

(51) International Patent Classification:
G06F 3/048 (2006.01) **H04L 29/08** (2006.01)(21) International Application Number:
PCT/FI201 1/050499(22) International Filing Date:
31 May 2011 (31.05.2011)

(25) Filing Language: English

(26) Publication Language: English

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

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

Published:

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

(54) Title: PROVIDING INFORMATION RELATING TO THE STATUS OF A CONNECTION

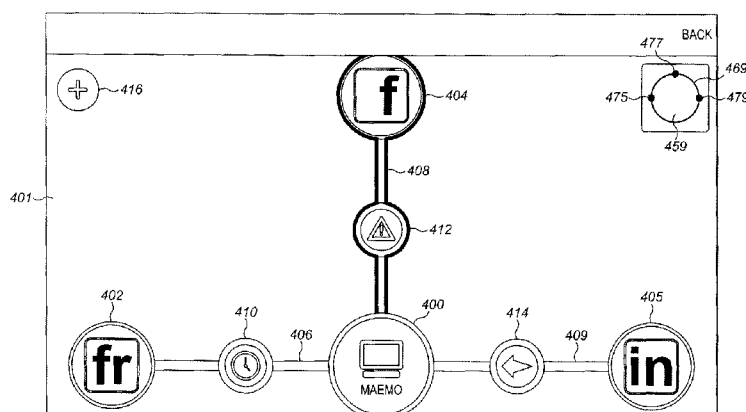


FIG. 4

(57) Abstract: A method of operating a device (100) comprises causing the device to display a menu (401) having a plurality of nodes, wherein the plurality of nodes comprises a root node (400) and first and second selectable subsidiary nodes (402, 404, 405), wherein a first one of the plurality of nodes (402, 404, 405) relates to a service or secondary device, a second one of the plurality of nodes relates either to the device (100), or to a functionality associated with the service or secondary device corresponding to said first one of the plurality of nodes, and either the first one of the plurality of nodes or the second one of the plurality of nodes comprises the root node. The method comprises causing the device to display a status indicator (410, 412, 414) between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator providing information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality of nodes.

PROVIDING INFORMATION RELATING TO THE STATUS OF A CONNECTION

5 **Field of the Invention**

The present invention relates to providing information relating to the status of a connection.

Background to the Invention

10 Current internet tablets, mobile telephones and smartphones are capable of data connection with different internet services by way of upload and download. Nokia Corporation provides Ovi™, a suite of Internet services including remote file storage/access, maps, email and music purchasing. The Ovi service allow users to synchronise contact, calendar, to-do and notes content between their mobile device
15 and the Ovi website so that content can be kept up to date locally and online.

Summary of the Invention

A first aspect of the invention provides a method of operating a device, the method comprising causing the device to display a menu having a plurality of nodes, wherein
20 the plurality of nodes comprises a root node and first and second selectable subsidiary nodes, wherein a first one of the plurality of nodes relates to a service or secondary device, a second one of the plurality of nodes relates either to the device, or to a functionality associated with the service or secondary device corresponding to said first one of the plurality of nodes, and either the first one of the plurality of nodes or
25 the second one of the plurality of nodes comprises the root node, and wherein the method further comprises causing the device to display a status indicator between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator providing information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality
30 of nodes.

A second aspect of the invention provides an apparatus comprising at least one processor and at least one memory having stored therein computer program code, wherein the computer program code is configured, when executed by the at least one

processor using the at least one memory, to cause the apparatus to perform a method of operating a device comprising causing a device to display a menu having a plurality of nodes, wherein the plurality of nodes comprises a root node and first and second selectable subsidiary nodes, wherein a first one of the plurality of nodes relates to a
5 service or secondary device, a second one of the plurality of nodes relates either to the device, or to a functionality associated with the service or secondary device corresponding to said first one of the plurality of nodes, and either the first one of the plurality of nodes or the second one of the plurality of nodes comprises the root node, wherein the method further comprises causing the device to display a status indicator
10 between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator providing information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality of nodes.

15 A third aspect of the invention provides an apparatus comprising means for causing a device to display a menu having a plurality of nodes, wherein the plurality of nodes comprises a root node and first and second selectable subsidiary nodes, wherein a first one of the plurality of nodes relates to a service or secondary device, a second one of the plurality of nodes relates either to a device, or to a functionality associated with the
20 service or secondary device corresponding to said first one of the plurality of nodes, and either the first one of the plurality of nodes or the second one of the plurality of nodes comprises the root node, wherein the apparatus further comprises means for causing the device to display a status indicator between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator providing
25 information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality of nodes.

A fourth aspect of the invention provides a non-transitory computer-readable storage medium having stored thereon computer-readable code, which, when executed by
30 computing apparatus, causes the computing apparatus to display a menu having a plurality of nodes, wherein the plurality of nodes comprises a root node and first and second selectable subsidiary nodes, wherein a first one of the plurality of nodes relates to a service or secondary device a second one of the plurality of nodes relates either to the device, or to a functionality associated with the service or secondary device

corresponding to said first one of the plurality of nodes, and either the first one of the plurality of nodes or the second one of the plurality of nodes comprises the root node, and to display a status indicator between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator providing information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality of nodes.

The status indicator may provide information about the status of a connection relating to the transfer of data between the device and the service or secondary device associated with the first one of the plurality of nodes.

This specification also describes a method of operating a device, comprising defining a plurality of selectable menu options, causing the device to display an arrangement of a subset of the selectable menu options; and causing the device to rotate the arrangement such that one or more of the plurality of selectable menu options forming part of the subset are ceased to be displayed and such as to cause the device to display one or more of the plurality of selectable menu options that do not form part of the subset of the selectable menu options.

This method may comprise evenly spacing displayed selectable menu options.

The method may further comprising causing the device to display an indicator, the indicator indicating the number of selectable menu options that are not displayed.

The selectable menu options may be arranged along an arc and wherein the indicator comprises a plurality of markers arranged in a ring, the indicator including one marker for each user-selectable option and for each hidden option.

The markers may be evenly spaced around the ring.

The method may further comprise selecting an option and in response to selection of the option, including a selectable image corresponding to the selected option in a menu.

Brief Description of the Drawings

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a mobile terminal according to various aspects of the invention;

5 Figure 2 shows some aspects of the hardware and software configuration of the terminal of Figure 1;

Figure 3 schematically illustrates data connection with different web services;

Figure 4 shows a menu displayed by the device of Figure 1;

Figure 5 shows a sub-menu displayed by the device of Figure 1;

10 Figure 6 shows a status view displayed by the device of Figure 1;

Figure 7 shows a settings view displayed by the device of Figure 1;

Figure 8a and 8b show a log view displayed by the device of Figure 1;

Figure 9 shows a sub-menu displayed by the device of Figure 1;

15 Figure 10 shows a rotatable arrangement of selectable options displayed by the device of Figure 1;

Figure 11 shows the arrangement of Figure 10 following rotation through 36 degrees;

Figure 12 shows a login view displayed by the device of Figure 1;

Figure 13 shows a view displayed by the device of Figure 1, showing functionality options;

20 Figure 14 shows the menu of Figure 4 following addition of an additional node;

Figure 15 shows a sub menu displayed by the device of Figure 1, the sub menu having a root node;

Figure 16 shows rotatable list of different functionality options displayed by the device of Figure 1;

25 Figure 17 shows a first time setup view displayed by the device of Figure 1;

Figure 18 shows the sub menu of Figure 15 following addition of a leaf node;

Figure 19 shows the sub menu of Figure 18 following addition of several leaf nodes;

Figure 20 shows a state diagram illustrating different user interface views and navigation options therebetween;

30 Figure 21 shows a connection log displayed by the device of Figure 1;

Figure 22 shows different status indicators;

Figure 23 shows animation frames for different status indicators; and

Figure 24 shows different leaf node arrangements

Detailed Description of the Embodiments

Referring firstly to Figure 1, a terminal 100 is shown. The terminal 100 embodies aspects of the invention and is not limiting on the scope of the invention. The terminal 100 has a touch sensitive display, or touchscreen 102 for displaying content and for receiving tactile user inputs. The terminal may also comprise one or more physical keys 104 for receiving inputs from a user. The terminal 100 is a mobile computer, mobile phone, PDA, internet tablet, smartphone or other device.

Figure 2 is a block diagram illustrating some aspects of the hardware and software configuration of the terminal 100. The terminal includes a controller 200 comprising one or more processors. The controller 200 communicates with the other hardware components via a system bus 201. Each hardware component is connected to the system bus 201 either directly or via an interface.

The terminal 100 includes both volatile memory 212 and non-volatile memory 214. Both types of memory are accessed by controller 200 via the system bus 201 and both types are connected directly to the system bus 201. The volatile memory 212 is RAM, DRAM or any other type of volatile memory. The volatile memory 212 is used by the controller 200 for the temporary storage of data, for instance when controlling the operation of another hardware or software component or moving data between components. The non-volatile memory 214 is ROM, flash memory, a hard disk or any other type of non-volatile memory. The non-volatile memory 214 stores computer readable instructions used in operating the terminal 100 as well as storing content and personal data such as images, videos, music and contacts. A file digital file system having a hierarchal folder structure may be employed to organise content and personal data in different folders.

The touch sensitive display 102 comprises a display part 202 and a tactile interface part 204. The controller 200 receives inputs from the tactile interface 204 and controls the display shown on the display part 202. The touch sensitive display 102 is connected to the system bus 201 by an interface. User input means 208 are connected to the system bus 201 via an interface and include one or more physical keys 104 and/or any other input means such as a QWERTY or numeric keypad, microphone or accelerometer. The terminal 100 also has a camera 209 connected to the system bus 201 via an

interface. The camera is configured to take digital photographs which can be stored in the memory 214. The terminal 100 also contains a transceiver 210 connected to the system bus 201 via an interface for communicating over a wireless link, such as a GSM, CDMA, UMTS, LTE, WiMax or Wi-Fi link.

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As is schematically illustrated in Figure 3, the terminal 100 is configured for data connection with a plurality of different web services 302, 304, 306. Data can be transferred from the terminal 100 to the web services 302, 304, 306 and vice versa via the wireless link.

10

The web services 302, 304, 306 may be configured to allow upload of data from the terminal 100 to the service for storage or to make the data available to other service users. A user of the mobile terminal 100 may for example upload digital photographs stored on the terminal 100 to the Flickr service 302 to share his photographs with other Flickr users.

15

The terminal 100 and web services 302, 304, 306 may also be configured to allow download from the services 302, 304, 306 to the terminal 100. For example, a user of the mobile terminal may download digital photographs from the Flickr service 302 for local storage at the terminal 100.

20

Some web services provide the possibility for synchronisation of content between data stored by the web service and data stored on a mobile terminal 100. For example, the Ovi™ service allows subscribers to synchronise contact and calendar data to keep this data up-to-date both online and on a mobile terminal. Synchronisation comprises transfer of data from the terminal 100 to a service 302, 304, 306 and/or from the service 302, 304, 306 to the terminal 100.

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Referring again to Figure 2, the terminal 100 also includes a memory card interface 203 comprising a memory card slot for receiving a memory card. The memory card interface allows data to be transferred between the terminal 100 and the memory card. The terminal 100 also includes a battery 299 for storing electrical energy.

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The controller 200 operates under the control of computer-readable instructions stored in the non-volatile memory 214, which include an operating system and additional software, middleware or firmware modules, and software applications. The operating system 216 is the Maemo operating system, developed by Nokia Corporation. It may alternatively be the Meego operating system, Symbian, or another operating system. As shown, non-volatile memory 214 also includes user interface software 218. The controller 200 may also comprise one or more application specific integrated circuits (ASICs) (not shown).

Figures 4 to 19 illustrate exemplary operations of the terminal 100 of Figure 1 according to a first exemplary aspect of the invention. In the operations of Figures 4 to 19, the controller 200 performs the stated functions and actions, including controlling the display of content on the display part 202, under the control of user interface software 218. User inputs are detected by the user interface software 218 and are acted upon to control a state of the user interface software 218 and thus the terminal 100. It is the user interface software 218 that generates images for display and that results in some elements of the displayed images being selectable by a user through a user input.

Figure 4 shows an output of display part 202, in which the terminal is displaying a menu 401 comprising a root node 400, a first leaf node 402, a second leaf node 404 and a third leaf node 405. This output is provided by the device under control of the user interface software 218. The root node 400 comprises an encircled icon of a mobile computer which denotes the terminal 100. The leaf nodes 402, 404, 405 are termed leaf nodes because they are the terminal nodes in the display, although it will be seen from the description below that these nodes can in other displays have nodes depending therefrom. These leaf nodes 402, 404, 405 may be termed subsidiary nodes since they are subsidiary to the root node 400 but may not be the absolute end nodes in the menu 401.

The leaf nodes 402, 404, 405 of Figure 4 relate to services 302, 304, 306 and therefore can be referred to as service nodes. However, it will be appreciated that the menu 401 may include leaf nodes which denote entities other than services. For example a leaf node may denote a data source such as a memory card or other secondary device. As will be more fully understood from the examples below, the user may navigate the

menu 401 to change configuration options relating to the entities denoted by the leaf nodes.

As shown in Figure 4, the first leaf node 402 comprises an encircled icon denoting the first web service 302. The second leaf node 404 comprises an encircled icon denoting the second web service 304 and the third leaf node 405 comprises an encircled icon denoting the third web service 306. Each web service may for example be one of Ovi, Flickr, Facebook, LinkedIn, YouTube, FileVault, DropBox or Twitter.

Referring to Figure 4, the leaf nodes 402, 404, 405 are radially equidistant from the central root node 400. Graphical links in the form of first, second and third radial graphical connections 406, 408, 409 are shown between the root node 400 and each leaf node 402, 404, 405. These indicate that the terminal 100 may connect to the first, second and third web services 302, 304, 306. The menu is thus arranged in an intuitive way which is analogous to the schematic or "mental picture" shown in Figure 2.

The first graphical connection 406 comprises a first status indicator 410 between the root node 400 and the first leaf node 402. The first status indicator 410 indicates the status of the connection between the terminal 100 (denoted by the root node 400) and the first web service 302 (denoted by the first leaf node 402). The status indicator 410 comprises an encircled image of a clock, which indicates that the terminal 100 is scheduled to synchronise data with the first web service 302 at a future time.

The second graphical connection 408 comprises a second status indicator 412 which indicates the status of the connection between the terminal 100 and the second web service 304. The status indicator 412 comprises an encircled warning sign, which indicates that there is an error in the connection between the terminal 100 and the second web service 304.

The third graphical connection 409 comprises a third status indicator 414 which indicates the status of the connection between the terminal 100 and the third web service 306. The status indicator 414 comprises an encircled image of an arrow, which points towards the root node. This indicates that data is being downloaded from the third web service 306 to the terminal 100.

The status indicators 410, 412, 414 allow the user to monitor the status of active and inactive data connections with the terminal 100. The controller 200, under instruction of the operating system 216, is configured to periodically monitor the status of each data connection and update the status indicators 410, 412, 414 accordingly. Therefore,
5 the status indicators 410, 412, 414 are dynamic status indicators.

The menu 200 thus provides a holistic, up-to-date view of the status of all active connections and also of any connection errors. In this way, the user can obtain connection information with minimal interaction between the user and the terminal 100.

10 It will be appreciated that other status indicators may be displayed, depending on the status of the relevant connection. Exemplary status indicators are illustrated in Figure 22, which show status indicators for download 2202, upload 2204, synchronisation 2206, backup 2208, disabled 2210, pending 2212, error 2214 and paused 2216 connection states.

15 The leaf nodes 402, 404 and the status indicators 410, 412 of the menu 401 of Figure 4 are user-selectable to allow connection options to be configured. A user may select the leaf nodes 402, 404 or status indicators 410, 412 by touching a corresponding area of the touch sensitive display 102.

In response to user selection of the first leaf node 402, the controller causes a sub-
20 menu 500 to be displayed on the display part 202. The sub-menu 500 is shown in Figure 5. As shown, sub-menu 500 includes a root node 502 which is a service node comprising an encircled icon representing the first web service 302. The sub-menu 500 also includes first, second and third sub-menu leaf nodes 504, 506, 508 graphically connected to the root node 502. As shown, each sub-menu leaf node 504, 506, 508
25 comprises encircled text identifying different features/functionalities associated with the first web service 302. The functionalities represented by the sub-menu leaf nodes 504, 506, 508 are respectively: synchronisation of contact data stored on the first web service with contact data stored on the device ("Sync Flickr Contacts"), upload of photograph data from the device to the first web service thereby to share photos with
30 other users of the first web service ("Share Flickr Photos"), and download of photograph data from the first web service onto the device ("Download Flickr Photos"). The sub-menu leaf nodes can be referred to as functional nodes, since they

relate to different functionalities associated with the first web service 302. It will be appreciated that the sub-menu could include further nodes relating to further functionalities, for example scheduled backup of photos stored on the terminal 100.

The sub-menu also includes a "back" button 511, which allows the user to navigate
5 back to the menu of Figure 4. A "back" button is shown in each of Figures 5, 6, 7, 8a, 8b and 9-19. Generally, the back button 511 allows navigation back to the previously displayed view. For example, where the sub-menu 500 is reached by selecting a leaf node from the menu 401, selecting the "back" button 511 returns the user to the menu 401. It will be appreciated that in some implementations the back button 511 always
10 brings the user back to the previously determined view in this way. However, the user interface may be implemented so that, in some cases, selection of the back button 511 brings the user "back" to a predetermined view other than the previously displayed view. For example, as will be described in more detail below, the back button 511 of Figure 13 always brings the user to the root menu 401, even where the immediately
15 preceding view is not the root menu 401.

Optionally, selection of the sub-menu root node 502 may also return the user to the root menu 400. In an alternative implementation, selection of the sub-menu root node 502 causes display of a connection activity log for the web service 302, including for example synchronisation and download events.

20 The first sub-menu leaf node 504 is selectable to allow configuration of the contact synchronisation functionality. In response to user selection of the first sub-menu leaf node 504, the controller causes a status view 600 to be displayed. As shown in Figure 6, status view 600 comprises status information and configuration options relating to contact synchronisation. As shown, the view 600 provides information regarding the
25 last synchronisation event and the next scheduled synchronisation event. A user may start the synchronisation immediately by selecting the "start" button 602 or may cancel synchronisation by selecting the "cancel" button 604. The user may also adjust the settings of the synchronisation functionality by clicking on the "settings" button 606. A log of synchronisation events may be viewed by selecting the "log" button 608. The
30 view 600 also shows the username or unique identifier 610 of the user who is presently logged in to the web service 302. The view 600 also shows a "remove" button 612. If the "remove" button is selected, the first sub-menu leaf node 502 will be removed

from the sub-menu 500 and will not be visible when the user navigates back to sub-menu 500. Removed nodes may be added again when required using the "+" button. The procedure for adding nodes will be described in more detail below.

Figure 7 shows a settings view 700 which is displayed on the display part 202 when the "settings" button 606 is selected. As shown, the settings view 700 lists a "name" field 702, a "what" field 704, a "where" field 706 and a "how" field 708. It will be appreciated that different fields may be displayed depending on the functionality selected from the sub-menu 500.

The "name" field 702 shown in Figure 7 indicates the text which is displayed in the first sub-menu leaf node 504 of sub-menu 500. A user may change the text which is displayed by editing the "name" field 702 using the tactile interface 208 or user input means 208.

The "what" field 704 indicates that contact data is synchronised. This field may be user-editable to allow different data to be synchronised between the web service 302 and the terminal 100.

The "where" field 706 indicates the folder in the file system of the terminal 100 in which contact data is to be stored. A user may choose for the contact data to be stored in a different folder by selecting the "where" field and choosing a folder from a predetermined list.

Other fields may be displayed, depending on the selected functionality. For example, a "how" field may also be displayed to indicate how the synchronisation is performed. Possible options for the "how" field include "manual", "disabled", "scheduled" and "auto".

The view 700 also includes a "save settings" button which allows a user to save any changes to the setting, and a "cancel" button to allow a user to cancel any changes made.

Figure 8a shows a log view 800 which can be reached by selecting the "log" button 608 of view 600 of Figure 6. The log view 800 shows a list of contact synchronisation events for web service 302, along with the time of each event. As shown, icons are

shown to summarise the event. For example, a warning/ failure icon is displayed where an error occurred in relation to a particular synchronisation event.

A user may select one of the listed events to display further information relating to the event. Figure 8b shows an example of further information for a warning/ failure. As
5 shown, the reason for the failure is shown to the user along with synchronisation details including time elapsed, the connection type and the number of files synced. Optionally, in the case of a successful synchronisation, information relating to the data transferred may be displayed.

It will be appreciated that other log views 800 for other functionalities may be reached
10 from other status views 600 for other functionalities selected from the sub-menu 500, with upload/download/synchronisation events illustrated by corresponding icons.

Returning again to Figure 5, graphical links 501, 505, 507 are displayed between the root service node 502 and the functional nodes 504, 506 and 508 to indicate that the functional nodes relate to the first web service 302. The graphical link 505 between
15 sub-menu root node 502 and the first sub-menu leaf node 504 has a selectable sub-menu status indicator 510. The sub-menu status indicator 510 is identical to the first status indicator 410 of Figure 4 and comprises an encircled image of a clock. The sub-menu status indicator 510 indicates the status of the synchronisation function, in this case indicating that the terminal 100 is scheduled to synchronise data with the first
20 web service 302 (denoted by the sub-menu root node 502) at a future time.

As described above, the view 600 of Figure 6 can be reached by selection of the leaf node 504. However, this view 600 can also be reached by selection of the sub-menu status indicator 510, or alternatively by selection of the first status indicator 410 of Figure 4.

25 The "Share Flickr Photos" leaf node 506 and the "Download Flickr Photos" leaf node 508 are also selectable in order to adjust configuration settings. When the "Share Flickr Photos" node 506 is selected for example, a status view 600 is displayed which is similar to the view of Figure 6, except that information relating to the last share and the number of files shared is displayed instead of information relating to the last or
30 next scheduled event. The user may initiate the share photos function by selecting a "start" button, view a log by selecting a "log" button or configured settings for the

share photos function by selecting a "settings" button, in the same way as described above in relation to the "Share Flickr Contacts" node. Selecting the "settings" button brings up a view similar to Figure 7, which allows configuration of various settings for the "Share Flickr Photos" functionality. For example, the user may adjust the name of the local folder containing the photos to be shared, whether the shared photos should be made public on the Flickr website, or whether the uploaded content should be restricted to particular users or user groups.

Similarly, a user may configure the "download Flickr photos" functionality by selecting the corresponding functional node 508. In response, a status view for the "download Flickr photos" is displayed. This view may display information relating to the last download and the number of files downloaded.

It will be appreciated that selection of one of the other service nodes 404, 405 of Figure 4 causes a different sub-menu to be displayed, the sub-menu having a root node comprising the corresponding service node and a plurality of different functional nodes graphically connected to the root node, each functional node relating to a different functionality. The functional nodes thus displayed may be selected by a user to configure corresponding functions of the service.

It will be appreciated that different status views 600 are displayed depending on the selected functional node. Different functionalities may have different configuration options which may be configured via their corresponding status views 600. For example, synchronisations may be configured such that either the client or server takes priority when syncing, thereby to implement client/ server conflict resolution. Further, a user may optionally configure downloads by for example specifying details such as username data or by specifying images which are to be downloaded to the terminal 100, for example by specifying image tags.

Figure 9 shows the sub-menu 900 which is displayed when the service node 404 of Figure 4 is selected. As shown, the sub-menu 900 has a status indicator 902 which indicates that there is a connection error relating to transfer of data between the terminal 100 and the second web service 306 and that this error relates to the "Facebook music" functionality.

Returning again to Figure 4, as shown an encircled "+" icon 416 is displayed in the top left corner of the menu. This icon is user-selectable and allows a user to add further leaf nodes to the menu. The procedure for adding further leaf nodes to the menu of Figure 4 will now be described with reference to Figures 10-14. This procedure allows
5 a straightforward and convenient way for a user to set up multiple connections with the terminal 100.

In response to user selection of the "+" icon 416, the controller 200 causes an arrangement 1001 of selectable options 1002, 1004, 1006, 1008, 1010 to be displayed on the display part 202, as shown in Figure 10. The options 1002, 1004, 1006, 1008,
10 1010 are evenly spaced and arranged along an arc, which may be circular. As shown, an out of focus or blurred image of the menu of Figure 4 is displayed within the arc of icons. It will be appreciated that the arc itself need not necessarily be displayed. Each option comprises an encircled icon which when it is selected may be added as a leaf node to the menu of Figure 4.

In response to a user input via the touchscreen 102 or the keys 104, the controller 200 is configured to cause the arrangement of options to rotate either clockwise or anticlockwise on the display part 202. Rotation occurs around a point that is central to the arc. The user input may comprise a repeated pressing of one of the keys 104, or alternatively a left or right sweeping movement across the touchscreen 102, for
20 example in a straight line or in a clockwise or anticlockwise arc.

Figure 11 shows the arrangement of options after a clockwise rotation through one tenth of a full rotation, i.e. 36 degrees. As shown, one of the previously displayed options 1010 has become hidden from view, while a previously hidden option 912 has been brought into view. Further rotation brings further options into view. It will be
25 appreciated that the arrangement may be rotated anticlockwise as well as clockwise.

A full rotation through 360 degrees brings the arrangement back to its starting position, with the same options displayed. Accordingly, the user has the sense of a virtual ring of evenly spaced options which rotate as a solid body around a central point, where only a sector of the ring is visible on the display 202 at any one time.

The rotatable arrangement of Figures 10 and 11 displays a selection of some but not all of the available options concurrently, thereby providing an uncluttered display. This is
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particularly relevant for mobile devices, where the size of the display screen is limited. The user can intuitively estimate the number of hidden options, since these are the options in the virtual ring which are not displayed on the display part 202.

Selection of one of the options 1002, 1004, 1006, 1008, 1010 causes the corresponding
5 icon to be added as a leaf node to the menu of Figure 4. As shown in Figures 9 and 10 possible options are to include a service node for the "Ovi" service 1006 or the "Twitter" service 912.

A further option is to include a leaf node relating to a secondary device such as a memory card. Configuration options relating to data transfer between the terminal 100
10 and a secondary device such as a memory card may be configured in a similar manner as for services, i.e.: in the manner described above with reference to Figures 6 and 7.

The rotatable arrangement of Figure 10 also includes an option to add a "device switch" node to the menu of Figure 4. "Device switch" is a local service which allows selectable data transfer between the terminal 100 and other external devices, for
15 example via a Bluetooth link. Configuration options relating to the "device switch" connection may be configured in a similar manner as for services as described hereinabove.

Addition of a leaf node for the "Ovi" service will now be described with reference to Figures 10-14. When the "Ovi" option 1006 is selected from the rotatable
20 arrangement of Figure 10 or 11, a login screen 1202 is displayed on the display part 202, which is shown in Figure 12. A user enters their username and password and presses the login button, causing the terminal 100 to log in to the Ovi™ service. Alternatively, the user may select "cancel" to return to the options menu of Figure 11. Further alternatively, the user may select the "create new account" button. Selection
25 of this option executes a web browser stored on the terminal 100, which opens a web page to allow service-specific account creation.

Once the user has been logged in, the terminal 100 displays the view 1301 shown in Figure 13. This view shows a node 1302 for each of the functionalities of the Ovi service which can be added as a sub-menu functional nodes for the Ovi service, as is
30 described in more detail below. The nodes of Figure 13 are user selectable. Selection of one of the nodes causes the terminal 100 to display a configuration screen for the

selected functionality, similar to the screen of Figure 6 but with different configuration options for the selected functionality.

The user can navigate from the view of Figure 13 by selecting one of the nodes 1302 to configure a selected functionality and initiate a connection with Ovi or by clicking
5 the "back" button, which in this particular case is configured to return the user to the root menu 401. In either case, when the user is returned to the menu 401, an additional service node 407 is displayed for the Ovi service, as shown in Figure 14.

Selection of the "Ovi" service node from Figure 14 causes the terminal to display a sub-menu for the "Ovi" node, as shown in Figure 15. No functional nodes have yet
10 been added and therefore only a root node is shown in Figure 15.

A user may add functional nodes to the sub-menu of Figure 15 in a similar manner to the manner described above in relation to the addition of service or secondary device nodes to the menu of Figure 4. That is, the user may add a functional node by
15 selecting the "+" icon and choosing a functional node to be added from a rotatable arrangement 1603 of options 1601, shown in Figure 16.

Selection of the "sync" option, causes a first time setup view 1702, shown in Figure 17, to be displayed, thereby providing the user with the option to configure settings for the newly added synchronisation functionality, including configuring what content to synchronise (e.g.: contacts, calendar), and how often to perform the
20 synchronisation. The user then selects the "done" button. In response, the terminal displays a status view 600 which is similar to the view of Figure 6, which displays status information regarding the Ovi synchronisation functionality, including information regarding the time elapsed, the time remaining, the number of files transferred and a progress bar and which provides options for further configuration of
25 the Ovi functionality.

The user may then select "back", thereby causing the terminal 100 to display the sub-menu of Figure 18, but with an additional functional node 1802 for the synchronisation functionality, as shown in Figure 18. Referring to Figure 18, a status indicator 1804 is shown between the root Ovi service node 1801 and the functional
30 node 1802. Status indicator 1804 shows two curved arrows, indicating that the terminal 100 is presently synchronising with the Ovi service.

It will be appreciated that other functional nodes can be added to the Ovi service sub-menu in a similar manner. Figure 19 shows the sub-menu after the addition of several further functional nodes. As shown the sub-menu includes a "Ovi online backup" node 1806. The status indicator between the Ovi service node and the "Ovi online backup" node indicates that a scheduled backup to the Ovi service has been set up.

The views of Figures 4, 5, 9, 10, 11, 14, 15, 16, 18 each include a navigational indicator in the top right corner to indicate the present level of navigation within the menu hierarchy. In menu 401, the navigational indicator 459 comprises a single highlighted ring 469 having an individual circular marker 475, 477, 479 for each leaf node 402, 404, 405. The navigational indicator 459 thus indicates to the user that the menu 401 is a root menu.

In sub-menu 500, the navigational indicator 559 comprises a highlighted ring 569 having an individual marker for each leaf nodes 504, 506, 508. The highlighted ring 569 is centred on a circular marker 579 representing the corresponding service node 502, 402. The circular maker 579 is shown on a circular arc 587 representing a part of the ring 469 of the navigational indicator 459 of the root menu 401. Thus, it is immediately and intuitively clear to a user glancing at the navigational indicator 559 that the menu 500 is a sub-menu of root menu 401 and that the menu 401 is "below" menu 500 and can be reached by selecting the "back" button.

In the options menu of Figure 10, the navigational indicator 1059 comprises a highlighted ring 1069 including circular markers for each available option, including hidden options. Thus, the user can immediately see the total number of options and hidden options by glancing at the indicator 1059. The navigational indicator 1059 also shows the ring 469 of menu 401 inside the highlighted ring 1069, indicating that the menu 401 is "below" the options menu of Figure 10 and can be reached by selecting the "back" button.

Similarly, in the case of the options menu exemplified in Figure 16, the navigational indicator 1659 comprises a highlighted ring including circular markers for each available option. The navigational indicator 1659 shows two inner rings 1669, 1679 representing menus 501 and 401 respectively indicating that the menus 401 and 501 are "below" the options menu of Figure 16 and can be reached by selecting the "back" button.

In this way, the navigational aid provides information regarding the level of navigation and regarding the possibility for navigating to other "lower" menus by selecting the "back" button.

Figure 20 shows a state diagram 2002 illustrating different user interface views and navigation options therebetween. Like reference signs are used to illustrate the correspondence between the blocks of diagram 2002 and the views of Figures 4-19. In the diagram 2002, lines are used to show navigation options from one view to another. Dotted lines 2004 are used to illustrate navigation using the "back" button.

As shown, starting from the root menu 401, a user may select a leaf node and navigate to the sub-menu 500. Alternatively, the user may select a status indicator and navigate to the status menu 600 for the functionality corresponding to the status indicator. Alternatively, the user may select the "+" icon 416 to reach menu 1001 and then follow the procedure described above with reference to Figures 10-14 to add an additional leaf node. As described above, the procedure for adding a leaf node comprises entering login information via login view 1202, after which functionality options associated with the selected device/ service are displayed in view 1301. From the view 1301, the user may either select a functionality for configuration via "setup new connection" view 1702, or alternatively select the "back" button to return to the root menu 401.

As shown in Figure 20, starting from the sub-menu 500, a user may select either a leaf node or status indicator and navigate to the status menu 600 for the corresponding functionality. From the status menu 600, the user may navigate to settings view 700 and log view 800. The user may also add leaf nodes to the sub menu 500 by following the procedure described above with reference to Figures 16 and 17.

Figure 21 shows a device connection log 2102, which can be reached by selecting the root node 400 of Figure 4. The device connection log 2102 shows a history of device connection events. The log 2102 shows icons 2104 representing devices or services to which a connection was made together with the time of each connection. A status indicator 2106 is also shown to indicate the type of connection event. Optionally, log views relating to particular services, secondary devices or functionalities may be accessed from the connection log 2102. For example, the log view 800 of Figure 8a may be reached from the main log view 2102.

The status indicators shown in the menu 401 and the sub-menu 500 may be animated so as to provide an informative visual effect to the user. Figure 23 shows different animation frames 2302, 2304, 2306 and 2308 for the upload 2204, download 2202, synchronisation 2206 and error 2214 status indicators. As shown, the upload status indicator 2204 has a three-frame animation 2302 in which an upwardly directed arrow moves from top to bottom. The download status indicator 2202 has a three-frame animation 2304 in which a downwardly directed arrow moves from top to bottom. The synchronisation status indicator 2206 has a three frame animation 2306 in which the arrows move in a circular path. The error status indicator 2214 has a two frame animation 2308 in which a warning sign is shown fading in and out. Other visual effects may also be provided, for example visual effects may be used in transitions between different views.

It will be appreciated that the root and leaf nodes of the root menu 401 and sub-menu 500 could be arranged in a variety of different ways. Figure 24 shows different possible arrangements 2402, 2404, 2406, 2408, 2410, 2412, 2414, 2416, 2418, 2420, 2422 for different numbers of node images. As shown, node images may be evenly spaced around a semicircular arc, as shown in arrangements 2404, 2406, 2408, 2410, 2412, 2414, 2416. Alternatively, node images may be evenly spaced around a full circle, as shown in arrangements 2418, 2420. Alternatively, node images may be evenly spaced around an upper semicircular arc with a first angular spacing, and evenly spaced around a lower semicircular arc with a second angular spacing, as shown in arrangement 2422. It will be appreciated that the arc itself, or the full circle as the case may be, need not necessarily be displayed.

Although a menu hierarchy involving a node-based root menu 401 and a single node-based sub-menu 500 has been described above, alternatively there may be multiple hierarchical layers of node-based sub-menus. For example, instead of displaying a status view 600 when a subsidiary node 504, 506, 508 is selected, a further node-based sub-menu may alternatively be displayed having a root node corresponding to the selected subsidiary node 504, 506, 508 and a plurality of leaf nodes, each providing access to a status view 600 either directly or via further hierarchical levels. It will be appreciated that the number of hierarchical levels may be different for different root menu leaf nodes, depending on the corresponding service or subsidiary device. For example, some services may not require a sub-menu, in which case a status view 600

may be displayed when the corresponding leaf node 401, 402, 404 is selected, instead of displaying a sub-menu 500.

It should be realized that the foregoing embodiments should not be construed as limiting. Other variations and modifications will be apparent to persons skilled in the art upon reading the present application. Moreover, the disclosure of the present application should be understood to include any novel features or any novel combination of features either explicitly or implicitly disclosed herein or any generalization thereof and during the prosecution of the present application or of any application derived therefrom, new claims may be formulated to cover any such features and/or combination of such features.

We Claim:

1. A method of operating a device, the method comprising:

causing the device to display a menu having a plurality of nodes, wherein the plurality of nodes comprises a root node and first and second selectable subsidiary
5 nodes, wherein:

a first one of the plurality of nodes relates to a service or secondary device,

a second one of the plurality of nodes relates either to the device, or to a functionality associated with the service or secondary device corresponding to said
10 first one of the plurality of nodes, and

either the first one of the plurality of nodes or the second one of the plurality of nodes comprises the root node; and

causing the device to display a status indicator between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator
15 providing information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality of nodes.

2. A method as claimed in claim 1, further comprising:

receiving a user input comprising a selection of the status indicator or one of
20 the subsidiary nodes,

in response to receiving the user input, providing plural connection configuration options,

in response to selection of one of the plural connection configuration options, changing the configuration of said connection.
25

3. A method as claimed in claim 1 or claim 2, further comprising causing the device to display a navigational aid comprising a marker for each subsidiary node.

4. A method as claimed in claim 3, wherein the markers are arranged along an arc.
30

5. A method as claimed in any of claims 1 to 4, wherein said first one of the plurality of nodes is the first subsidiary node and said second one of the plurality of nodes is the root node, and

wherein the root node relates to the device and wherein the second subsidiary node relates to a service or secondary device which is different to the service or secondary device associated with the first subsidiary node.

5 6. A method as claimed in claim 5, further comprising:
selecting one of said first and second subsidiary nodes;
causing the device to display a sub-menu comprising a sub-menu root node and
first and second sub-menu subsidiary nodes;
wherein the sub-menu root node relates to the service or secondary device
10 associated with said one of the first and second subsidiary nodes;
wherein the sub-menu subsidiary nodes relates to different functionalities, each
functionality being associated with the service or secondary device corresponding to
the sub-menu root node.

15 7. A method as claimed in claim 6, further comprising:
selecting one of said first and second sub-menu subsidiary nodes;
in response to selecting one of said first and second sub-menu subsidiary
nodes, providing plural configuration options relating to the functionality
corresponding to said selected one of said first and second sub-menu subsidiary nodes;
20 and
in response to selection of one of the plural connection configuration options,
changing the configuration of said connection.

8. A method as claimed in claim 7, further comprising:
25 causing the device to display a sub-menu navigational aid comprising a marker
for each sub-menu subsidiary node and an indicator relating to the parent menu.

9. A method as claimed in claim 8, wherein the markers for each sub-menu
subsidiary node are arranged along an arc.

30

10. A method as claimed in claim 9, wherein the indicator relating to the parent
menu comprises an arc concentric with the arc along which the nodes are arranged.

11. A method as claimed in any of claims 5 to 10, further comprising:

causing the device to display an image, the image being selectable for adding a subsidiary node to the menu;

receiving a user input comprising a selection of the selectable image;

in response to receiving the user input, causing the device to display a menu
5 having a plurality of nodes including the root node, the first subsidiary node, the second subsidiary node and a third subsidiary node, wherein the third subsidiary node relates to a service or secondary device which is different to the service or secondary device associated with the first subsidiary node and to the service or secondary device associated with the second subsidiary node.

10

12. A method as claimed in claim 11, wherein the user input further comprises selecting a service or device from a plurality of different options, wherein the third node corresponds to the selected service or device.

15

13. A method as claimed in any of claim 1 to 4, wherein said first one of the plurality of nodes is the root node and wherein said second one of the plurality of nodes is the first subsidiary node, and wherein the first and second subsidiary nodes respectively relate to different functionalities, each functionality being associated with the service or secondary device corresponding to the root node.

20

14. A method as claimed in claim 13, further comprising:

causing the device to display an image, the image being selectable for adding a subsidiary node to the menu;

receiving a user input comprising a selection of the selectable image;

25

in response to receiving the user input, causing the device to display a menu
having a plurality of nodes including the root node, the first subsidiary node, the second subsidiary node and a third subsidiary node, wherein the third subsidiary node relates to a functionality which is different to the functionality associated with the first subsidiary node and to the functionality associated with the second subsidiary node.

30

15. A method as claimed in claim 14, wherein the user input further comprises selecting a functionality from a plurality of different options, wherein the third node corresponds to the selected functionality.

16. A method as claimed in any preceding claim, further comprising:
monitoring the status of the connections corresponding to each status indicator;

determining whether the status of a connection has changed;
5 in response to determining that the status of a connection has changed,
updating the corresponding status indicator.

17. Computer program code, optionally stored on a computer readable medium,
which when executed by a computer apparatus causes the apparatus to perform the
10 method of any of claims 1 to 16.

18. An apparatus comprising
at least one processor;
and at least one memory having stored therein computer program code;
15 wherein the computer program code is configured, when executed by
the at least one processor using the at least one memory, to cause the apparatus to
perform a method of operating a device comprising:

causing the device to display a menu having a plurality of nodes,
wherein:

20 the plurality of nodes comprises a root node and first and second
selectable subsidiary nodes,

a first one of the plurality of nodes relates to a service or secondary
device,

a second one of the plurality of nodes relates either to the device, or to a
25 functionality associated with the service or secondary device corresponding to said
first one of the plurality of nodes, and

either the first one of the plurality of nodes or the second one of the
plurality of nodes comprises the root node; and

causing the device to display a status indicator between the first one of the
30 plurality of nodes and the second one of the plurality of nodes, the status indicator
providing information about the status of a connection between the device and the
service or secondary device associated with the first one of the plurality of nodes.

19. An apparatus comprising:

means for causing a device to display a menu having a plurality of nodes, wherein the plurality of nodes comprises a root node and first and second selectable subsidiary nodes, wherein:

5 a first one of the plurality of nodes relates to a service or secondary device,

a second one of the plurality of nodes relates either to a device, or to a functionality associated with the service or secondary device corresponding to said first one of the plurality of nodes, and

10 either the first one of the plurality of nodes or the second one of the plurality of nodes comprises the root node; and

means for causing the device to display a status indicator between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator providing information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality of nodes.

20. A non-transitory computer-readable storage medium having stored thereon computer-readable code, which, when executed by computing apparatus, causes the computing apparatus to:

20 display a menu having a plurality of nodes, wherein the plurality of nodes comprises a root node and first and second selectable subsidiary nodes, wherein:

a first one of the plurality of nodes relates to a service or secondary device,

25 a second one of the plurality of nodes relates either to the device, or to a functionality associated with the service or secondary device corresponding to said first one of the plurality of nodes, and

either the first one of the plurality of nodes or the second one of the plurality of nodes comprises the root node; and

30 display a status indicator between the first one of the plurality of nodes and the second one of the plurality of nodes, the status indicator providing information about the status of a connection between the device and the service or secondary device associated with the first one of the plurality of nodes.

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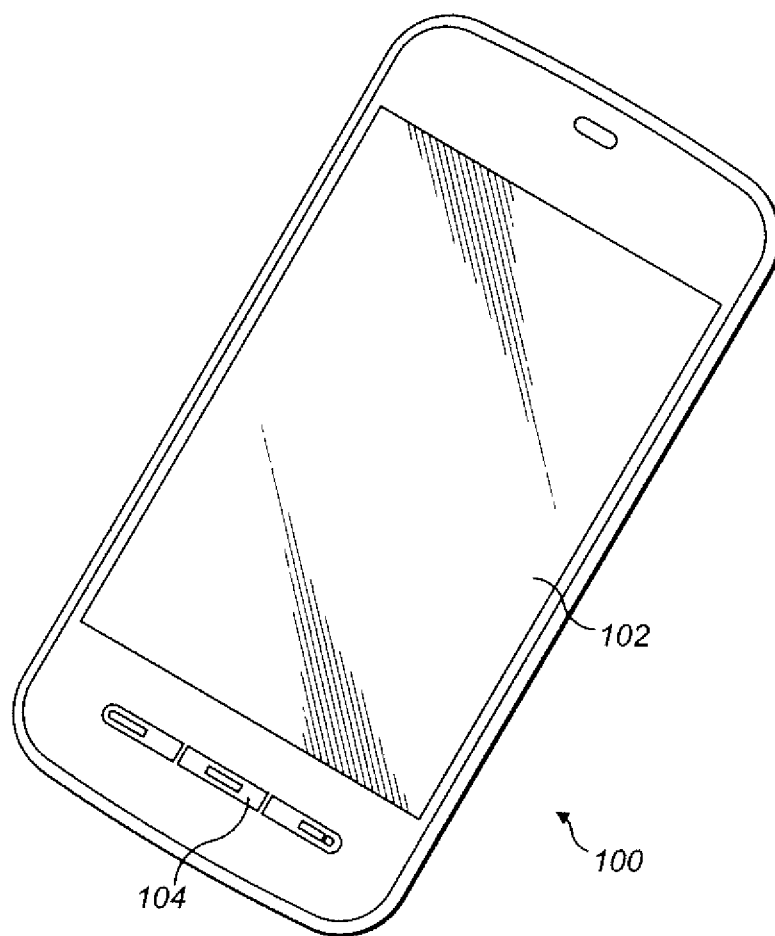
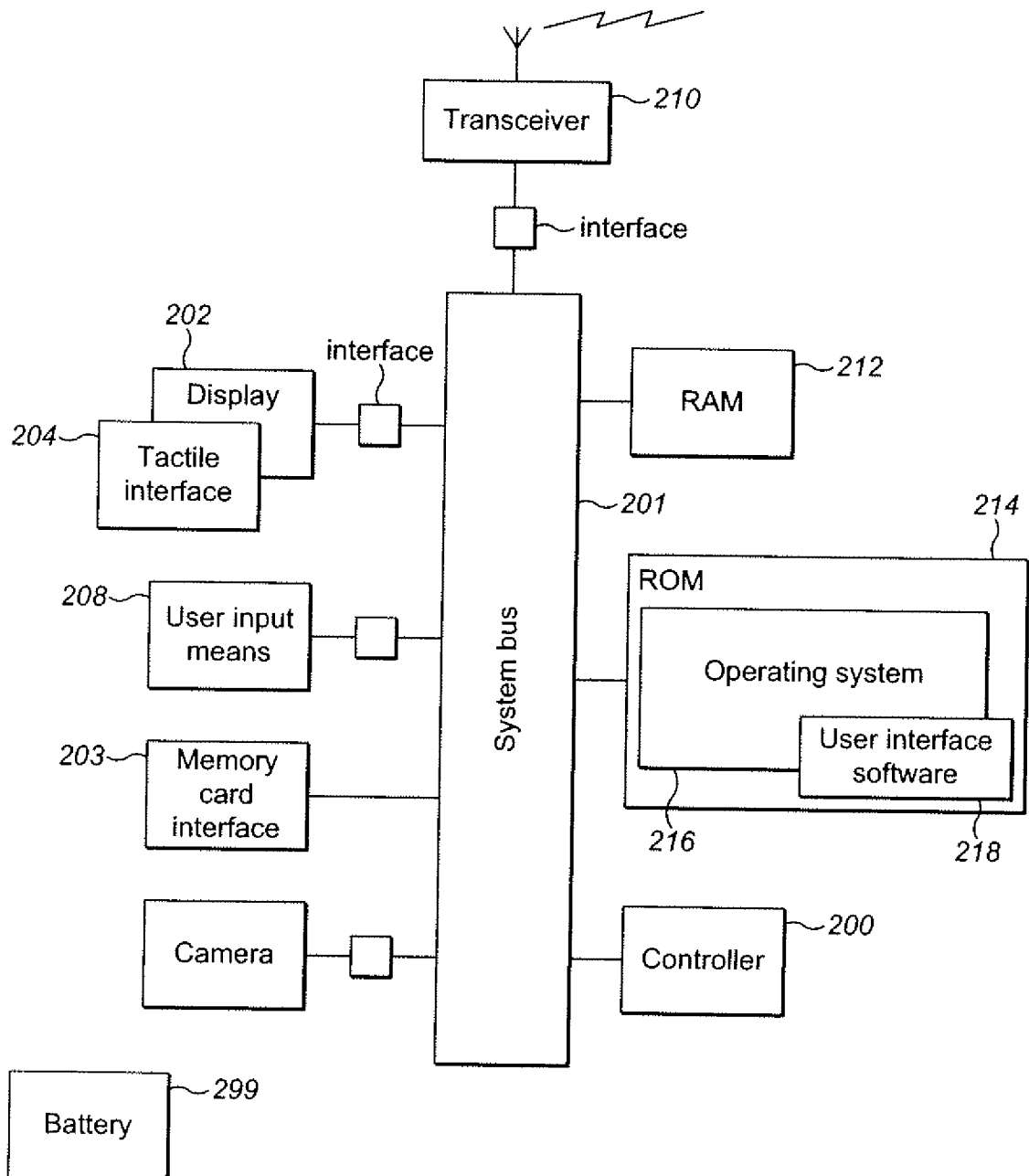


FIG. 1

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**FIG. 2**

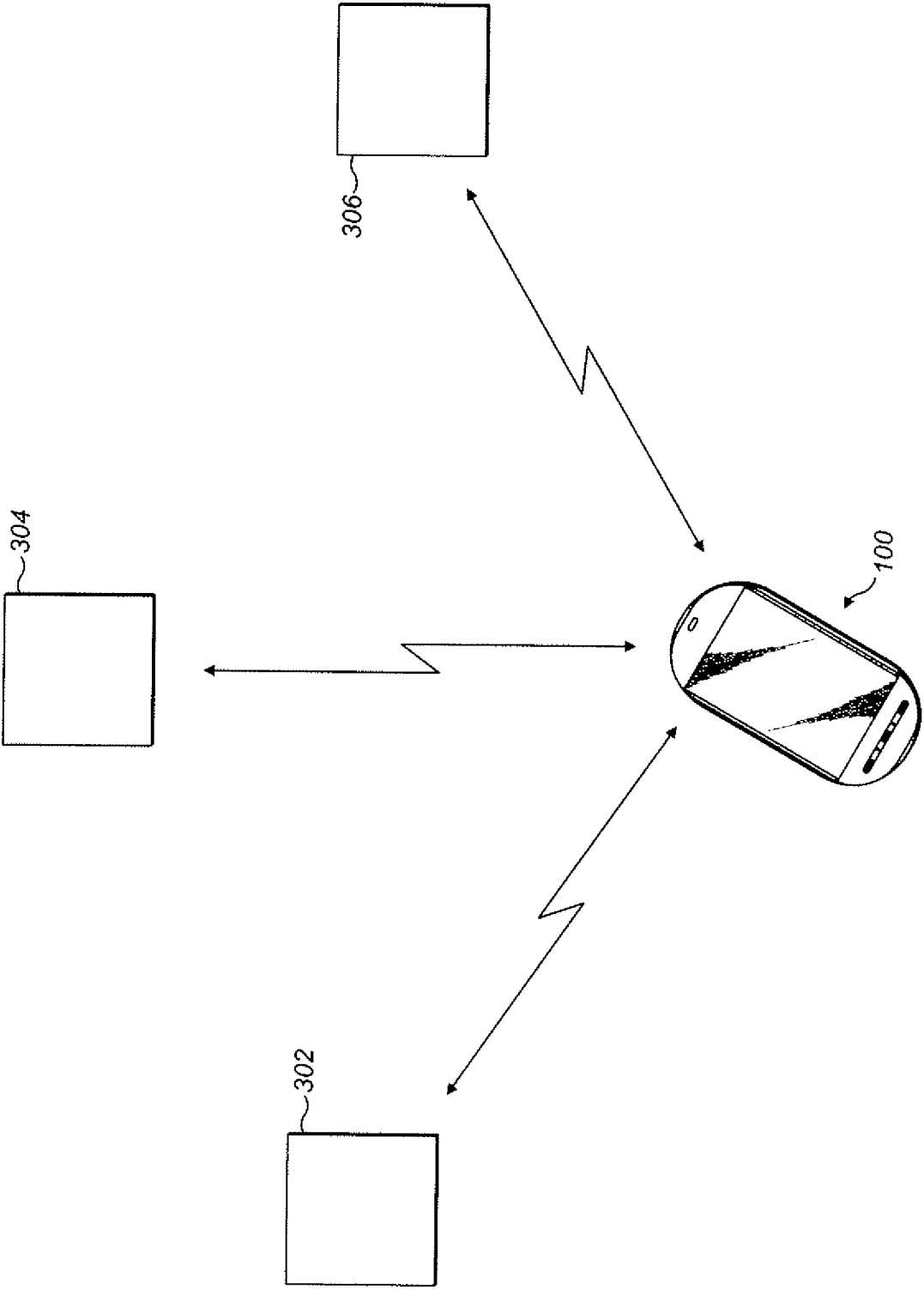
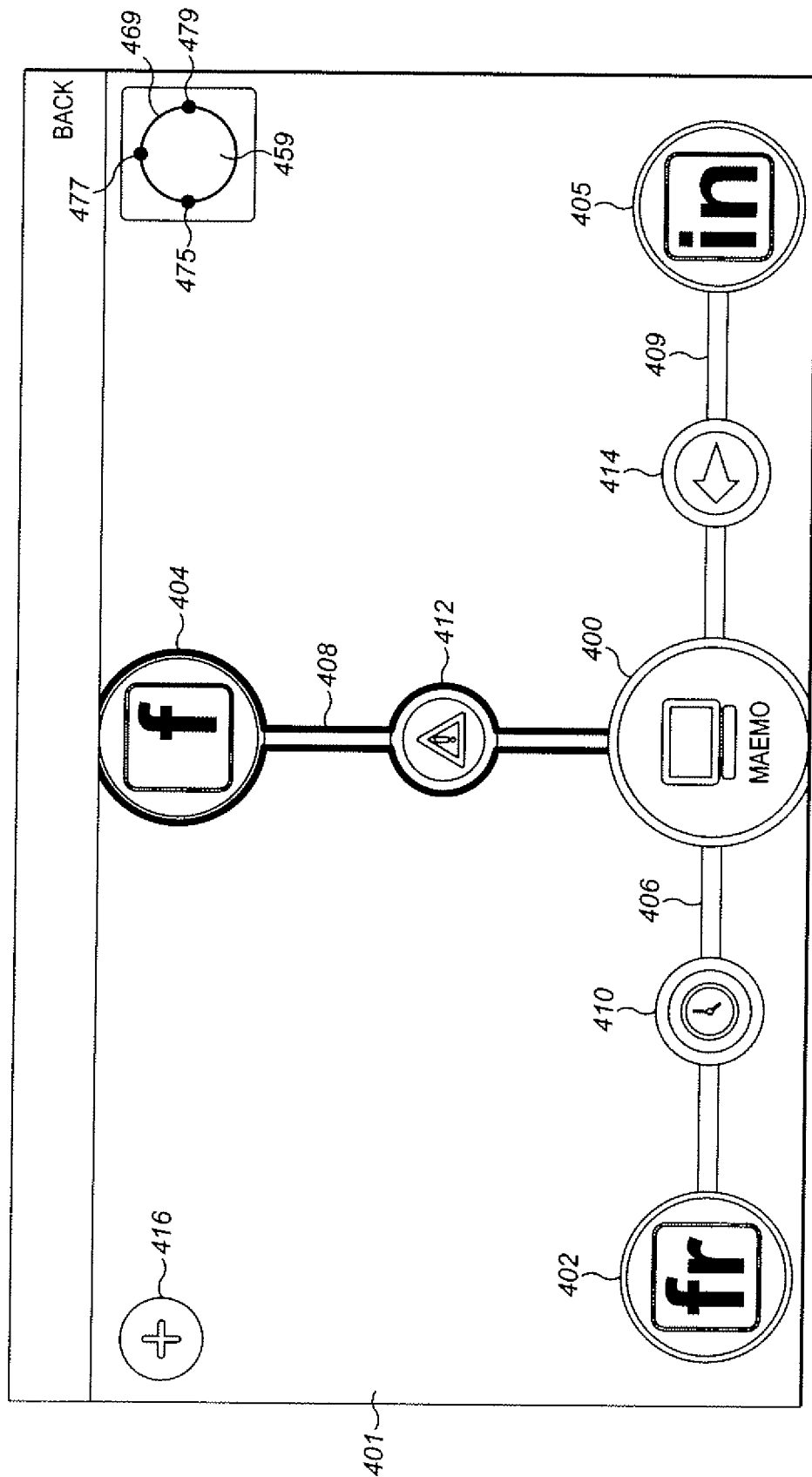


FIG. 3



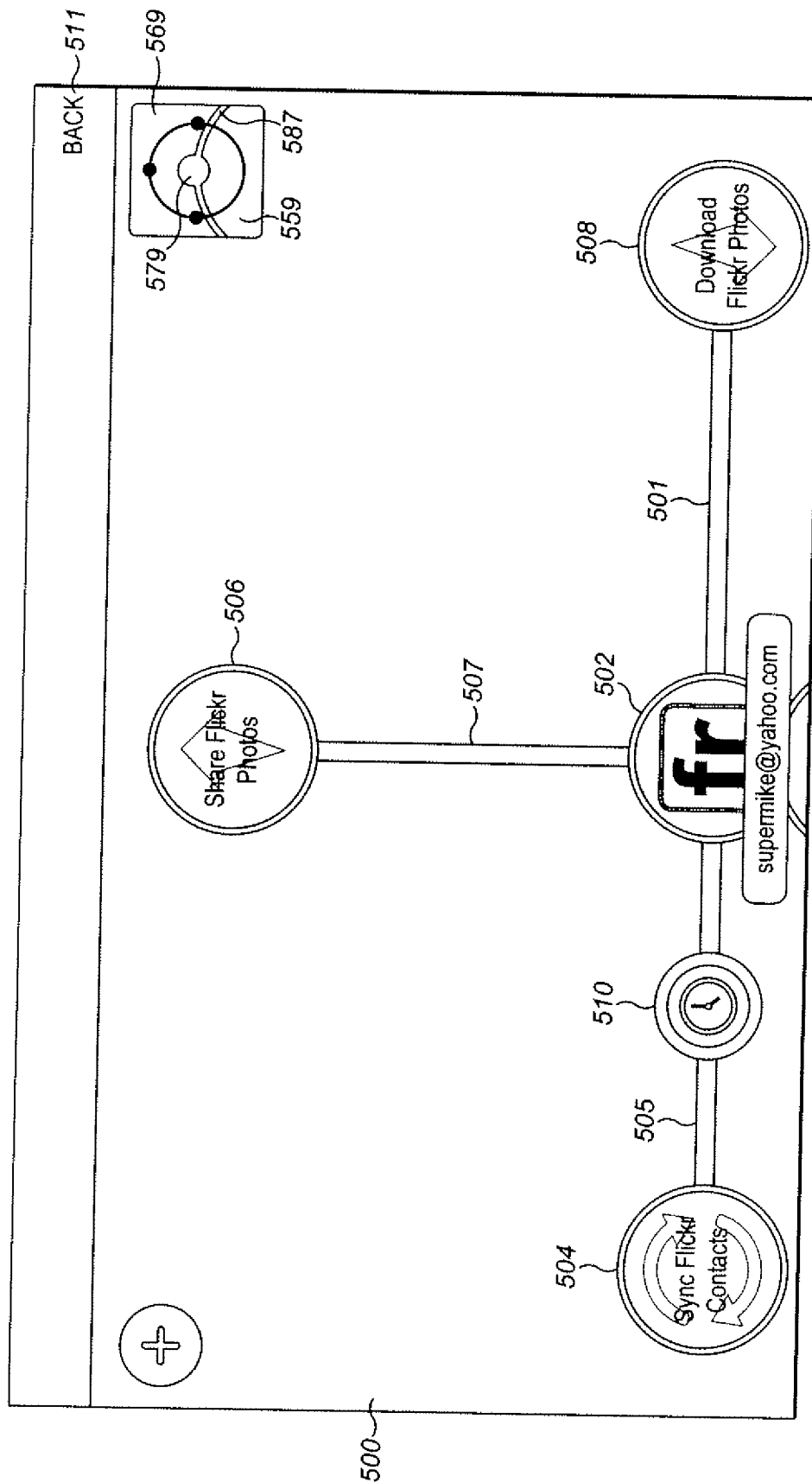


FIG. 5

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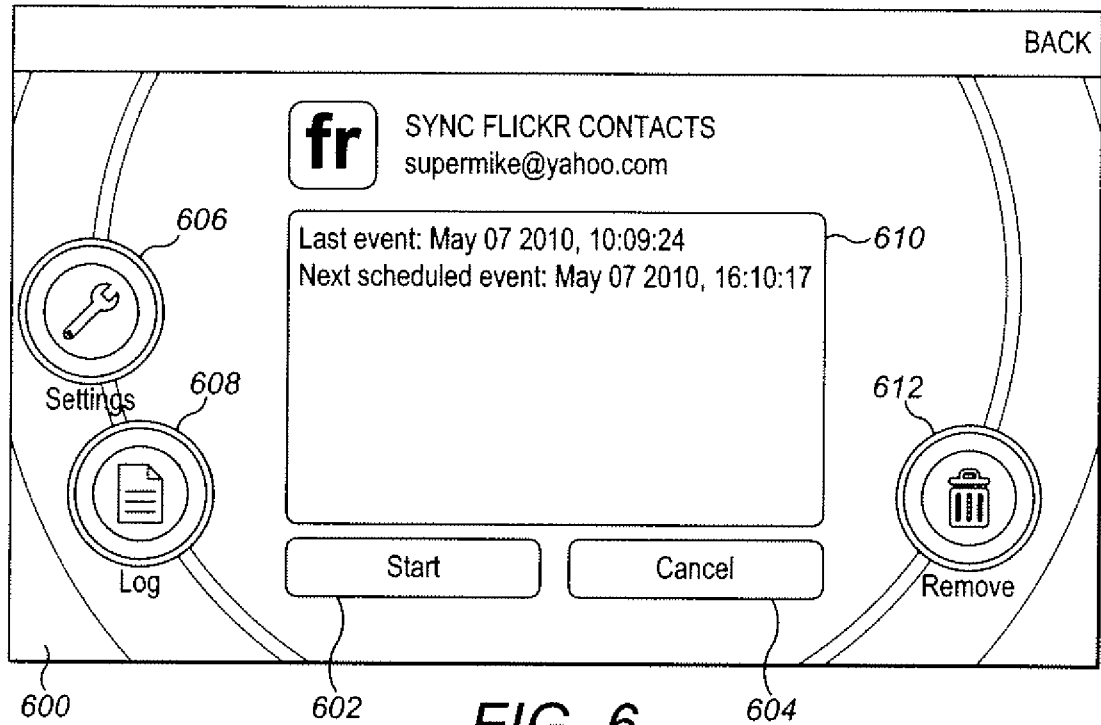


FIG. 6

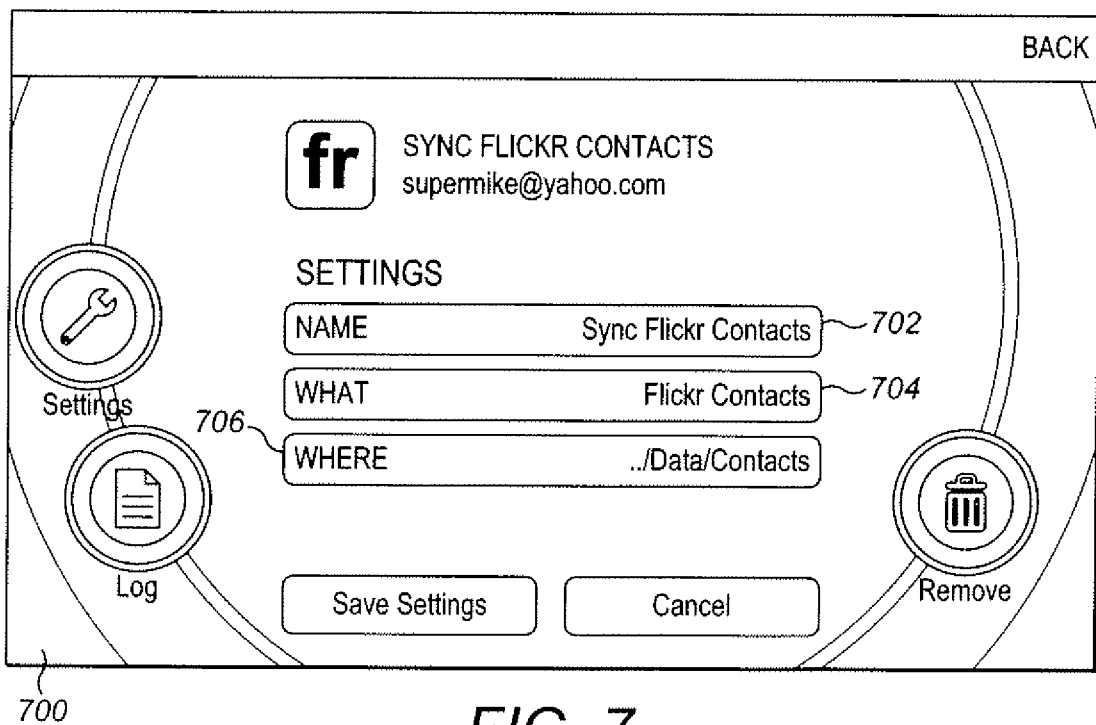


FIG. 7

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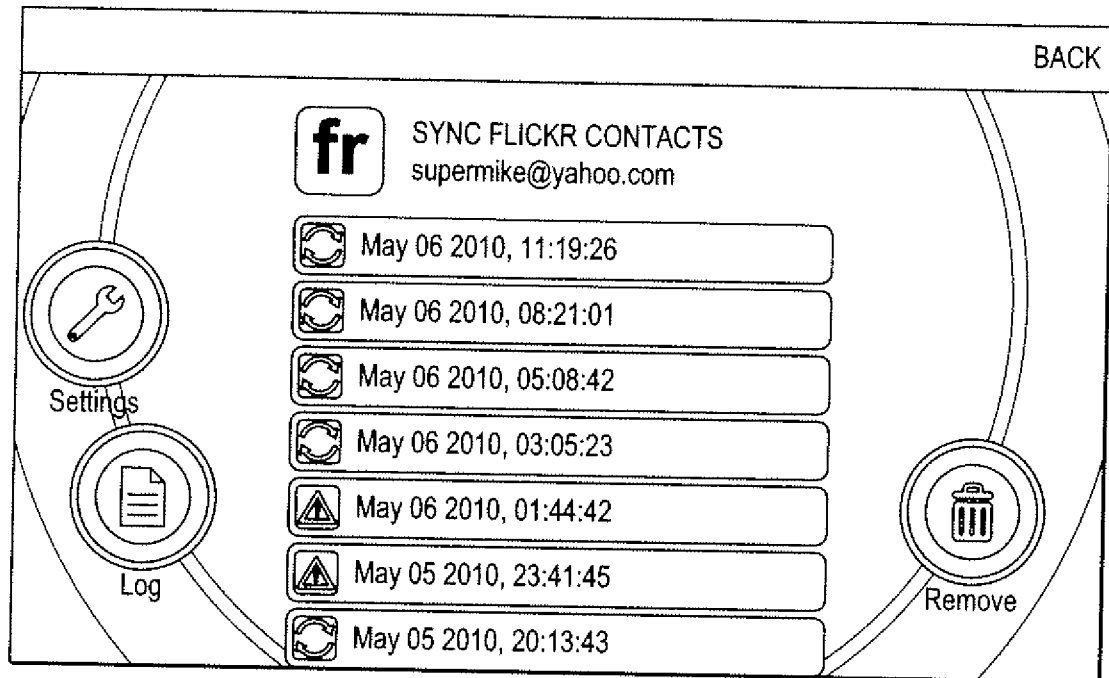


FIG. 8a

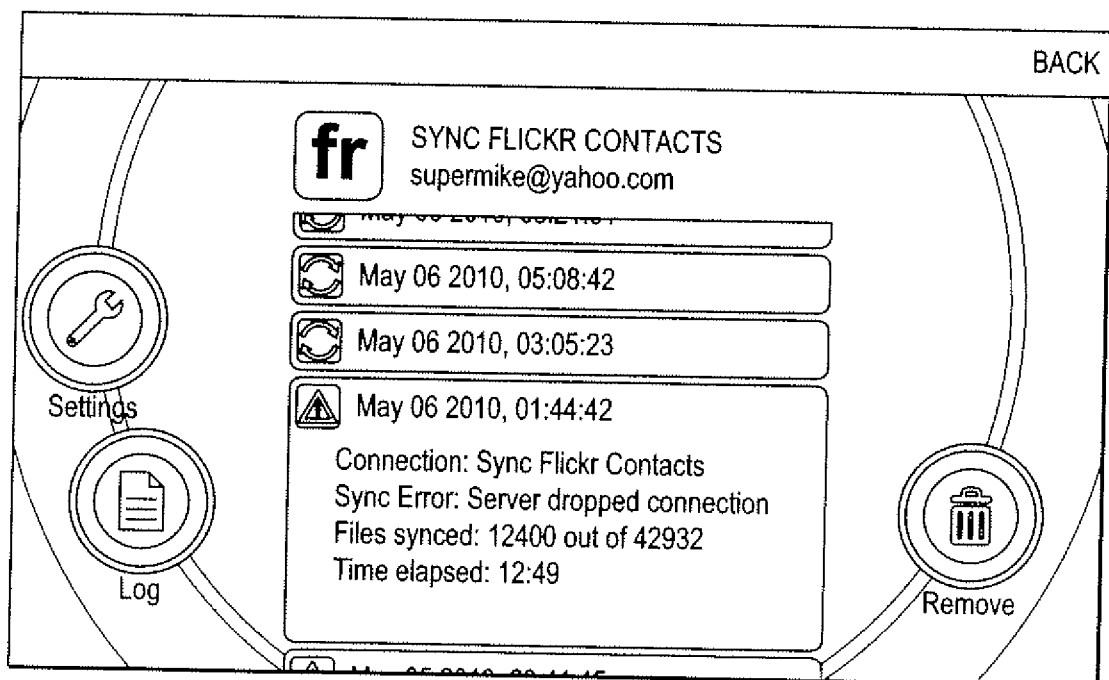


FIG. 8b

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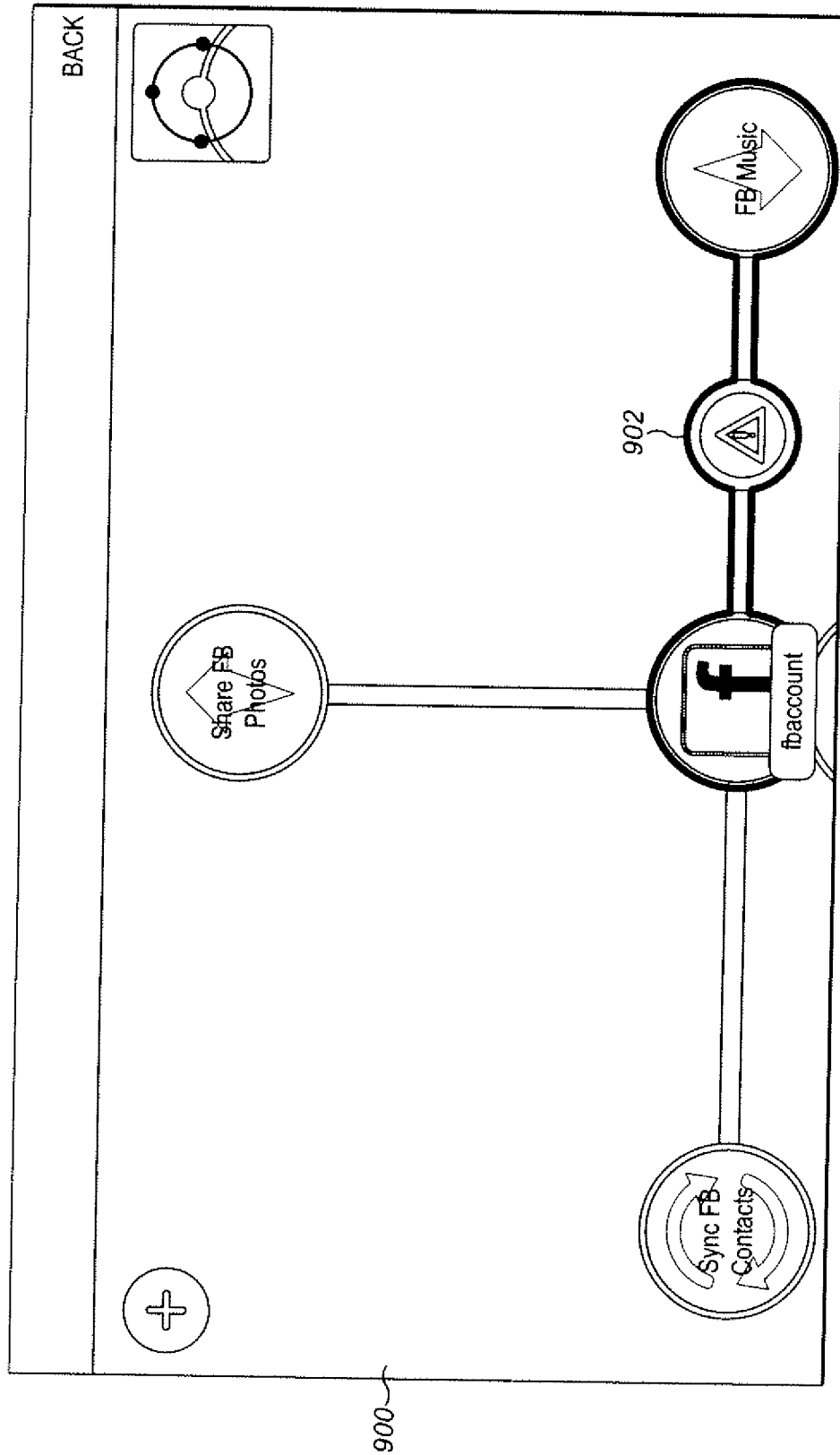


FIG. 9

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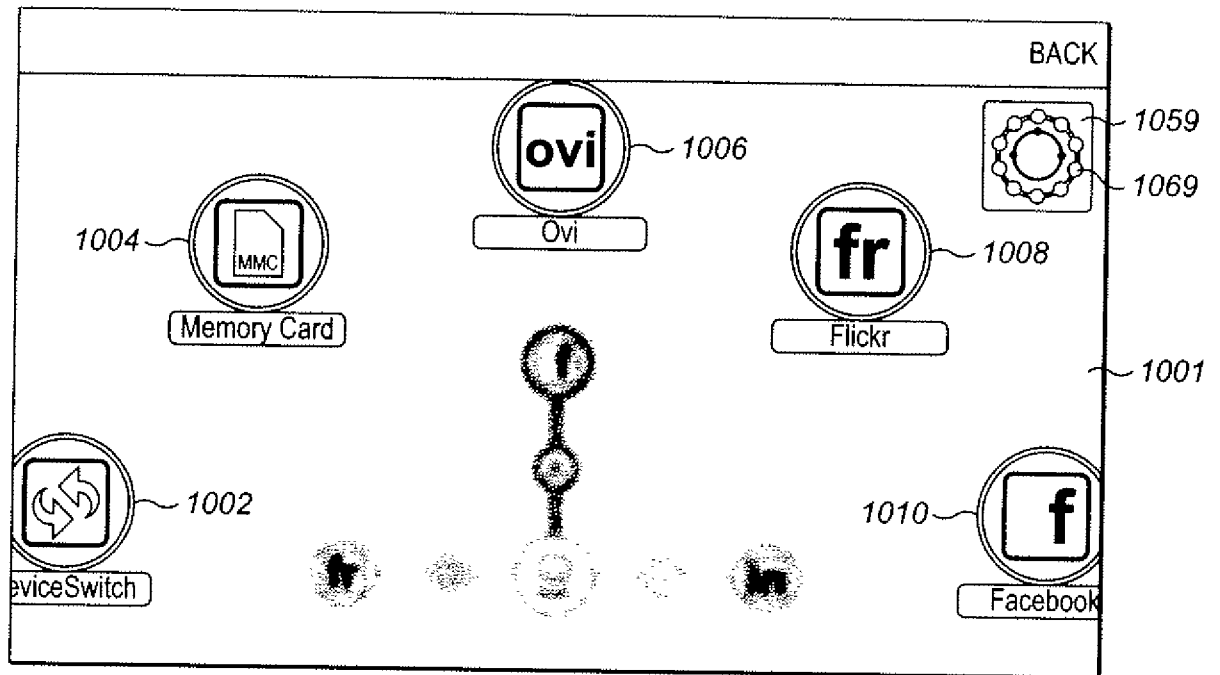


FIG. 10

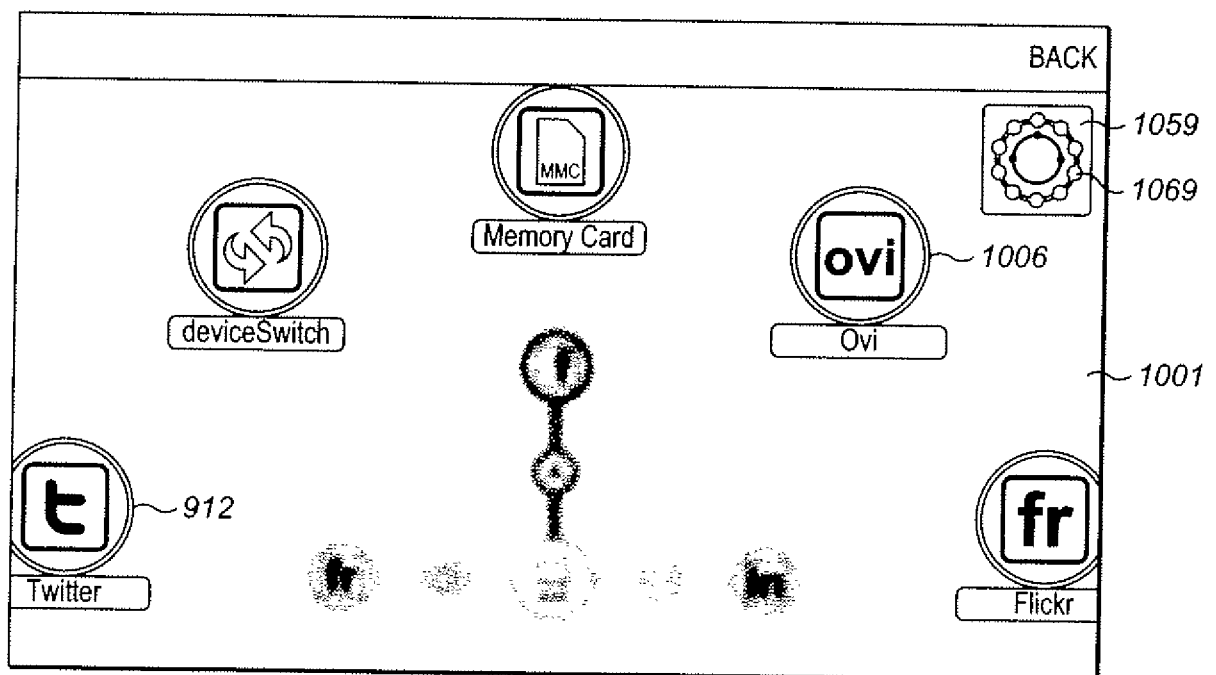


FIG. 11

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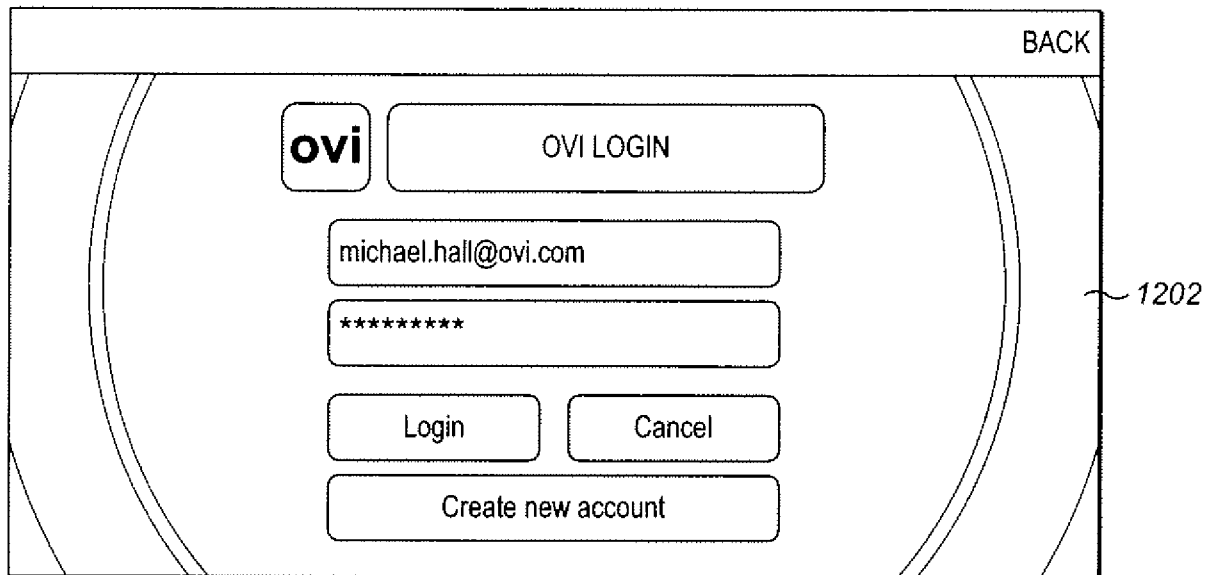


FIG. 12

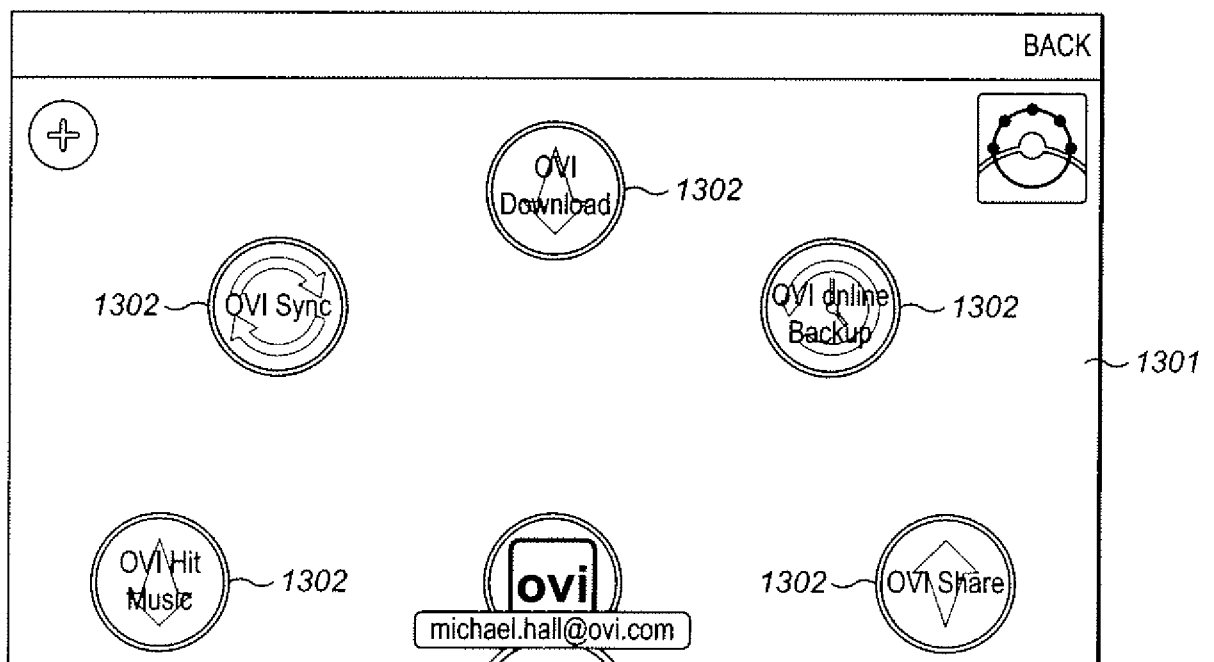


FIG. 13

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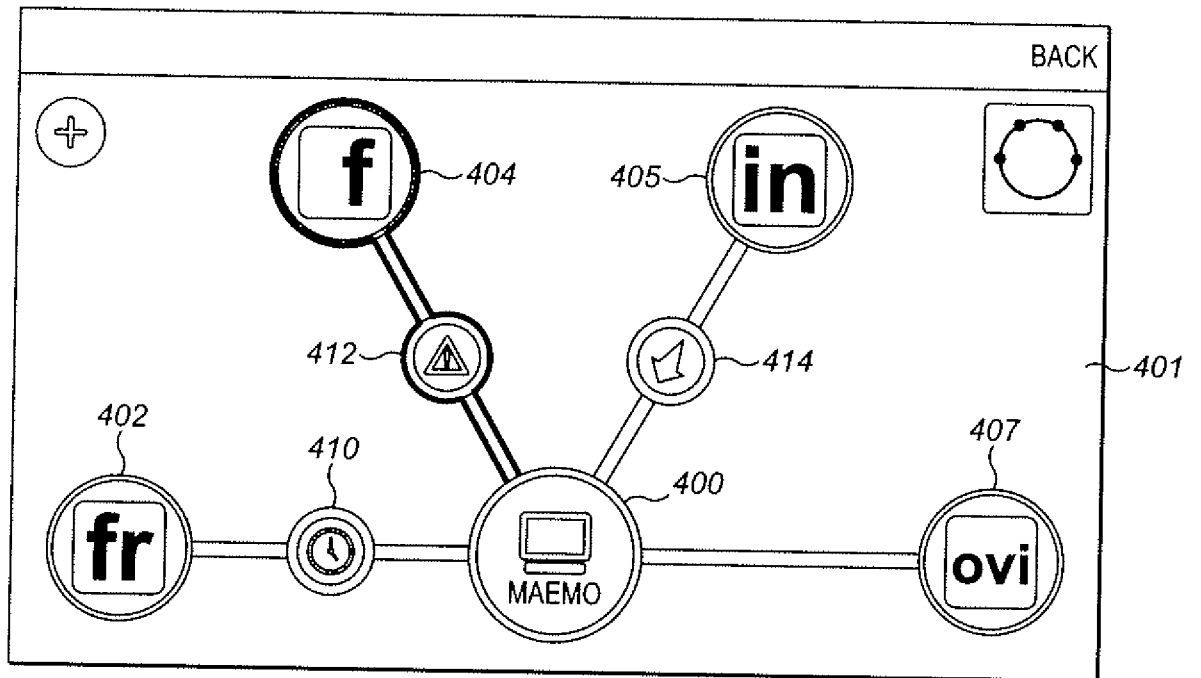


FIG. 14

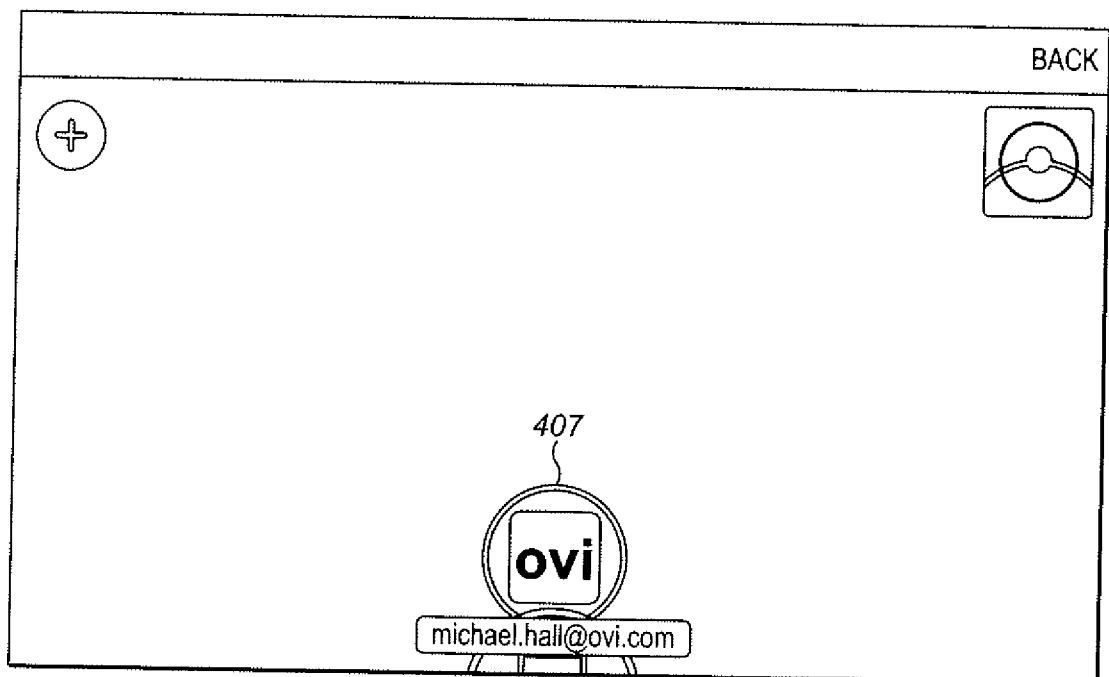


FIG. 15

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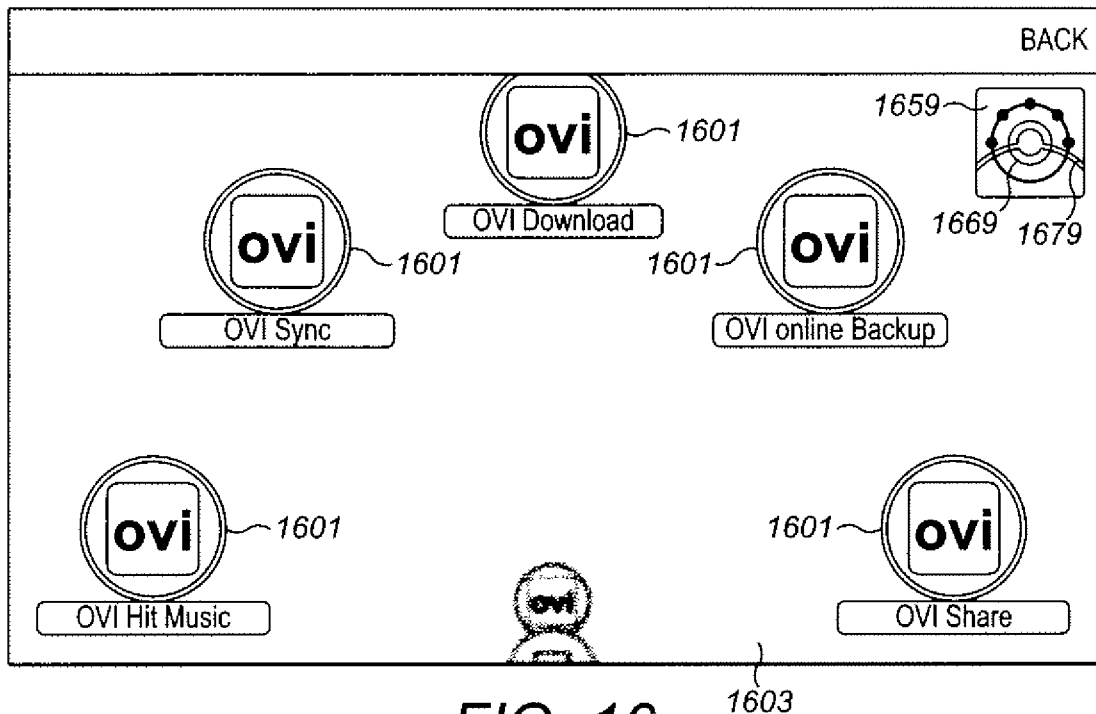


FIG. 16

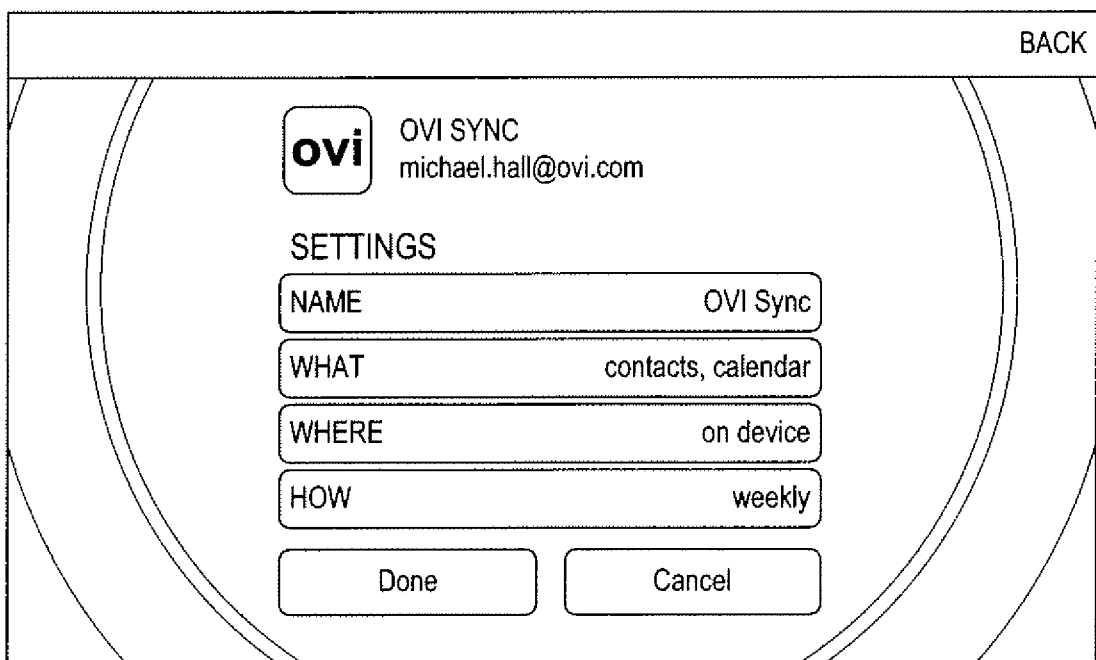


FIG. 17

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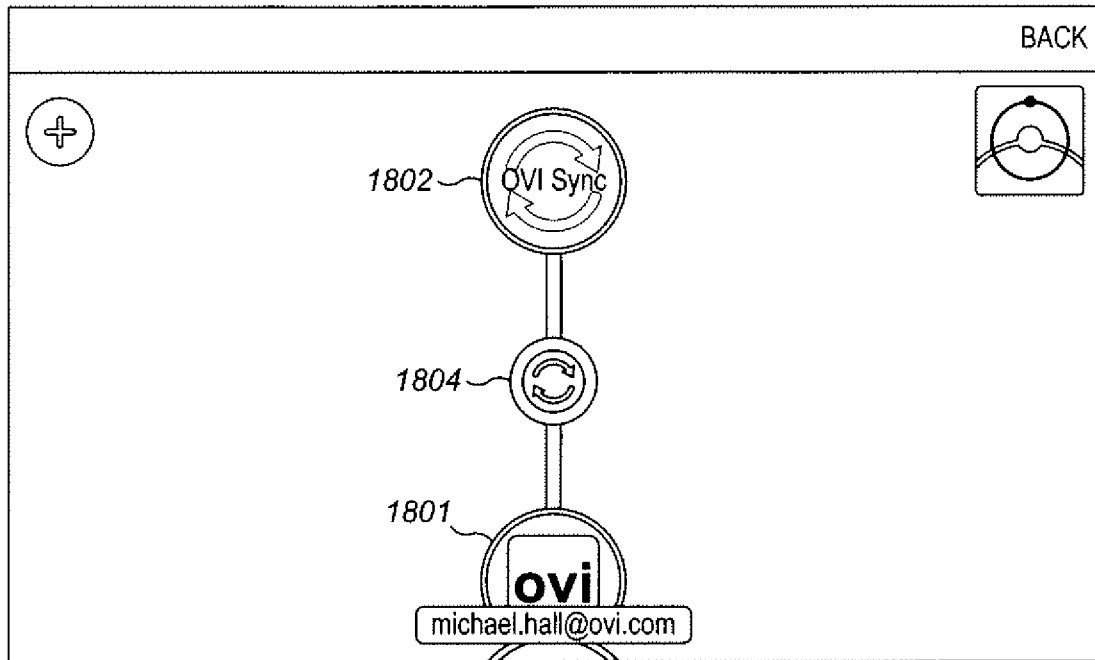


FIG. 18

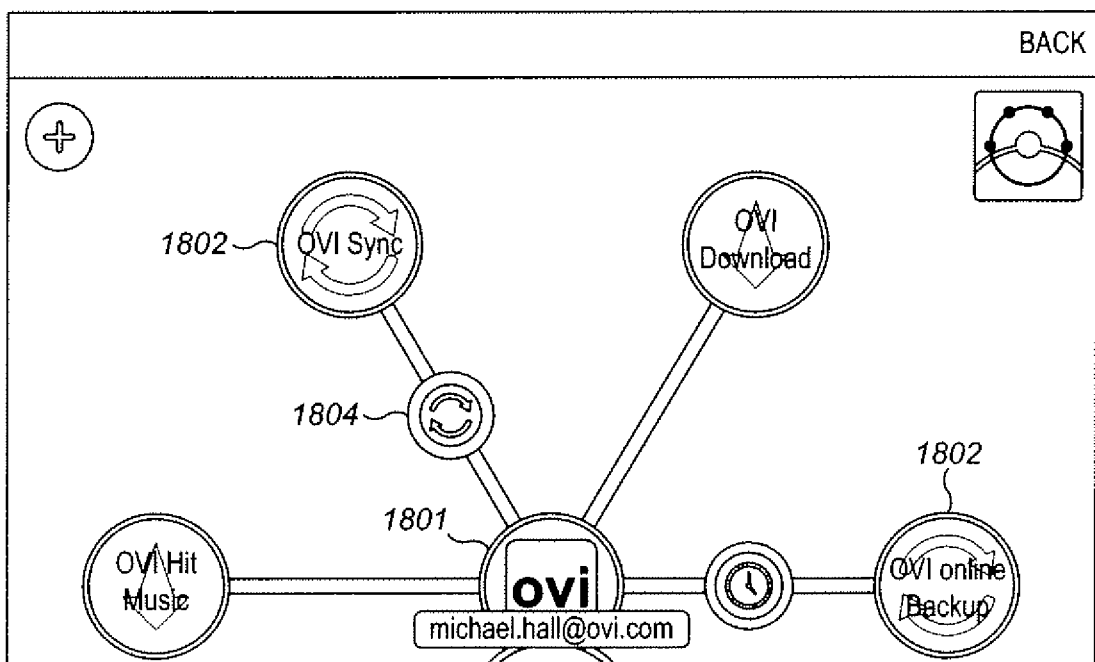


FIG. 19

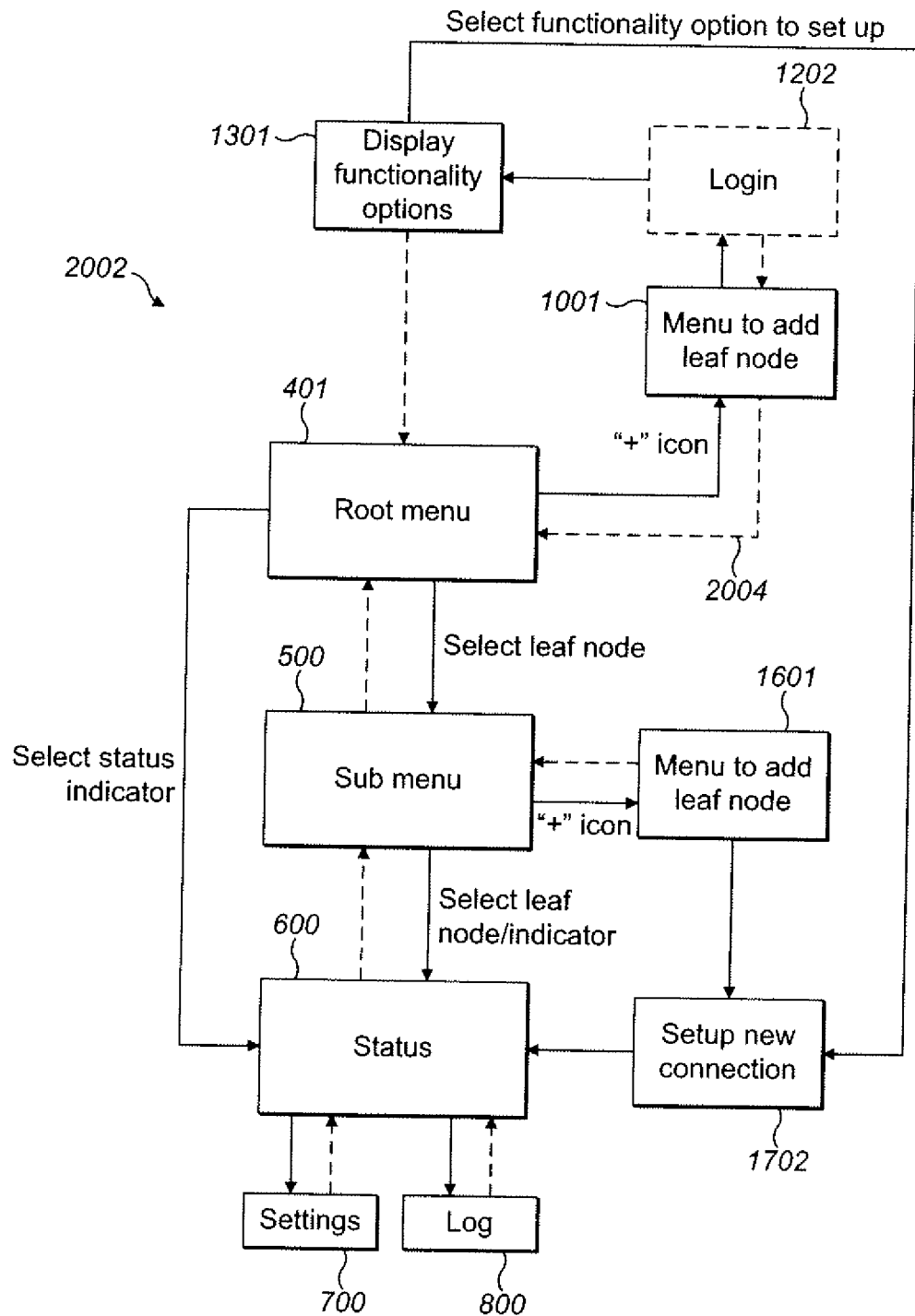


FIG. 20

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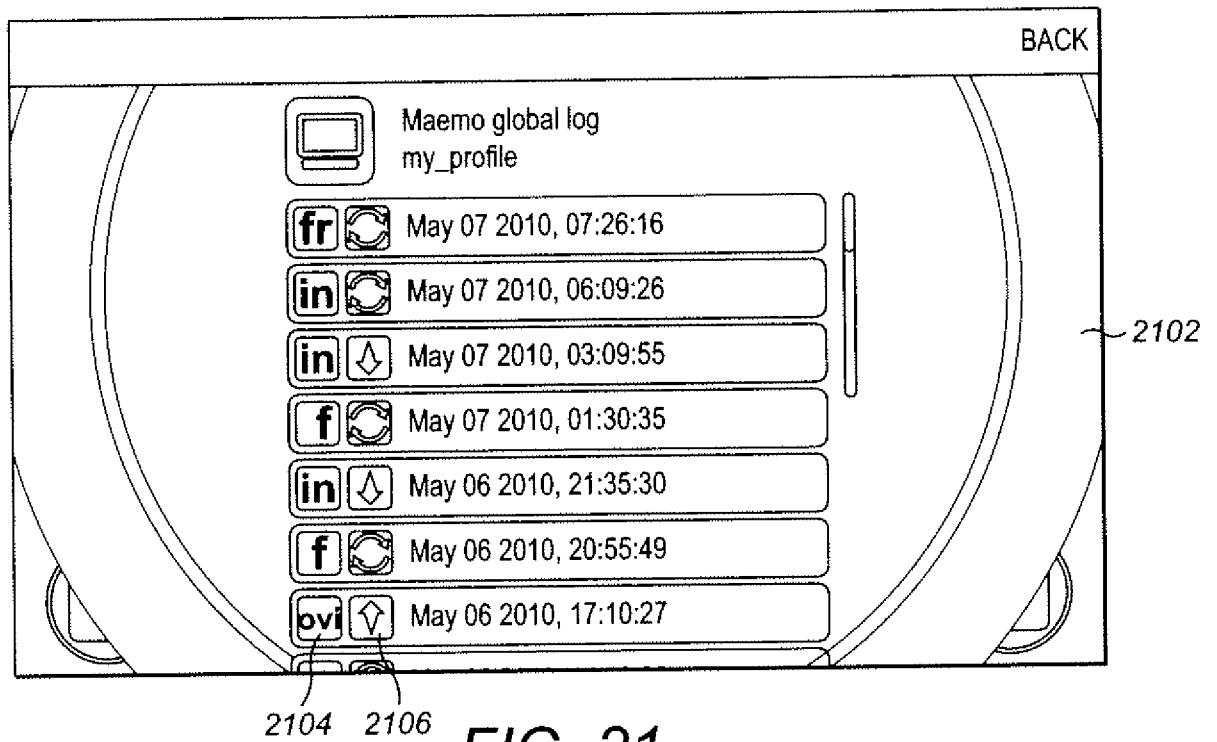


FIG. 21

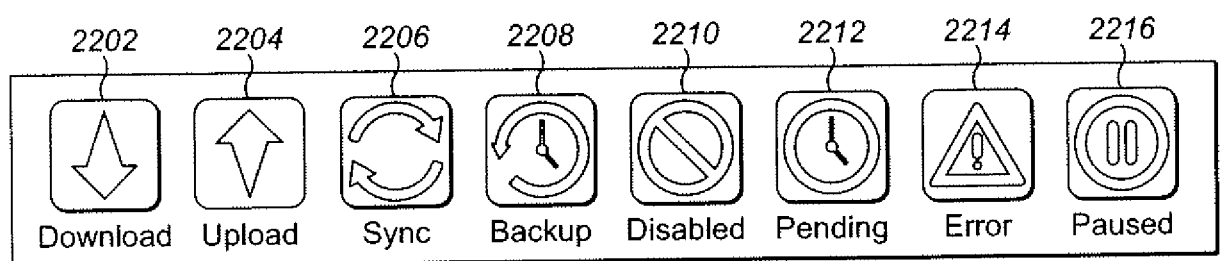


FIG. 22

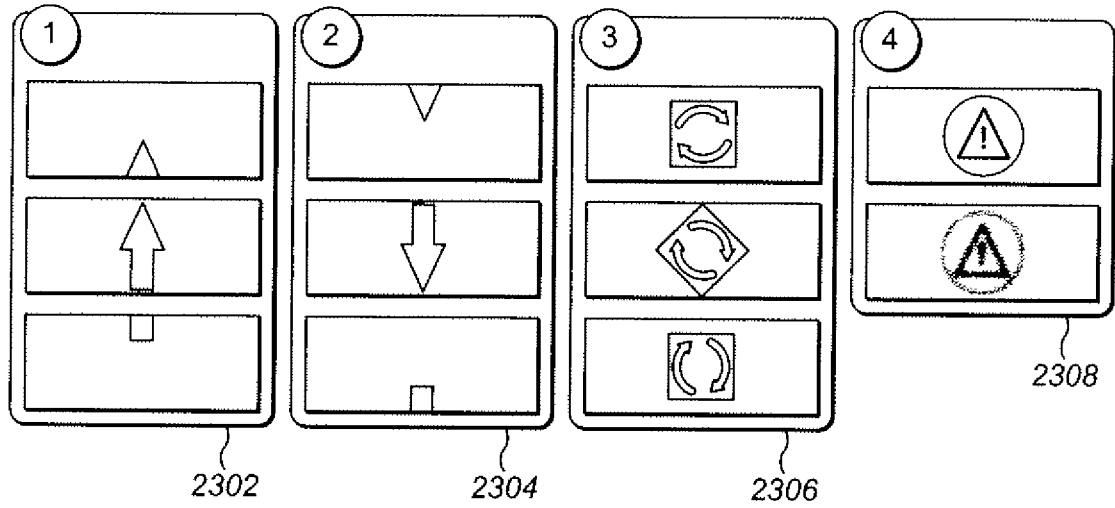


FIG. 23

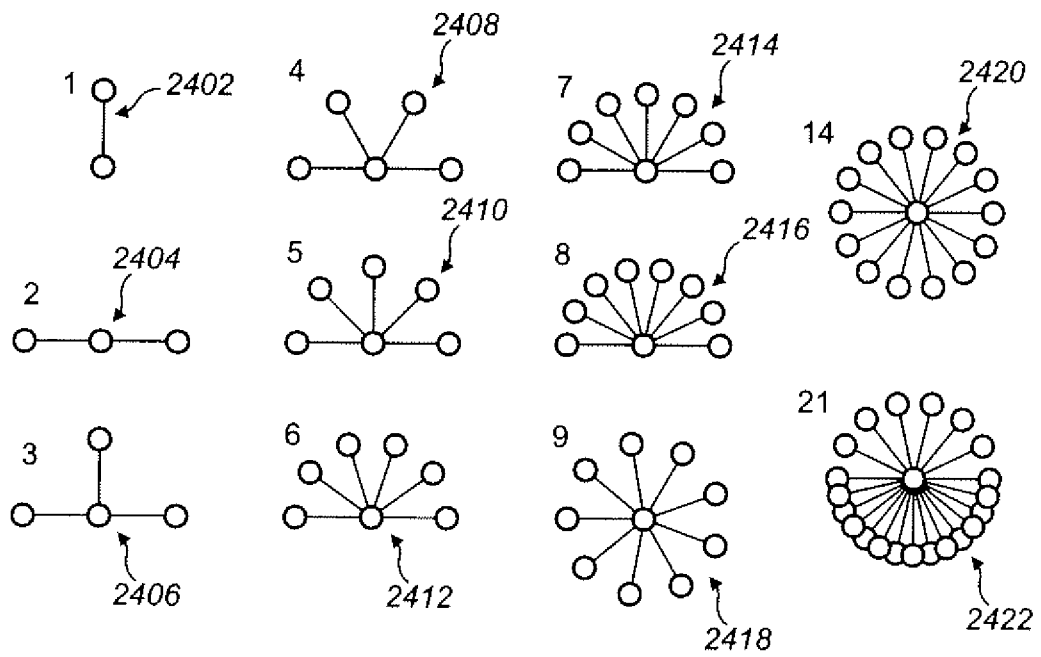


FIG. 24

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI201 1/050499

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: G06F, H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
FI, SE, NO, DK

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

EPO-Internal, WPI, INSPEC, IPCOM, IEEE Xplore, ELSEVIER, IETF, ETSI, COMPDX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003079028 A 1 (KORTUM, P. T. et al.) 24 April 2003 (24.04.2003) paragraphs [0049]-[0051], [0061], figure 1	1-5, 16-20
A	US 200931 9947 A 1 (WANG, X. et al.) 24 December 2009 (24.12.2009) abstract, paragraphs [0013]-[0015], figure 1	1-20
A	US 2009064055 A 1 (CHAUDHRI, I. A et al.) 05 March 2009 (05.03.2009) paragraph [0083]	1-20
A	US 201 005821 6 A 1 (YOON, S. Y. et al.) 04 March 2010 (04.03.2010)	1-20
A	WO 2006037545 A2 (NOKIA CORP et al.) 13 April 2006 (13.04.2006)	1-20
A	US 20041 55908 A 1 (WAGNER, A. M.) 12 August 2004 (12.08.2004)	1-20
A	US 200721 3041 A 1 (HORIE, H.) 13 September 2007 (13.09.2007)	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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

23 September 2011 (23.09.2011)

Date of mailing of the international search report

26 September 2011 (26.09.2011)

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Authorized officer

Seppo Ojala

Telephone No. +358 9 6939 500

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI201 1/050499

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
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US 200931 9947 A 1	24/1 2/2009	None	
US 2009064055 A 1	05/03/2009	DE 2020080 18005U U1 WO 2009032638 A2 EP 2203806 A2 CN 10 182 1707 A	10/03/201 1 12/03/2009 07/07/201 0 01/09/201 0
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International application No.
PCT/FI201 1/050499

Form PCT/ISA/210 (patent family annex) (My 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI201 1/050499

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.

G06F 3/048 (2006.01)

H04L 29/08 (2006.01)