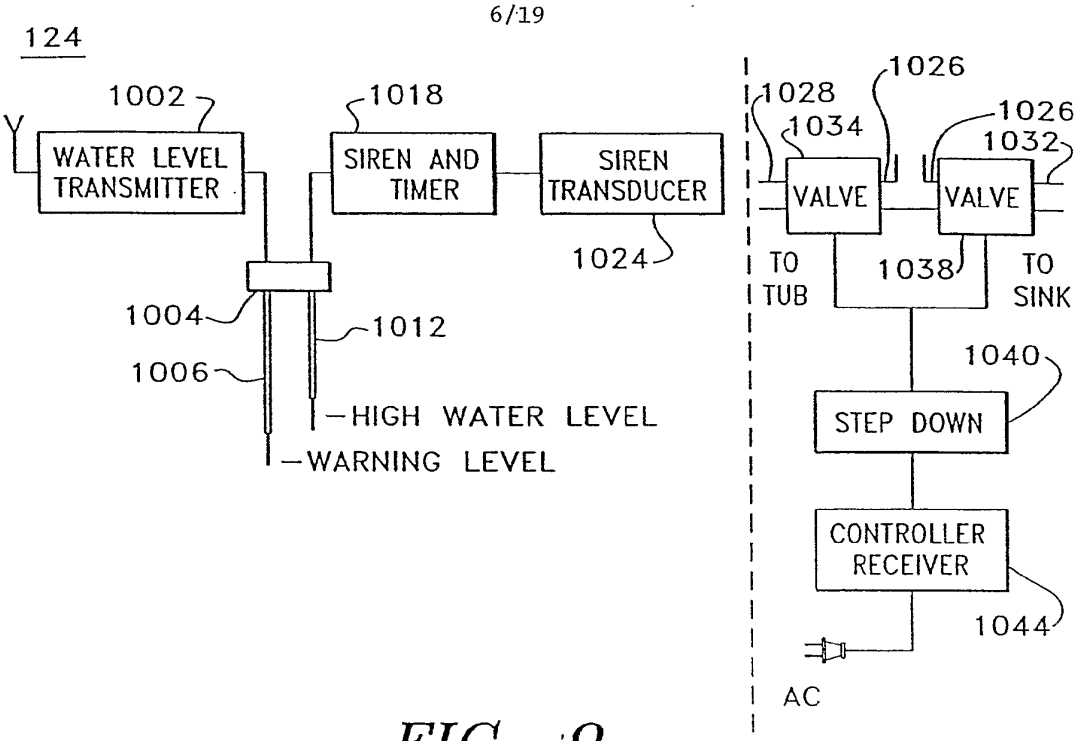

124
1002
WATER LEVEL TRANSMITTER
1018
SIREN AND TIMER
SIREN TRANSDUCER
1024
1004
1012
1006
HIGH WATER LEVEL
WARNING LEVEL
1026
1028
1034
1026
1032
VALVE
VALVE
TO TUB
1038
TO SINK
1040
STEP DOWN
CONTROLLER RECEIVER
1044
AC

FIG. 9

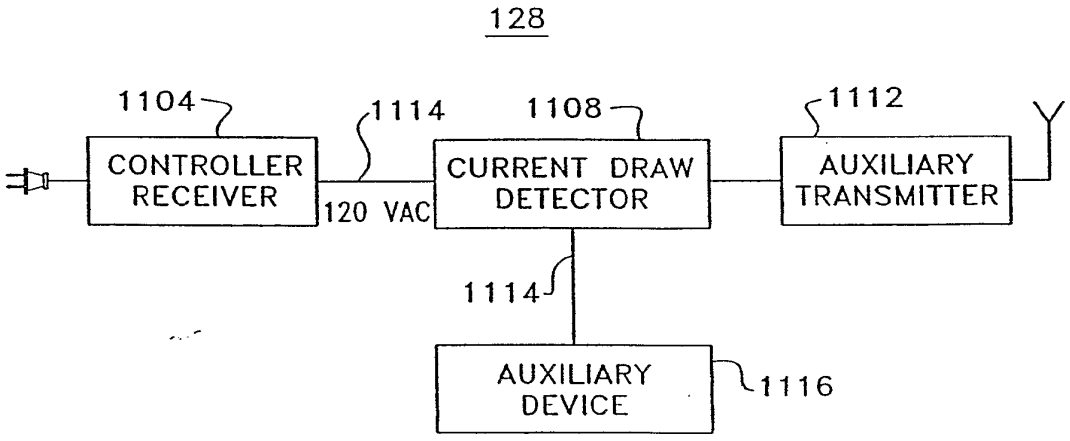

128
1104
CONTROLLER RECEIVER
1114
120 VAC
1108
CURRENT DRAW DETECTOR
1112
AUXILIARY TRANSMITTER
1114
AUXILIARY DEVICE
1116

FIG. 10

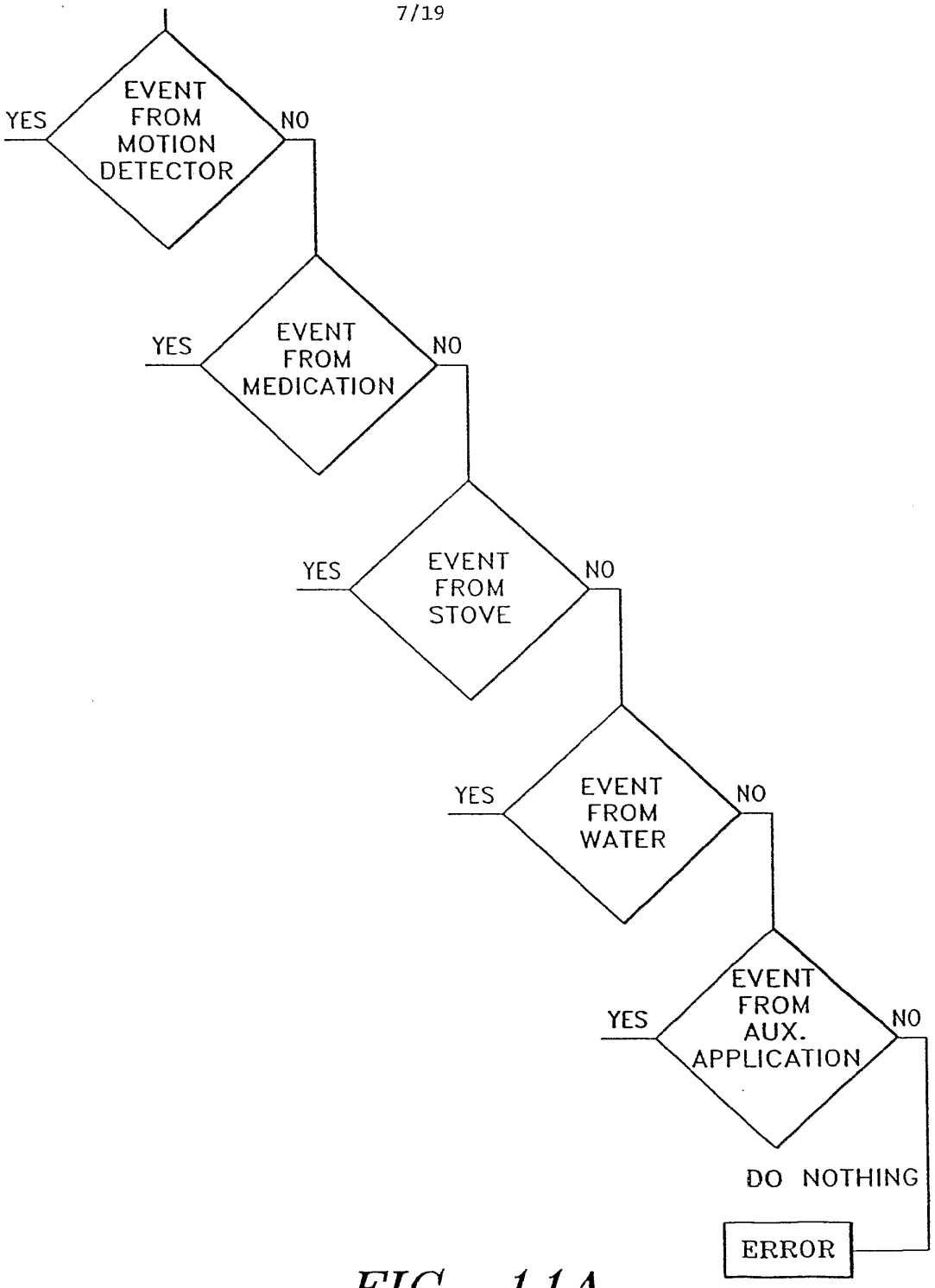

EVENT FROM MOTION DETECTOR
YES
NO
EVENT FROM MEDICATION
YES
NO
EVENT FROM STOVE
YES
NO
EVENT FROM WATER
YES
NO
EVENT FROM AUX. APPLICATION
YES
NO
DO NOTHING
ERROR

FIG. 11A