

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
6 July 2006 (06.07.2006)

PCT

(10) International Publication Number
WO 2006/070236 A1

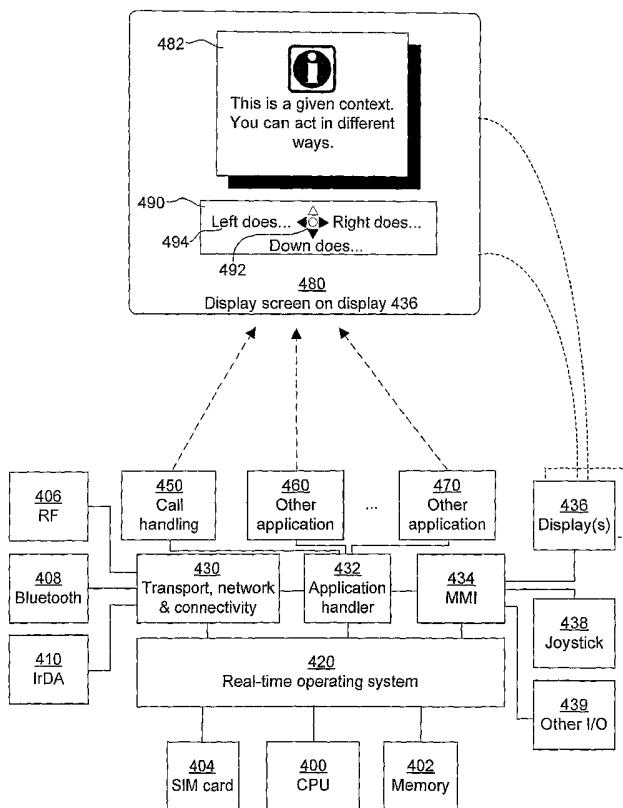
- (51) International Patent Classification:
H04M 1/725 (2006.01) G06F 3/033 (2006.01)
G06F 3/023 (2006.01)
- (21) International Application Number:
PCT/IB2005/003740
- (22) International Filing Date:
12 December 2005 (12.12.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
11/025,253 29 December 2004 (29.12.2004) US
- (71) Applicant (for all designated States except US): NOKIA CORPORATION [FI/FI]; Keilalahdentie 4, FIN-02150 ESPOO (FI).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): MÄKI, Nina [FI/FI]; Koivistontie 23 I 117, FIN-33820 Tampere (FI).

KOSKINEN, Sanna, M. [FI/FI]; Sukkavartaankatu 1 A 10, FIN-33100 Tampere (FI). LINDROOS, Sanna [FI/FI]; Vaajakatu 5 B 32, FIN-33720 Tampere (FI). JOKINEN, Päivi [FI/FI]; Kalevanpuistotie 19 C 122, FIN-33500 Tampere (FI). PUSA, Juha, M. [FI/FI]; Niemenmaantie 9-15 D 15, FIN-33960 Pirkkala (FI). KONKKA, Katja [FI/FI]; Kievarinkuja 5, FIN-33560 Tampere (FI).

- (74) Agent: AWAPATENT AB; Box 5117, S-200 71 Malmö (SE).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: A MOBILE TERMINAL, AND ASSOCIATED METHODS, WITH IMPROVED USER INTERFACE



(57) Abstract: A mobile terminal having a user interface formed by a controller (400), a display (436) and a multi-way input device (438) for navigating and selecting among information shown on said display is presented. The controller is adapted, in a current context among a plurality of possible contexts, to make different logical actions available for selection by a user through respective associated physical actions on said multi-way input device (438), and to present, for a logical action available in the current context, information (490) on said display (436) that serves to indicate (492) the physical action with which the logical action is associated as well as to explain (494) the logical action.

WO 2006/070236 A1



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

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report*

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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.

A MOBILE TERMINAL, AND ASSOCIATED METHODS, WITH IMPROVED
USER INTERFACE

Field of the Invention

The present invention relates to mobile telecommu-
nication and more particularly to improvements in the
user interface of a mobile terminal that has a multi-way
5 input device such as a joystick.

Background of the Invention

A mobile (cellular) telephone for a telecommu-
nications system like GSM, UMTS, D-AMPS or CDMA2000 is a
10 common example of a mobile terminal according to the
above. For many years, the conventional user interface of
mobile telephones were limited to a display, a keypad, a
speaker and a microphone. As regards the keypad, it
normally included an alpha-numeric or ITU-T type set of
15 keys (characters "0"- "9", "*", "#", and a few other keys
such as call handling keys for "Call"/"Yes" and
"Hangup"/"No". In such conventional mobile terminals,
essentially all non-acoustic user input was entered
through the keypad (except for certain specific control
20 operations that were done through dedicated buttons, such
and volume control buttons).

A keypad as described above has its limitations as
regards user-friendliness. In older days, when a mobile
terminal was used almost only for speech communication,
25 an ITU-T type keypad sufficed for most users, since the
required user interaction was essentially limited to the
dialing of telephone numbers and call handling for
generating outgoing calls and answering or rejecting
incoming calls. Modern terminals, on the other hand, are
30 used for many other purposes than merely speech communi-
cation; electronic messaging, recording of digital
pictures or video, listening to FM radio or MP3 music,
and electronic games being just a few examples of soft-

ware applications that are typically used in a contemporary mobile terminal. For such applications, an ITU-T type keypad is clearly insufficient if used as the only input device in the mobile terminal.

5 One popular way in the prior art to extend the usability of the user interface in a mobile terminal having an ITU-T type keypad has been to introduce soft keys into the user interface. Fig 6 gives a schematic illustration of a prior art mobile terminal having a user
10 interface which includes a display 600 and an ITU-T type keypad 640. The latter includes conventional alphanumeric hard keys 646 as well as left and right soft keys 642, 644. Here, to avoid any confusion, it is worth mentioning that a "soft key" is not soft in a physical
15 sense but in a logical; a soft key can and will be assigned different functions in different contexts, so that it may have one meaning in a certain situation in an active application, a completely different meaning in another situation in the same application, and yet other
20 meanings in other applications. The hard keys 646 are not harder than the soft keys in a physical sense but normally only has one meaning irrespective of application, e.g. the hard key labeled "1" represents the digit "1" both in call handling and a calendar application as well as in a
25 calculator application.

In the exemplifying situation given in Fig 6, a status area 610 at the uppermost part of the display 600 presents general information that is not associated with a particular application, such as date/time, battery
30 level and RSSI (Received Signal Strength Indicator). An incoming call is announced as a message 622 in a main presentation area 620. A lowermost area 630 of the display 600 shows respective text labels 632 and 634 which indicates the current function or meaning associated with soft keys 642 and 644, respectively. In another
35 situation than handling of an incoming call, the soft key labels 632 and 634 will be assigned other functions, and

consequently the text labels 632 and 634 will be updated to reflect this.

An ITU-T type keypad is not particularly advantageous for navigation and selection among information presented on the display. Since this is frequently required in the various applications available in a modern mobile terminal, it is known in the prior art to provide a mobile terminal with other kinds of input devices instead of or in addition to an ITU-T type keypad, such as a multi-way input device in the form of a joystick or 4-way/5-way navigation key. Such a multi-way input device is advantageous for two reasons: it is physically compact and therefore conforms well to modern demands for miniaturization, and it represents an intuitive and easily operated means for navigating and selecting among information presented on the mobile terminal's display. For instance, the Nokia® 7650 has, in addition to a retractable ITU-T keypad, a joystick placed between two soft keys. The joystick is used as a means for scrolling in lists and among user interface objects such as icons and menu items.

In recent years, some mobile terminal models have been introduced that have two displays. A primary, larger display is predominantly used for all user interaction in active operating modes, whereas a secondary, smaller display is used for certain indication of basic status information in idle mode. In some models, the primary display is a high-resolution color display, whereas the secondary display is an inexpensive monochrome display. This arrangement is typically used for a foldable or otherwise closable two-part mobile terminal having an open position where the primary display is available, and a closed position where only the secondary display is available. Hence, the primary display is used for all user interaction, including user input by way of an ITU-T keypad and/or a multi-way input device, whereas the secondary display is used for limited presentational

purposes but not for user input. The primary display is sometimes of touch-sensitive type, which may be operated by way of a pen or stylus in a PDA (Portable/Personal Digital Assistant) manner.

5

Summary of the Invention

In view of the above, an objective of the invention is to solve or at least reduce the problems discussed above. In more particular, the present invention seeks to provide improvements to the user interface of a mobile terminal having a multi-way input device by extending the utilization of the multi-way input device to functions and situations not hitherto associated with such a device. Thus, one object is to facilitate use of the multi-way input device as a control means also for other actions than traditional navigation in the user interface. Another object is to allow the secondary display of a mobile terminal, which also has a primary display, to be used for more than just certain indication of basic status information in idle mode.

10
15
20

Generally, the above objectives are achieved by the attached independent patent claims.

A first aspect of the invention is a mobile terminal having a user interface formed by a controller, a display and a multi-way input device for navigating and selecting among information shown on said display, said controller being adapted, in a current context among a plurality of possible contexts, to make different logical actions available for selection by a user through respective associated physical actions on said multi-way input device, and to present, for a logical action available in the current context, information on said display that serves to indicate the physical action with which the logical action is associated as well as to explain the logical action.

25
30
35

As used herein, "logical actions" may include any type of user interaction normally available in a graphi-

cal user interface for controlling and interacting with any executing software application, as well as invoking/-launching/activating such software applications.

The information presented about said available
5 logical action may include an informative text label. In addition or alternatively, the information presented about said available logical action may include an informative graphical symbol. Such an informative
10 graphical symbol may include an icon that represents a logical action selectable by actuation of the multi-way input device in a further direction or position, that represents selection on said display and that is different from a plurality of directions or positions which represent navigation in respective directions on
15 said display. When the multi-way input device is a joystick, said icon thus represents a logical action selectable by depression of a joystick handle or a joystick select button.

Advantageously, the controller is adapted, in one
20 and the same given context, to present first information to indicate a first physical action for selection of a first available logical action as well as second information to indicate a second physical action for selection of a second available logical action, wherein said first
25 information is presented with respect to said second information on said display in a spatial relationship that reflects a corresponding spatial relationship between the associated first and second physical actions on said multi-way input device. For a multi-way input
30 device such as a joystick or four-way/five-way navigation key which is actuatable in a plurality of directions or positions that represent navigation in respective directions on said display, such associated first and second physical actions may be actuations of the multi-
35 way input device in first and second ones of said directions or positions.

Alternatively, the first physical action associated with said first logical action may be a directional action applied on the joystick, whereas the second physical action associated with said second logical action may be an affirmative action applied on the joystick. In such a case, the first information may include at least one of a first graphical symbol and a first text label, and the second information may include a graphical symbol.

In one embodiment, where the multi-way input device is or includes a joystick, the controller is adapted to determine selection of an available logical action by detecting the associated physical action in the form of an actuation of the joystick in a particular one among a plurality of different joystick directions followed by an affirmative action applied on the joystick. The affirmative action may be a prolonged actuation of the joystick in said particular joystick direction for a predetermined time period, or it may be a depression of the joystick, or a joystick select button on the joystick, in a direction different from said particular joystick direction.

When the current context is the arrival of an incoming telephone call, the available logical action may involve selecting how the incoming telephone call is to be handled. When the current context is the occurrence of an event in an active software application, the available logical action may involve controlling a user interface object belonging to said active software application.

In one embodiment, the mobile terminal has an apparatus housing, a primary display adapted for use in an active operating mode and/or in an open apparatus housing configuration, and a secondary display adapted for use in an idle operating mode and/or in a closed apparatus housing configuration, wherein the controller is adapted to present said information that serves to

indicate said physical action and explain said logical action at least on said secondary display.

The mobile terminal may be a mobile phone adapted for use in a mobile telecommunications network in compliance with a mobile telecommunications standard such as GSM, UMTS, D-AMPS or CDMA2000.

The controller may be a CPU ("Central Processing Unit"), DSP ("Digital Signal Processor") or any other electronic programmable logic device or combination of devices. The display may be any commercially available type of display screen suitable for use in mobile terminals, including but not limited to a color TFT LCD display.

A second aspect of the invention is a method of operating a user interface of a mobile terminal having a display and a multi-way input device for navigating and selecting among information shown on said display, the mobile terminal being operable in a plurality of different contexts, the method comprising presenting, on said display, a graphical indication as representation of the multi-way input device if and only if the multi-way input device has a defined functionality in a current context.

A third aspect of the invention is a method of updating a user interface of a mobile terminal having a display and a multi-way input device for navigating and selecting among information shown on said display, the mobile terminal being operable in a plurality of different contexts, the method comprising the steps of:

providing predefined control data that defines functionality of the multi-way input device in different ones of said contexts;

detecting a current context;

determining, by reference to said predefined control data, whether the multi-way input device has a defined functionality in the current context; and

if the multi-way input device is determined to have a defined functionality in the current context, presenting on said display an indication adapted to alert a user of the mobile terminal about the availability of said defined functionality.

The presented indication may include a graphical symbol. Furthermore, the multi-way input device may be a joystick and the presented indication may represent one or more joystick actions associated with respective one or more logical actions included in said defined functionality. Thus, the presented indication may include a graphical icon that symbolizes a logical action selectable by way of an affirmative or selecting action applicable on the joystick.

Alternatively or additionally, the presented indication may include a text label that explains a logical action selectable by way of a directional action applicable on the joystick.

The method may comprise the further steps of deciding that the multi-way input device has no defined functionality in the current context but that it did have a defined functionality in a preceding context, and in response removing from said display an indication that was presented in said preceding context.

A fourth aspect of the invention is a mobile terminal having a user interface formed by a controller, a display and a multi-way input device for navigating and selecting among information shown on said display, the mobile terminal comprising a plurality of software applications executable by said controller,

said user interface having a first state, in which a graphical indication of said multi-way input device is presented on said display, and a second state, in which graphical indications for at least some of said plurality of software applications are presented on said display;

said controller being adapted, in said first state, to detect a first predefined actuation of said multi-way

input device, and in response switch to said second state;

said controller being adapted, in said second state, to provide for navigation and selection, by said multi-way input device, among the graphical indications presented for said at least some of said plurality of software applications, wherein a selection of one of said presented graphical indications activates an associated one of said at least some of said plurality of software applications.

As used herein, to "activate a software application" includes but is not limited to the following alternatives: launching an application under the control or supervision of the controller and/or the operating system in the mobile terminal; invoking an application by making a subroutine call from a current execution point such as a dedicated idle application, or an idle routine executed by the controller and/or the operating system, to the application to be activated; or activating the application by having the controller and/or the operating system transferring its state from a current background process status to a foreground process status.

In one embodiment, the mobile terminal has a primary display and a secondary display, the primary display being adapted for use in an active operating mode and/or in an open apparatus housing configuration, and the secondary display being adapted for use in an idle operating mode and/or in a closed apparatus housing configuration, wherein said first and second states of said user interface pertain to the secondary display and/or the idle operating mode.

In said second state, a graphical indication of said multi-way input device may be presented on said display in addition to said graphical indications presented for said at least some of said plurality of software applications. The graphical indications presented for said at least some of said plurality of software

applications may be arranged in a two-dimensional matrix or grid, wherein said graphical indication of said multi-way input device is positioned at the center of the matrix or grid.

5 The controller may be adapted, in said second state, to detect a second predefined actuation of said multi-way input device, and in response switch to said first state. Both said first and said second predefined actuation of said multi-way input device may be a select
10 operation.

The multi-way input device advantageously includes a joystick or a four-way/five-way navigation key. The mobile terminal may be a mobile phone adapted for use in a mobile telecommunications network.

15 A fifth aspect of the invention is a method of operating a user interface of a mobile terminal having a display and a multi-way input device for navigating and selecting among information shown on said display, the mobile terminal comprising a plurality of software
20 applications, the method involving the steps of:

presenting on said display a plurality of graphical indications, each indication representing a respective one of at least some of said plurality of software applications;

25 detecting a selection by said multi-way input device of one of said indications; and

activating an associated software application which is represented by the selected indication.

30 "Activating a [...] software application" has the same meaning as explained above for the fourth aspect.

Said plurality of graphical indications may be distributed to different and mutually remote positions on a display area of the display. Each of said plurality of graphical indications may be a small graphical arrow that
35 serves to indicate a respective navigation direction on said multi-way input device.

The method may involve the additional step of presenting a text label describing the associated software application adjacent to a respective one of said plurality of graphical indications. Said step of presenting a text label may be performed once the respective one of said plurality of graphical indications has been navigated to by said multi-way input device.

For a mobile terminal having a primary display and a secondary display, the steps of the method may be performed in an idle state of said mobile terminal, using said secondary display but not said primary display.

The multi-way input device may include a joystick or a four-way/five-way navigation key. In one embodiment, the multi-way input device and the display are part of a touch-sensitive display screen.

The mobile terminal may be a mobile phone adapted for use in a mobile telecommunications network.

Other objectives, features and advantages of the present invention will appear from the following detailed disclosure, from the attached dependent claims as well as from the drawings.

Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

Brief Description of the Drawings

Embodiments of the present invention will now be described in more detail, reference being made to the enclosed drawings, in which:

Fig 1 is a schematic illustration of a telecommunication system, including a mobile terminal, a mobile telecommunications network and a couple of other devices, as an example of an environment in which the present invention may be applied.

Fig 2a is a schematic front view illustrating a mobile terminal according to a first embodiment, and in particular some external components that are part of a user interface towards a user of the mobile terminal.

Fig 2b is a schematic front view illustrating a mobile terminal according to a second embodiment.

Figs 3a and 3b are schematic perspective views illustrating a mobile terminal according to a third embodiment.

Figs 3c and 3d are schematic perspective views illustrating a mobile terminal according to a fourth embodiment.

Fig 4 is a schematic block diagram representing the internal component and software structure of a mobile terminal, which may be any one of the embodiments shown in Figs 2a-2b, 3a-3b or 3c-3d.

Fig 5 is a flowchart diagram that illustrates the operation of one embodiment to indicate the availability of certain joystick functionality in a given context, to detect selection of the functionality by actuation of the joystick, and to perform the functionality.

Fig 6 is a schematic illustration of the user interface of a mobile terminal of the prior art in the context of handling an incoming call, the user interface including an ITU-T type keypad with soft keys for which text labels are presented on the display.

Fig 7 is a schematic illustration of the user interface of a mobile terminal according to one embodiment in the same context as in Fig 6, the user interface including a joystick, different logical actions for call handling being associated with different physical actions on the joystick, and information being presented on the

display to indicate the availability of each of these logical actions.

Fig 7a is an enlarged schematic view of the information presented on the display in Fig 7 to indicate the availability of the logical actions through associated physical actions on the joystick.

Figs 7b-7d are different schematic display snapshots, from different contexts, which give further examples of how information may be presented on the display to indicate the availability of logical actions through associated physical actions on the joystick.

Fig 7e is an enlarged schematic view of the information presented on the display in Fig 7d,

Fig 7f is an enlarged schematic view of information that alternatively may be presented for the same context as in Fig 7e.

Figs 8a-c illustrate an embodiment which supports easy software application invocation/launch/activation by way of a multi-input device starting from an idle screen of a mobile terminal.

Figs 9a-b illustrate another embodiment which supports easy software application invocation/launch/activation by way of a multi-input device starting from an idle screen of a mobile terminal.

Detailed Description of the Invention

Fig 1 illustrates one example of a telecommunications system in which the invention may be applied. In the telecommunication system of Fig 1, various telecommunications services such as voice calls, data calls, facsimile transmissions, music transmissions, still image transmissions, video transmissions, electronic message transmissions and electronic commerce may be performed between a mobile terminal 100 according to the present invention and other devices, such as another mobile terminal 106, a PDA 112, a WWW server 122 and a stationary telephone 132. It is to be noticed that for

different embodiments of the mobile terminal 100, different ones of the telecommunications services referred to above may or may not be available; the invention is not limited to any particular set of
5 services in this respect.

The mobile terminals 100, 106 are connected to a mobile telecommunications network 110 through RF links 102, 108 via base stations 104, 109. The mobile telecommunications network 110 may be in compliance with any
10 commercially available mobile telecommunications standard, such as GSM, UMTS, D-AMPS or CDMA2000.

The mobile telecommunications network 110 is operatively connected to a wide area network 120, which may be Internet or a part thereof. Various client computers and
15 server computers, including WWW server 122, may be connected to the wide area network 120.

A public switched telephone network (PSTN) 130 is connected to the mobile telecommunications network 110 in a familiar manner. Various telephone terminals, including
20 stationary telephone 132, are connected to the PSTN 130.

A first embodiment 200 of the mobile terminal 100 is illustrated in slightly more detail in Fig 2a. As is well known in the art, the mobile terminal 200 comprises an apparatus housing 201, a loudspeaker 202, a display
25 203, a set of keys 204 which may include a keypad of common ITU-T type (alpha-numerical keypad), and a microphone 205. In addition, but not shown in Fig 2a, the mobile terminal 200 comprises various internal components, the more important of which are illustrated in Fig
30 4 and will be described later. External components 202-205 are all part of the user interface of the mobile terminal.

Furthermore, the user interface involves a multi-way input device 210 in the form of a joystick, the
35 handle of which may be actuated by the user in a plurality of directions 212/214 so as to command navigating operations, i.e. to navigate in corresponding directions

among information 206 shown on display 203, in a manner which is conventional per se for joystick-equipped mobile terminals. The navigation directions may be 4 in number, as indicated by solid arrows 212 in Fig 2a, and may be distributed orthogonally in an "up, down, left, right" or "north, south, west, east" fashion with respect to a base plane which is essentially coincidental or parallel with the display 203 or the front surface of apparatus housing 201. Alternatively, the navigation directions may be 8 in number, as indicated by dashed lines 214 together with solid arrows 212 in Fig 2a, and may be distributed around a virtual circle in aforesaid base plane with successive 45° displacements, representing corresponding actuations of the joystick handle by the user.

The user may also perform a selecting operation among information 206 by actuating the joystick 210 in a direction perpendicular to the base plane, e.g. by depressing the joystick at its top. Depending on implementation, this will either cause displacement of the entire joystick handle, or will cause depression of a joystick select button. In some embodiments such a joystick select button may be located at the top of the joystick handle; in others it may be mounted next to the joystick handle on the base plane.

In accordance with the invention, broader usage of the multi-way input device than in the prior art is made possible by linking or associating, in a given context, physical actions on the multi-way input device (e.g. joystick actuations in the various navigation and selection directions) with logical actions in the user interface (e.g. call handling operations, or issuing commands and performing confirmations in software applications, etc). To the benefit of the user, the availability and meaning of such logical actions, selectable through associated physical actions on the multi-way input device, are indicated to the user on the mobile terminal display. An example of this is found in Fig 4,

which moreover illustrates the mobile terminal's internal component and software structure.

In Fig 4, the availability and meaning of logical actions selectable through associated physical actions on a joystick 438 are indicated to the user by presenting information 490 on the display screen 480 of a display 436. The presented information 490 is dependent on context (situation), as represented by an information alert 482 on the display, and comprises explanatory text labels 494 which are shown grouped together in a spatial relationship on the display that reflects the corresponding spatial relationship between the associated physical actions on the joystick 438. For instance, the three logical actions that are associated with left, right and downward joystick actuation, respectively, may be indicated as three text labels shown to the left of, right of and below a joystick icon 492 on the display. More examples and a deeper description of this inventive aspect will be given later with reference to the remaining drawings.

Referring now to Fig 2b, a second embodiment 200' of the mobile terminal 100 is illustrated. In this embodiment, the multi-way input device is implemented as a 5-way navigation key 210' which is can be actuated (depressed) at different circumferential positions 212', that represent different navigation directions 212', so as to generate navigating operations in similarity with the description above for the embodiment of Fig 2a. Furthermore, a selecting operation may be commanded by depressing the 5-way key 210' at its center 214'. The other components 201'-205' are preferably identical with or equivalent to components 201-205 of Fig 2a.

Figs 3a and 3b illustrate a third embodiment 300 of the mobile terminal 100. In contrast to the embodiments described above, this embodiment is foldable; the apparatus housing 301 is divided into two parts 301a and 301b which are pivotally interconnected at a hinge 301c. This

arrangement allows use of the mobile terminal 300 in two different physical modes, an open mode as shown in Fig 3a and a closed mode as shown in Fig 3b, by turning the housing parts 301a-b to and from each other, as indicated
5 by rotational arrow 301d.

The open mode, Fig 3a, offers maximum usability to the user, since all major user interface components are conveniently accessible: a large display 303 located on the inside of one housing part 301b, and a speaker 302, a
10 set of keys 304 and a microphone 305 located on the inside of the other housing part 301a. In addition, a multi-way input device 310, here in the form of a joystick, is available at one side of housing part 301a and provides the user with an ability to command navigating
15 and selecting operations, just like in the previously described embodiments. The open mode is advantageously used in a variety of contexts, including conventional call handling as well as various software applications.

The closed mode, on the other hand, represents a
20 compact physical shape which is particularly advantageous for idle periods, for instance when the terminal 300 is stored in a pocket, bag, etc. In the closed mode, as seen in Fig 3b, the large display 303 and set of keys 304 (seen in Fig 3a) are protected from external influences
25 and are also inaccessible to the user. However, a secondary, smaller display 313 is provided on the opposite side of housing part 301b, compared to the large primary display 303, and is therefore accessible for the user in the closed mode. The secondary display 313 may be
30 used for presentation of idle or status information, such as date/time, battery level, RSSI, etc. In addition, thanks to the provision of the multi-way input device 310, which is accessible to the user also in the closed mode, some user interaction is possible even in the
35 closed mode. Such user interaction may for instance include handling of incoming calls; by presenting a number of logical actions like "Answer", "Reject" and

"Silence" in a certain spatial relationship on secondary display 313 and mapping these to corresponding physical actions on the multi-way input device 310, the user may conveniently handle the incoming call without unfolding the terminal 300 in order to access the conventional call handling keys among the set of keys 304. Again, more examples and a deeper description of this inventive aspect will be given later with reference to the remaining drawings.

10 A fourth embodiment 300' of the mobile terminal 100 is illustrated in Figs 3c and 3d. The fourth embodiment 300' resembles the third embodiment 300 of Figs 3a and 3b, except for the location of the multi-way input device 310'. The multi-way input device 310', implemented here
15 as a joystick, is located on the inside of housing part 301a', between speaker 302' and set of keys 304'. Consequently, the multi-way input device 310' is accessible in the open mode but inaccessible in the closed mode. Nevertheless, the fourth embodiment may be adapted for
20 some user interaction also in the closed mode, Fig 3d, by way of the secondary display 313' and an external input device 340, which is provided on an accessory 330. As seen in Fig 3d, a wireless handsfree unit 330 is connected to the mobile terminal 300' over a short-range
25 wireless link 320. The link 320 is preferably established and maintained in accordance with any existing communication standard or protocol for short-range wireless data communication, including but not limited to any one of BluetoothTM, WLAN, HomeRF and IrDA. The handsfree unit 330
30 is provided with a joystick 340 or another multi-way input device, and by actuating the joystick 340 in a desired direction 342, the user 350 may select and perform a logical action as presented on the secondary display 313'.

35 In an alternative to the embodiments disclosed above, the mobile terminal itself has no multi-way input device; such device is only provided on an accessory,

like the joystick 340 on accessory 330 in Fig 3d. In another alternative, the availability of some other input means than a multi-way input device or a set of hard keys is indicated in the same or analogous way as has been described above, e.g. by presenting an explanatory text label for each logical action available through an associated physical action on such other input means. Voice activated control (VAC) is one example of such other input means for which the inventive approach may be applied.

The internal component and software structure of a mobile terminal according to one embodiment, which may be any of the afore-mentioned embodiments, will now be described with reference to Fig 4. The mobile terminal has a controller 400 which is responsible for the overall operation of the mobile terminal and is preferably implemented by any commercially available CPU ("Central Processing Unit"), DSP ("Digital Signal Processor") or any other electronic programmable logic device. The controller 400 has associated electronic memory 402 such as RAM memory, ROM memory, EEPROM memory, flash memory, or any combination thereof. The memory 402 is used for various purposes by the controller 400, one of them being for storing data and program instructions for various software in the mobile terminal. The software includes a real-time operating system 420, man-machine interface (MMI) drivers 434, an application handler 432 as well as various applications. The applications include a call handling application 450 as well as various other applications, such as a contacts (phonebook) application, a messaging application, a calendar application, a control panel application, a camera application, a media-player, one or more video games, a notepad application, etc.

The MMI drivers 434 cooperate with the or each display 436, the joystick 438 as well as various other I/O devices such as a microphone, a speaker, a vibrator,

a keypad, a ringtone generator, an LED indicator, volume controls, etc. As is commonly known, a user may operate the mobile terminal through the man-machine interface thus formed.

5 The software also includes various modules, protocol stacks, drivers, etc., which are commonly designated as 430 and which provide communication services (such as transport, network and connectivity) for an RF interface 406, and optionally a Bluetooth interface 408 and/or an
10 IrDA interface 410. The RF interface 406 comprises an internal or external antenna as well as appropriate radio circuitry for establishing and maintaining a wireless link to a base station (e.g. the link 102 and base
15 station 104 in Fig 1). As is well known to a man skilled in the art, the radio circuitry comprises a series of analog and digital electronic components, together forming a radio receiver and transmitter. These components include, i.a., band pass filters, amplifiers, mixers, local oscillators, low pass filters, AD/DA con-
20 verters, etc.

The mobile terminal also has a SIM card 404 and an associated reader. As is commonly known, the SIM card 404 comprises a processor as well as local work and data memory.

25 The call handling application 450 handles all contexts in conventional voice call handling, e.g. receiving, announcing or rejecting incoming calls, and generating outgoing calls. The call handling application 450 may also keep record of various call statistics.

30 Fig 5 is a flowchart diagram that illustrates the operation of one embodiment to indicate the availability of certain joystick functionality in a given context, to detect selection of the functionality by actuation of the joystick, and to perform the functionality. The steps of
35 the method shown in Fig 5 will be explained below with reference to one exemplifying context, which is shown in

Fig 7 and which pertains to the handling of an incoming telephone call.

Thus, referring briefly to Fig 7 before turning to Fig 5, it is seen that a status area 710 is provided at the uppermost part of the display 700. The status area 710 presents general information that is not associated with a particular application, such as date/time, battery level and RSSI. An incoming call is announced as a pop-up message 722 in a main presentation area 720. This far, the display screen of Fig 7 resembles the one according to the prior art shown in afore-described Fig 6. In contrast to the prior art, however, available logical actions for call handling are not shown in a lowermost area of the display as text labels associated with soft keys (cf. reference numerals 630, 632, 634, 642 and 644 in Fig 6). Instead, the logical actions available are shown as information 740 next to the call announcement message 722. In more particular, as seen also in Fig 7a, this information 740 includes explanatory text labels 742_L, 742_R, 742_D which describe the logical actions "Answer", "Reject" and "Silence" that are available for handling the incoming call through associated physical actions 752_L, 752_R, 752_D on the joystick 750. The text labels 742_L, 742_R, 742_D are grouped together in a spatial relationship on the display 700 that reflects the corresponding spatial relationship between the associated physical actions on the joystick 750; therefore the user is given the information that the call may be answered, rejected and silenced, respectively, by actuating the joystick 750 to the left, right and downwards, respectively.

Thus, with reference again to Fig 5 as well as to Fig 4, for a given context 500, which may be the call handling situation shown in Fig 7, the following steps are performed. In step 502, it is checked through CPU 400, real-time operating system 420, application handler 423 and MMI drivers 434 whether the joystick 438 has a

defined functionality in the current context, e.g. the call handling application 450. As is appreciated by those skilled in the art, such defined functionality may be embodied as predefined control data in the form of pieces of software code, i.e. program instructions and related control data, that are stored in memory 402 and are executable by CPU 400. If it is found in step 502 that the joystick has no defined functionality in the current context, the procedure is terminated in step 503. Otherwise, in step 504, for the logical action(s) included in the defined functionality (e.g. the answering, rejection and silencing of an incoming call), information is presented on the display to indicate the associated physical action(s), and their spatial relationship if applicable, as well as to explain the logical action(s) (e.g. by way of the text labels "Answer" (742_L), "Reject" (742_R) and "Silence" (742_D) of Fig 7a).

In step 506, physical actuation of the joystick 438 is detected by the MMI drivers 434 (e.g. an actuation of the joystick to the left (744_L)). Step 508 determines the logical action (e.g. call answering) with which the detected physical action is associated. The logical action is performed in step 510. As used herein, performing a logical action relates to execution of a software function in the mobile terminal (e.g. invocation of a call answering subroutine in call handling application 450) upon selection by the joystick. In turn, performing this logical action will of course trigger performance of one or more other actions, in software as well as hardware (e.g. actions performed in modules 430 and 432, RF module 406 and in the mobile telecommunications network 110 to actually set up a call connection between the mobile terminal and the remote caller).

The information 740 shown to indicate available joystick functionality preferably includes a symbolic graphic representation of the joystick, such as a small arrow 744_L (etc), indicating each direction 752_L (etc) in

which the joystick 750 may be actuated to cause selection of a respective logical action described by an adjacent text label 742_L (etc). The information 740 may also include a center circle 744_C to represent "joystick-select", i.e. a displacement of the joystick handle or depression of the joystick select button depending on implementation.

As seen in Fig 7a, a joystick direction that has a defined functionality (i.e., is associated with a logical action) in the current context may be shown as a solid arrow, whereas a joystick direction that has no defined functionality in the current context may be omitted from presentation (such as joystick-up in Fig 7a). Alternatively, as seen in Fig 7b, directional arrows may be shown for all four joystick directions, whereas an "available" direction (joystick-left) is shown as a solid arrow (744_L) and the "non-available" directions (joystick-right, joystick-up, joystick-down) are shown as empty arrows. As a further alternative, solid directional arrows may be shown for all joystick directions, even the currently non-available ones. In such an alternative, the available joystick directions will be indicated by the presence of their adjacent explanatory text labels; no explanatory text labels will be shown for non-available joystick directions.

When there are more than one available joystick direction, as is the case in Fig 7a, the preferred or default logical action among these may be highlighted. Highlighting is achieved in Fig 7a by presenting the explanatory text label 742_L for the preferred or default logical action within a double-lined frame, whereas the other text labels have a single-lined frame. The user may select this highlighted option by simply performing a "joystick-select" 744_C (e.g. pressing a joystick select button) or by pushing the joystick handle to the left and maintaining it in this direction 744_L for a predetermined time ("joystick-long"). The latter case may be viewed

upon as the joystick equivalent of a conventional "long press" on a hard key in a keypad (such as long-pressing "1" to reach the voicemail box). Such highlighting of preferred or default logical action is advantageous not only in that it provides guidance to a novice user as regards the most common or safe action in a given context; it moreover minimizes the physical activity required for selecting and performing a certain logical action. If in a given context the user does not want the highlighted action to be performed, he may select any one of the other options available by moving the joystick handle in the desired direction and then either doing a "joystick select" 744_c or a "joystick-long".

It is possible to assign a logical action to the joystick select position 744_c, rather than merely serving to select logical actions represented by the joystick directions 744_L, 744_R, 744_U, 744_D. In Fig 7b, the joystick select position 744_c is given a iconized appearance, rather than a simple empty circle, and represents an Options action. Thus, upon "joystick-select", instead of executing the Close action 742_L, options available for further handling of the current context (as described by the information message 722) will be presented on the display 700. For instance, if the information message 722 alerts about an upcoming shortage of battery charge, the Options action may present and propose different ways in which the user may configure his mobile terminal to better preserve electric power in the future. If the information message 722 announces that the mobile terminal has just reached the mobile telecommunications network of a foreign network operator (e.g. when passing a border between two countries), the Options action may present a list of selectable alternatives such as searching for other and perhaps more familiar operators or presenting detailed information about the new operator. Of course, these are just two among virtually

unlimited numbers of Options actions in different contexts.

Fig 7c presents an exemplifying context in a Camera application 460-470. Here, the main presentation area 720 contains a flash settings window 722 with a list of selectable radio buttons. The information 740 about available joystick functionality includes solid arrows for all four joystick directions. However, explanatory text labels are shown for only two of these; "OK" for joystick-left and "Cancel" for joystick-right. No text labels are shown for the available joystick-up and joystick-down, since their meaning will be intuitive anyway given the current context: they are used for scrolling up and down in the list of radio buttons in flash settings window 722. Selecting one of the radio buttons may be done automatically once that radio button is scrolled to by joystick-up/joystick-down, or it may be done by a joystick-select (actuation of the joystick center position).

Another exemplifying context is presented in Fig 7d. Here, a Mediaplayer application 460-470 is active. The main presentation area 720 contains a list 722 of music tunes on an available storage medium, and the currently playing tune 724 is shown surrounded by a frame. The lowermost area 730 of the display 700 contains local status information for the Mediaplayer application (in contrast to the status indication area 710 at the top which shows global status information). The local status information in area 730 includes a play time indicator 746 and a volume setting indicator 748. Moreover, the area 730 includes information 740 about available joystick functionality in the visual form of an iconized representation of a joystick. As seen more clearly in Fig 7e, the iconized joystick representation 740 includes four empty directional arrows 744_L, 744_R, 744_U, 744_D surrounding an iconized joystick center position 744_C. Since the directional arrows are shown as empty without any

explanatory text label, they convey no information to the user about any available joystick directions; instead they are merely a part of the iconized joystick representation 740 which, as a whole, informs the user that there is in fact some joystick functionality available in this context.

In more particular, this available joystick functionality is indicated by the iconized joystick center position 744_c. In Fig 7e, the iconized joystick center position 744_c represents a logical Pause action. In other words, a joystick-select in this context will pause the currently playing tune 724. Once the tune has been paused, the iconized joystick center position 744_c may change to another appearance, as shown in Fig 7f, and represent a logical Play action. Hence, performing a joystick-select in the context shown in Fig 7f will cause the tune 724 to start playing.

Optionally, as indicated in Fig 7e, the solid arrows 744_L, 744_R at either sides of the volume setting indicator 748 may in fact be included in the information 740 about available joystick functionality, even if they are shown separate from the iconized joystick representation at the lowermost left corner of the display 700. In other words, the solid arrows 744_L, 744_R will indicate and represent logical actions for lowering and increasing the current volume setting, respectively. They need no explanatory text labels, since their meaning is intuitive enough given their location next to the volume setting indicator 748. Even more intuitive is the meaning of joystick-up and joystick-down; these actions will scroll up and down in the list of 722 to change the currently playing tune 724. As appears from Fig 7e, these two available joystick actions are not at all indicated on the display 700.

An embodiment will now be described, with reference to Figs 8a-c, in which the joystick is used for invoking, launching or activating software applications starting

from an idle screen. This embodiment is particularly advantageous when implemented in a mobile terminal of the type shown in Figs 3a-3d, i.e. having a primary display as well as a smaller secondary display, the latter of which is used predominantly in idle mode when the housing of the mobile terminal is put in a compact position. In more particular, it will now be described how the joystick may be used in this idle mode to launch software applications from the secondary display 800 in Fig 8a.

10 As seen in Fig 8a, in the idle mode, the secondary display 800 basically displays nothing except for general status information in the status area 810. The background of the main presentation area 820 may be truly empty, as shown in Fig 8a, or may contain a background image or pattern. This far, the contents of the idle mode screen 15 800 resembles the ones known from the prior art. In addition, however, information 840 is shown at e.g. the lowermost left corner of the display 800 to indicate available joystick functionality. In Fig 8a, the information 20 840 has the form of a symbolic graphic representation of the joystick. By presenting this information 840, the user is alerted of the fact that, in contrast to prior art idle screens, the idle mode may in fact be operated by way of the joystick. More particularly, by performing a joystick-select operation, the user will cause 25 a switch from a first state for display 800 shown in Fig 8a to a second state shown in Fig 8b.

When this switching of states occurs, the main presentation area is filled with a grid or matrix of icons for available software applications. In the example shown 30 in Fig 8b, a dice game icon 824a, a messaging application icon 824b and a help application icon 824c are shown in a first row on display 800, a calculator icon 824d, a return-to-idle icon 824e and a money application icon 35 824f are shown in a second row on display 800, and a fax application icon 824g, a notes application icon 824h and a pacman game icon 824i are shown in a third row on

display 800. Thus, eight software application icons 824abcd and 824fghi are centered around the return-to-idle icon 824e. If the user for some reason wants to return to the idle screen in Fig 8a, he simply performs a joystick-select. Otherwise, by actuating the joystick in a respective direction among 8 available directions (up, up-right, right, down-right, down, down-left, left, up-left), a respective application icon 824b, 824c, 824e, 824i, 824h, 824g, 824d and 824a may be selected. The selection of an icon may consist solely in pointing the joystick in the desired direction, or pointing in the desired direction followed by a highlighting of the desired icon and an affirmative joystick-select, or a combined operation of pointing in the desired direction and maintaining the actuation in that direction for a predetermined time (joystick-long). Upon selection of an icon, the software application associated with that icon will be invoked or launched, or activated if already executing in the background of the operating system, wherein that application will take command of the main presentation area 820 and fill it with application-specific contents. Since the joystick will likely be used for other purposes in the thus active application, a return to the idle screen may have to be performed through other means than the return-to-idle icon 824e, such as through selection of a certain menu item (e.g. "Exit").

Fig 8c illustrates an alternative to the embodiment described above. In this case, upon joystick-select in the idle screen and the following switch from the first state to the second state, the main presentation area 820 will show an application grid with four, not eight, cells, each of which may contain an application icon 824b, 824d, 824f, 824h. By actuating the joystick in different orthogonal directions (up, down, right, left), different ones of the application icons may be selected to invoke, launch or activate the associated application.

It is to be observed that the dashed lines in Fig 8 are merely for the purpose of illustrating the grid structure and may or may not be shown in a real case.

Another embodiment, in which a multi-way input device such as a joystick is used for invoking, launching or activating software applications starting from an idle screen, will now be described with reference to Figs 9a-b. As with the previously described embodiment, this embodiment is particularly advantageous when implemented in a mobile terminal having a primary display as well as a smaller secondary display. It will now be described how the joystick may be used in idle mode to launch software applications from the secondary display 900 in Fig 9a.

In the idle mode shown in Fig 9a, the secondary display 900 displays the general status information in the status area 910. The main presentation area 920 contains nothing except for information 940 which indicates available joystick functionality. In Fig 9a, the information 940 is divided into four arrows 944_L, 944_R, 944_U, 944_D which are distributed to four different remote positions on the display 900.

The arrows 944_L, 944_R, 944_U, 944_D represent the four joystick directions. Their presence on the display 900 alerts the user of the fact that, in contrast to prior art idle screens, the idle mode may in fact be operated by way of the joystick so as to launch, invoke or activate software applications. More particularly, each arrow is associated with a respective software application. In contrast to the previous embodiment, no application icons are shown. By actuating the joystick in a certain direction, the user will cause launch/invocation/activation of the associated software application.

Explanatory text labels may be shown next to the arrows 944_L, 944_R, 944_U, 944_D to increase the clarity for the user as regards which applications that are associated with the joystick directions. A trade-off between keeping a clean idle screen and giving some guidance to

the user is shown in Fig 9b. Here, an explanatory text label 942_D is shown only once that joystick direction (joystick-down) has been actuated. Thus, the user may explore the meaning of the different arrows by actuating the joystick in different directions. A selected application may be affirmed by a joystick-select or a joystick-long, as has already been explained above for other embodiments.

Even if the embodiments described above and shown in Figs 8a-c and 9a-b, respectively, are particularly advantageous for use with a secondary display in a mobile terminal that also has a primary display, it is to be observed, however, that they are also applicable in mobile terminals which have a single, all-purpose display, or in fact in mobile terminals which have more than two displays.

It is to be noted that the different embodiments described above of how the information about available joystick functionality may be shown in different contexts are just examples. Many other combinations of and alternatives to the ways described above are possible within the spirit of the invention. Moreover, it is to be noted that a four-way/five-way navigation key may be used instead of a joystick as multi-way input device in any of the embodiments described above. Alternatively, particularly for the embodiment of Figs 9a-b, the multi-way input device may be a touch-sensitive display screen which is operated by pointing, clicking or tapping with a pen, stylus or finger, etc.

The invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended patent claims.

CLAIMS

1. A mobile terminal having a user interface formed by a controller (400), a display (436; 700) and a multi-way input device (210; 210'; 310; 310'; 438; 750) for navigating and selecting among information shown on said display, **characterized by** said controller (400) being adapted, in a current context among a plurality of possible contexts, to make different logical actions available for selection by a user through respective associated physical actions on said multi-way input device (210; 210'; 310; 310'; 750), and to present, for a logical action available in the current context, information (490) on said display (436; 700) that serves to indicate (492) the physical action (752) with which the logical action is associated as well as to explain (494) the logical action (742).

2. A mobile terminal as defined in claim 1, wherein the information presented about said available logical action includes an informative text label (742).

3. A mobile terminal as defined in claim 1 or 2, wherein the information presented about said available logical action includes an informative graphical symbol (740, 744).

4. A mobile terminal as defined in any preceding claim, wherein the controller (400) is adapted, in one and the same given context, to present first information (742_L, 744_L) to indicate a first physical action (752_L) for selection of a first available logical action as well as second information (742_R, 744_R) to indicate a second physical action (752_R) for selection of a second available logical action, wherein said first information is presented with respect to said second information on said display (700) in a spatial relationship that

reflects a corresponding spatial relationship between the associated first and second physical actions on said multi-way input device (750).

5 5. A mobile terminal as defined in claim 4, the multi-way input device (750) being actuatable in a plurality of directions (752) or positions that represent navigation in respective directions on said display (700), wherein said associated first and second physical
10 actions are actuations of the multi-way input device in first (752_L) and second (752_R) ones of said directions or positions.

 6. A mobile terminal as defined in any preceding
15 claim, the multi-way input device including a joystick (750), wherein the controller (400) is adapted to determine selection of an available logical action by detecting the associated physical action in the form of an actuation of the joystick in a particular one among a
20 plurality of different joystick directions followed by an affirmative action applied on the joystick.

 7. A mobile terminal as defined in claim 6, wherein said affirmative action is a prolonged actuation of the
25 joystick in said particular joystick direction for a predetermined time period.

 8. A mobile terminal as defined in claim 6, wherein said affirmative action is a depression of the joystick
30 in a direction different from said particular joystick direction.

 9. A mobile terminal as defined in claim 6, wherein said affirmative action is a depression of a joystick
35 select button on the joystick in a direction different from said particular joystick direction.

10. A mobile terminal as defined in claim 3, the multi-way input device (750) being actuatable in a plurality of directions (752) or positions that represent navigation in respective directions on said display (700), as well as in a further direction or position, different from said plurality of directions or positions, that represents selection on said display, wherein the informative graphical symbol includes an icon (744_c) that represents a logical action selectable by actuation of the multi-way input device in said further direction or position.

11. A mobile terminal as defined in claim 10, the multi-way input device including a joystick (750), wherein said icon (744_c) represents a logical action selectable by depression of a joystick handle or a joystick select button.

12. A mobile terminal as defined in claim 4, the multi-way input device including a joystick (750), wherein

said first physical action (752_L) associated with said first logical action is a directional action applied on the joystick,

said second physical action associated with said second logical action is an affirmative action applied on the joystick,

said first information includes at least one of a first graphical symbol (744_L) and a first text label (742_L), and

said second information includes a graphical symbol (744_C).

13. A mobile terminal as defined in claim 1, wherein the multi-way input device includes a four-way/five-way navigation key (210').

14. A mobile terminal as defined in claim 1, in the form of a mobile phone (100; 200; 200'; 300; 300') for use in a mobile telecommunications network (110).

5 15. A mobile terminal as defined in claim 14, wherein, when the current context is the arrival of an incoming telephone call, said available logical action involves selecting how the incoming telephone call is to be handled.

10 16. A mobile terminal as defined in claim 14, wherein, when the current context is the occurrence of an event in an active software application, said available logical action involves controlling a user interface object belonging to said active software application.

15 17. A mobile terminal as defined in claim 1, the mobile terminal (300; 300') having an apparatus housing (301, 301'), a primary display (303, 303') adapted for use in an active operating mode and/or in an open apparatus housing configuration, and a secondary display (313, 313') adapted for use in an idle operating mode and/or in a closed apparatus housing configuration, wherein the controller (400) is adapted to present said information that serves to indicate said physical action and explain said logical action at least on said secondary display.

20 18. A method of operating a user interface of a mobile terminal having a display (436; 700; 800) and a multi-way input device (210; 210'; 310; 310'; 438; 750) for navigating and selecting among information shown on said display, the mobile terminal being operable in a plurality of different contexts, the method comprising presenting, on said display (700; 800), a graphical indication (740; 840) as representation of the multi-way

25
30
35

input device if and only if the multi-way input device has a defined functionality in a current context.

19. A method of updating a user interface of a mobile terminal having a display (700; 800) and a multi-way input device (210; 210'; 310; 310'; 438; 750) for navigating and selecting among information shown on said display, the mobile terminal being operable in a plurality of different contexts, the method comprising the steps of:

5 providing predefined control data that defines functionality of the multi-way input device in different ones of said contexts;

10 detecting a current context;

15 determining, by reference to said predefined control data, whether the multi-way input device has a defined functionality in the current context; and

20 if the multi-way input device is determined to have a defined functionality in the current context, presenting on said display an indication (740, 744; 840) adapted to alert a user of the mobile terminal about the availability of said defined functionality.

20. A method as defined in claim 19, wherein the presented indication includes a graphical symbol.

21. A method as defined in claim 19 or 20, wherein the multi-way input device is a joystick (750) and the presented indication (740, 744) represents one or more joystick actions (752) associated with respective one or more logical actions included in said defined functionality.

22. A method as defined in claim 21, wherein the presented indication includes a graphical icon (744c) that symbolizes a logical action selectable by way of an

affirmative or selecting action applicable on the joystick (750).

23. A method as defined in claim 21, wherein the
5 presented indication includes a text label (742_L) that explains a logical action selectable by way of a directional action (752_L) applicable on the joystick (750).

10 24. A method as defined in any of claims 19-23, comprising the further steps of deciding that the multi-way input device has no defined functionality in the current context but that it did have a defined functiona-
15 lity in a preceding context, and in response removing from said display an indication that was presented in said preceding context.

25. A method as defined in any of claims 19-24, wherein the mobile terminal is a mobile phone (100; 200;
20 200'; 300; 300') adapted for use in a mobile telecommunications network (110).

26. A mobile terminal having a user interface formed by a controller (400), a display (438; 800) and a
25 multi-way input device (210; 210'; 310; 310'; 438; 750) for navigating and selecting among information shown on said display, the mobile terminal comprising a plurality of software applications (450-470) executable by said controller, **characterized by**

30 said user interface having a first state, in which a graphical indication (840) of said multi-way input device is presented on said display, and a second state, in which graphical indications (824) for at least some of said plurality of software applications are presented on
35 said display (800);

said controller (400) being adapted, in said first state, to detect a first predefined actuation of said

multi-way input device, and in response switch to said second state;

said controller being adapted, in said second state, to provide for navigation and selection, by said multi-way input device, among the graphical indications presented for said at least some of said plurality of software applications, wherein a selection of one of said presented graphical indications activates an associated one of said at least some of said plurality of software applications.

27. A mobile terminal as defined in claim 26, said mobile terminal (300, 300') having a primary display (303; 303') and a secondary display (313; 313'), wherein said first and second states of said user interface pertain to the secondary display.

28. A mobile terminal as defined in claim 27, the mobile terminal (300, 300') having an apparatus housing (301, 301'), the primary display (303; 303') being adapted for use in an active operating mode and/or in an open apparatus housing configuration, and the secondary display (313; 313') being adapted for use in an idle operating mode and/or in a closed apparatus housing configuration.

29. A mobile terminal as defined in any of claims 26-28, wherein, in said second state, a graphical indication of said multi-way input device is presented on said display in addition to said graphical indications presented for said at least some of said plurality of software applications.

30. A mobile terminal as defined in claim 29, wherein said graphical indications presented for said at least some of said plurality of software applications are arranged in a two-dimensional matrix and wherein said

graphical indication of said multi-way input device is positioned at the center of the matrix.

31. A mobile terminal as defined in any of claims
5 26-30, wherein said controller is adapted, in said second state, to detect a second predefined actuation of said multi-way input device, and in response switch to said first state.

10 32. A mobile terminal as defined in any of claims 26-31, wherein said first predefined actuation of said multi-way input device is a select operation.

15 33. A mobile terminal as defined in claim 31, wherein said second predefined actuation of said multi-way input device is a select operation.

20 34. A mobile terminal as defined in any of claims 26-33, wherein the multi-way input device includes a joystick.

25 35. A mobile terminal as defined in any of claims 26-33, wherein the multi-way input device includes a four-way/five-way navigation key.

30 36. A mobile terminal as defined in any of claims 26-35, wherein the mobile terminal is a mobile phone (100; 200; 200'; 300; 300') adapted for use in a mobile telecommunications network (110).

35 37. A method of operating a user interface of a mobile terminal having a display (436; 800; 900) and a multi-way input device (210; 210'; 310; 310'; 438; 750) for navigating and selecting among information shown on said display, the mobile terminal comprising a plurality of software applications (450-470), the method involving the steps of:

presenting on said display a plurality of graphical indications (824; 944), each indication representing a respective one of at least some of said plurality of software applications;

5 detecting a selection by said multi-way input device of one of said indications; and

activating an associated software application which is represented by the selected indication.

10 38. A method as defined in claim 37, wherein said plurality of graphical indications (944) are distributed to different and mutually remote positions on a display area (920) of the display (900).

15 39. A method as defined in claim 38, wherein each of said plurality of graphical indications is a small graphical arrow (944_b) that serves to indicate a respective navigation direction on said multi-way input device.

20 40. A method as defined in any of claims 37-39, involving the additional step of presenting a text label (942_b) describing the associated software application adjacent to a respective one (944_b) of said plurality of graphical indications.

25 41. A method as defined in claim 40, wherein said step of presenting a text label is performed once the respective one of said plurality of graphical indications has been navigated to by said multi-way input device.

30 42. A method as defined in any of claims 37-41, said mobile terminal (300, 300') having a primary display (303; 303') and a secondary display (313; 313'), wherein the steps of the method are performed in an idle state of said mobile terminal, using said secondary display but not said primary display.

43. A method as defined in any of claims 37-42, wherein the multi-way input device includes a joystick (210; 310; 310'; 750).

5

44. A method as defined in any of claims 37-42, wherein the multi-way input device includes a four-way/five-way navigation key (210').

10

45. A method as defined in claim any of claims 37-42, wherein the multi-way input device and the display are part of a touch-sensitive display screen.

15

46. A method as defined in any of claims 37-45, wherein the mobile terminal is a mobile phone (100; 200; 200'; 300; 300') adapted for use in a mobile telecommunications network (110).

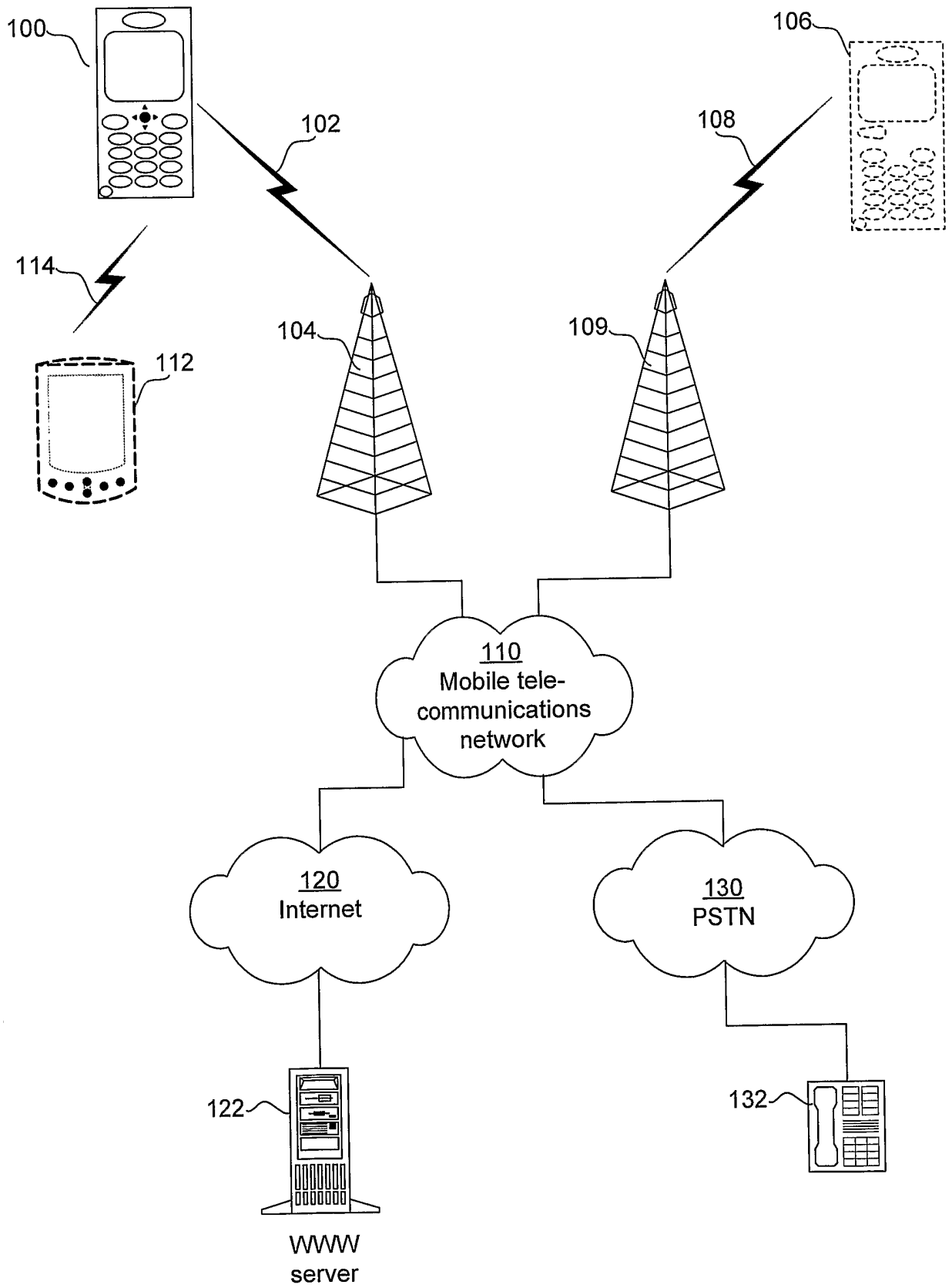


Fig 1

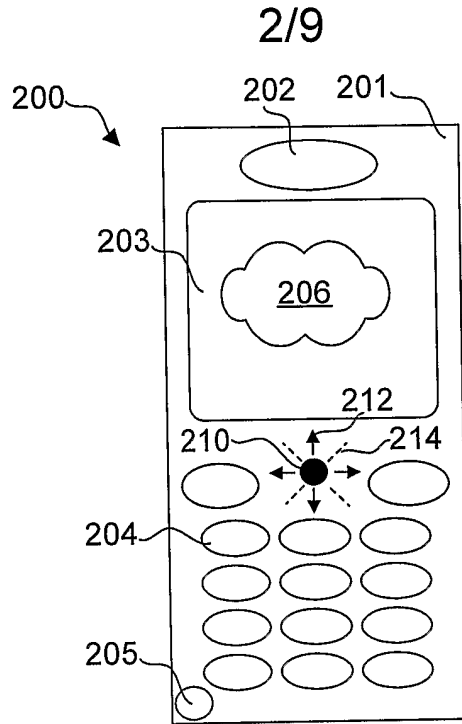


Fig 2a

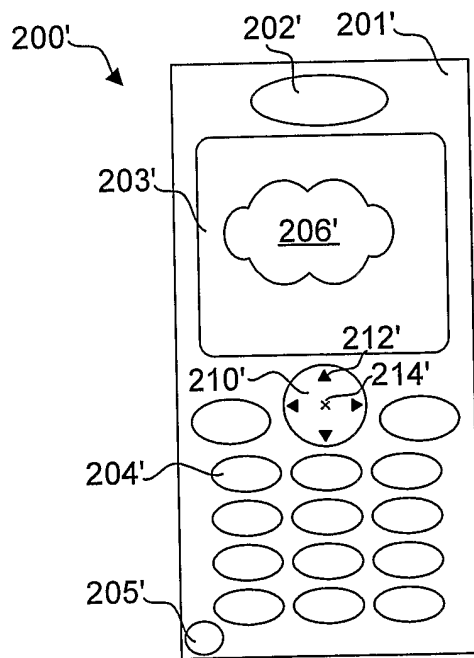


Fig 2b

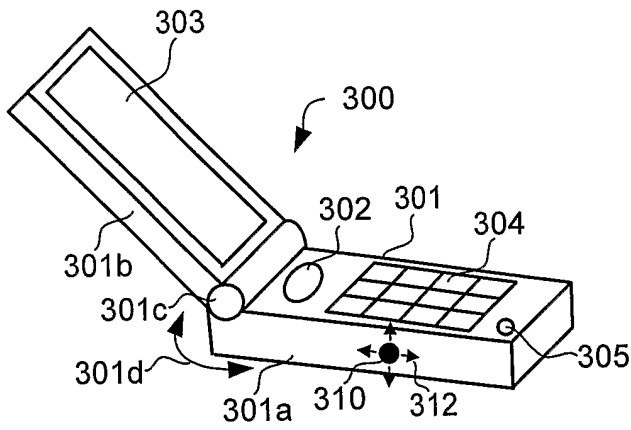


Fig 3a

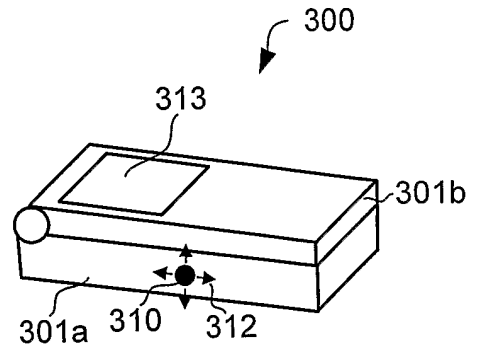


Fig 3b

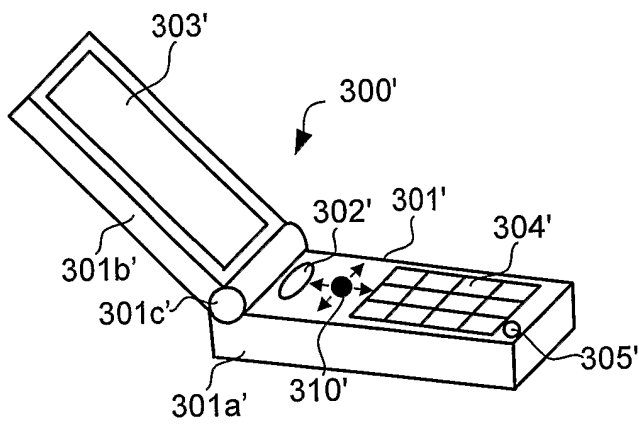


Fig 3c

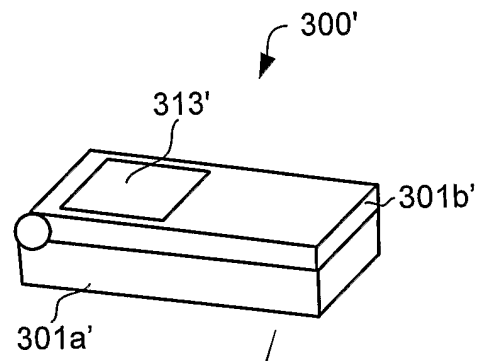
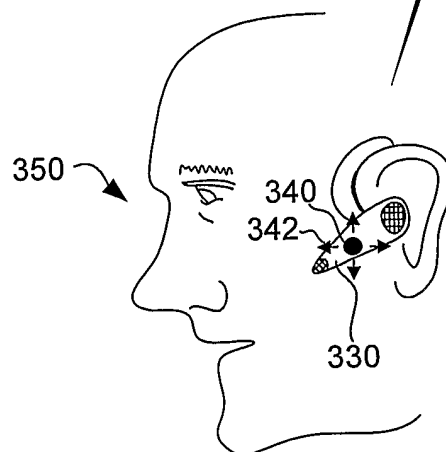


Fig 3d



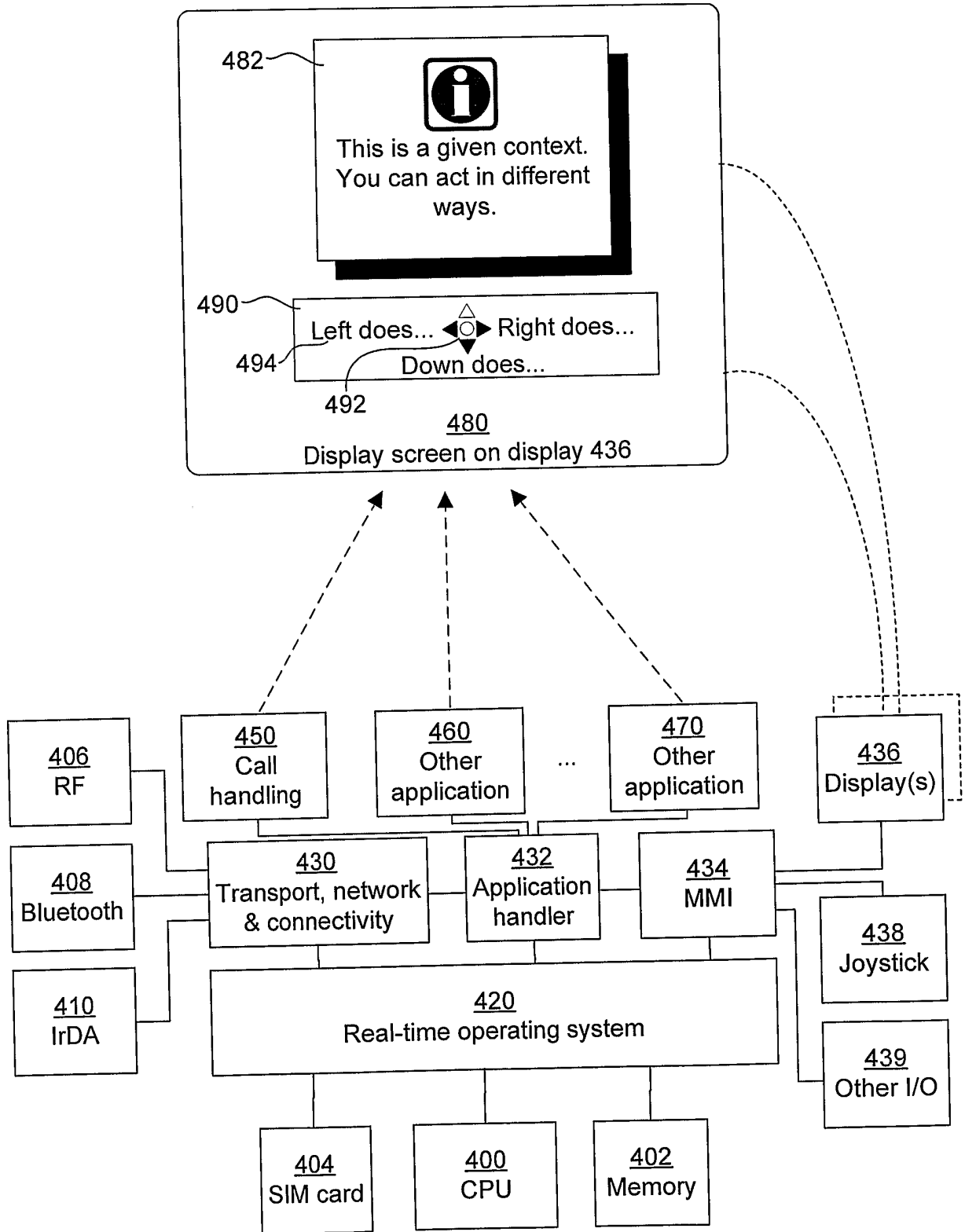


Fig 4

5/9

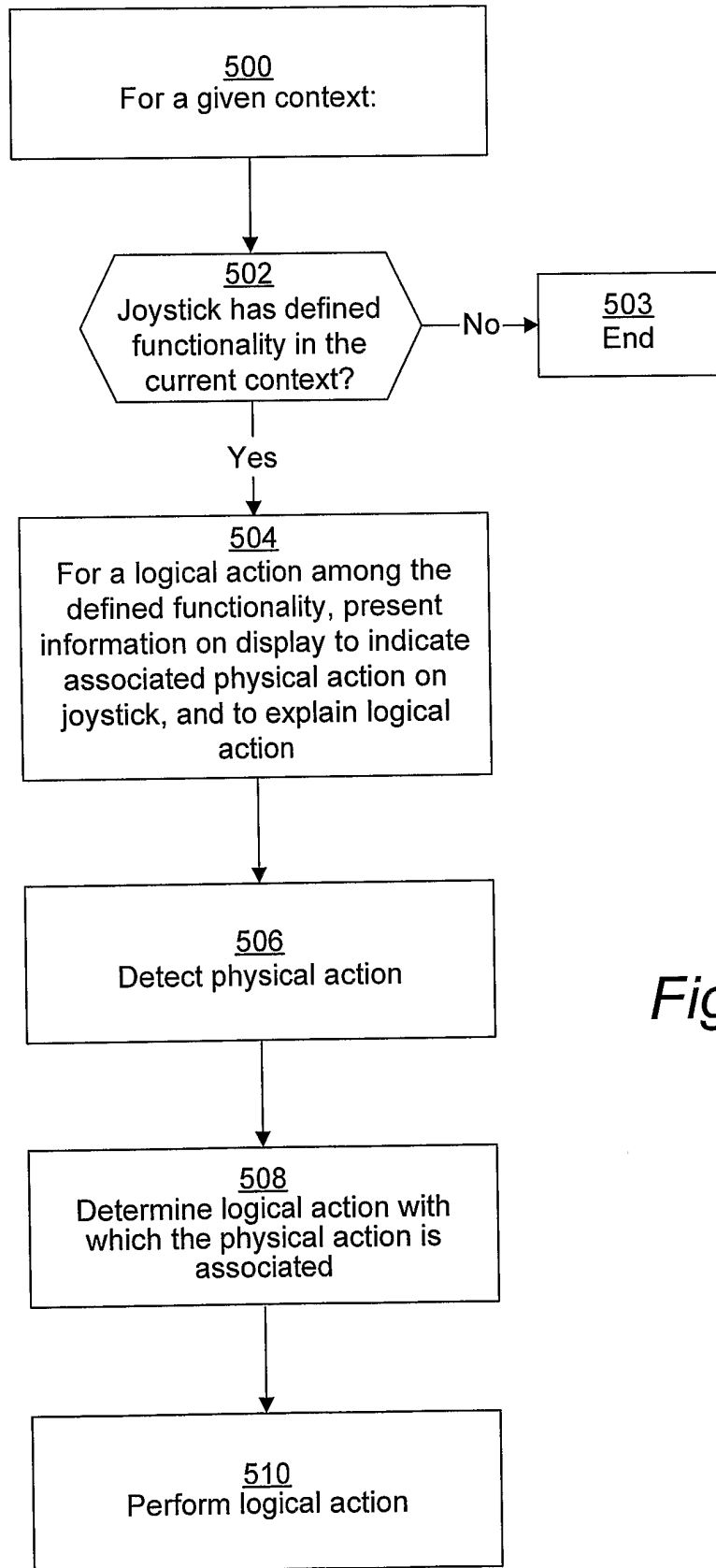


Fig 5

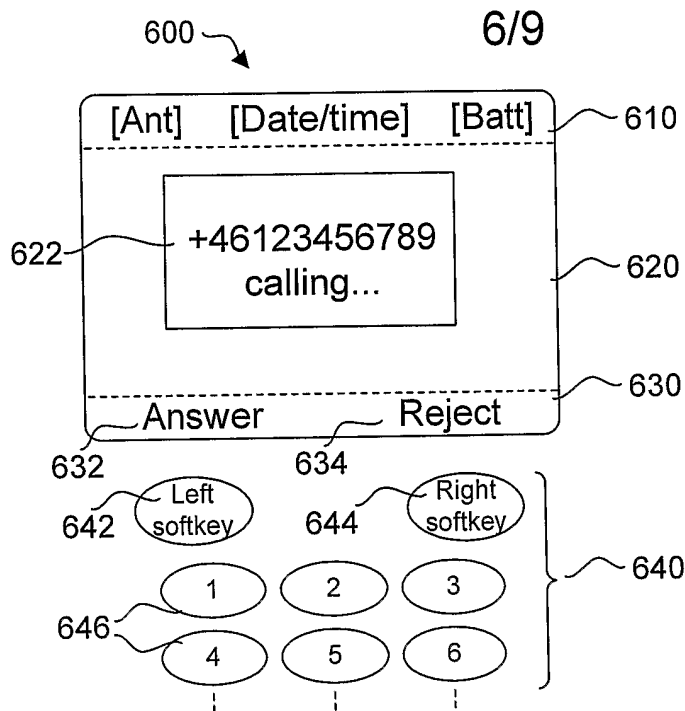


Fig 6
Prior art

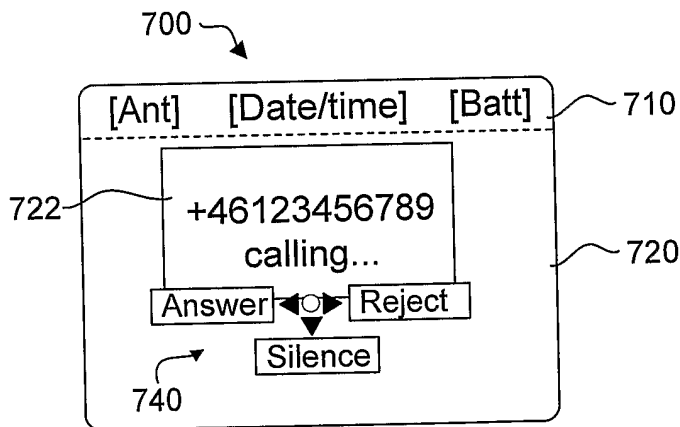


Fig 7

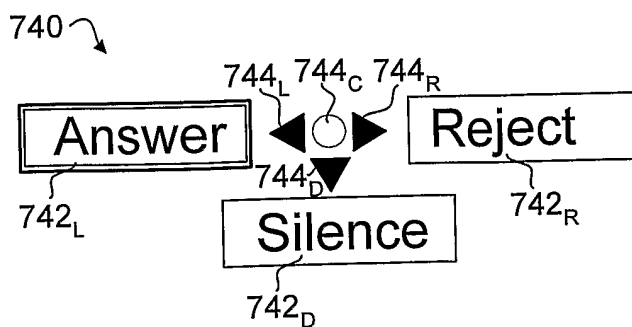
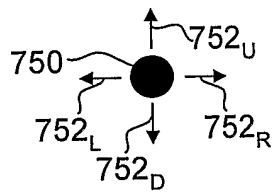


Fig 7a

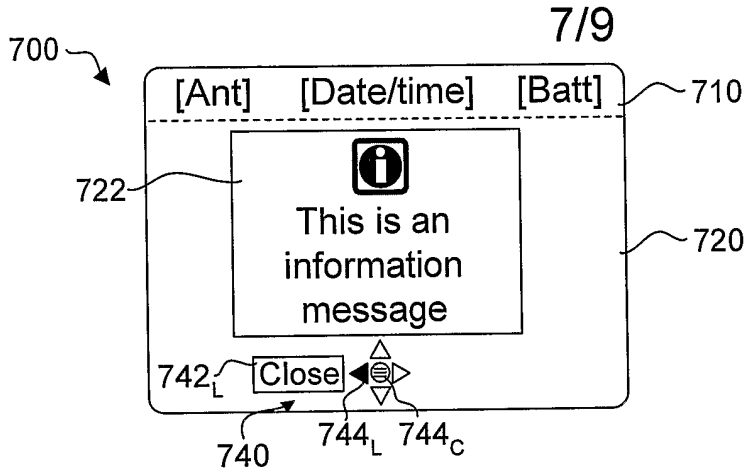


Fig 7b

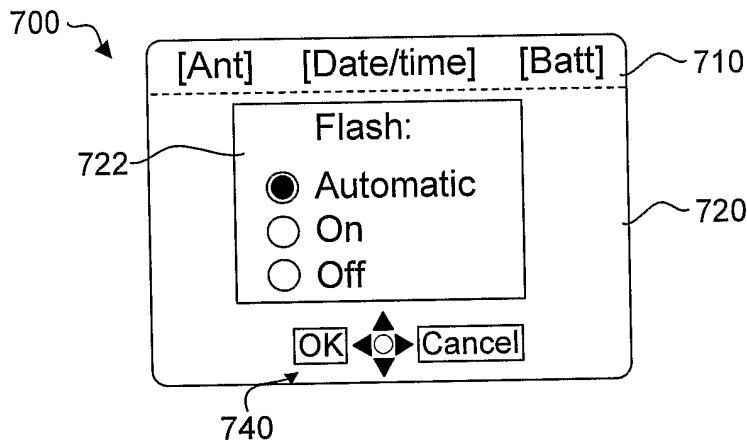


Fig 7c

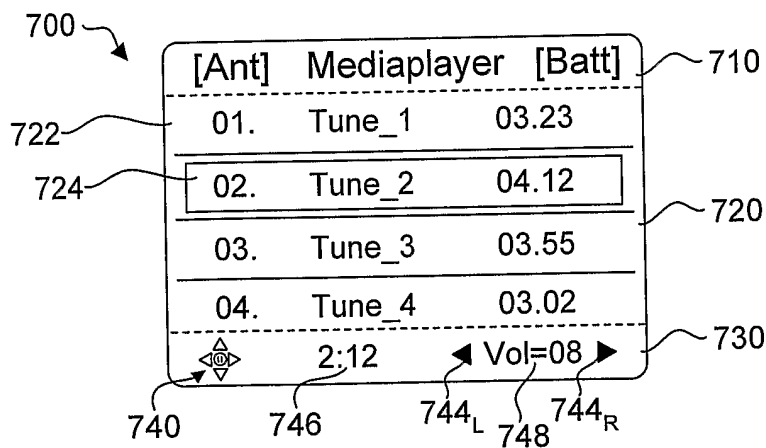


Fig 7d



Fig 7e



Fig 7f

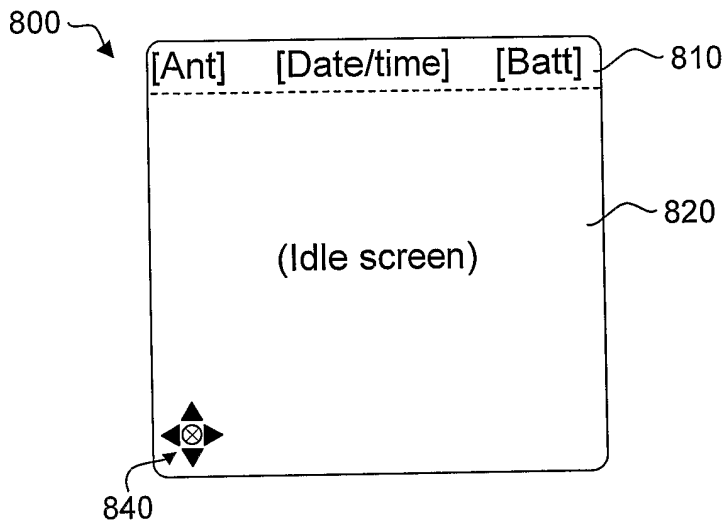


Fig 8a

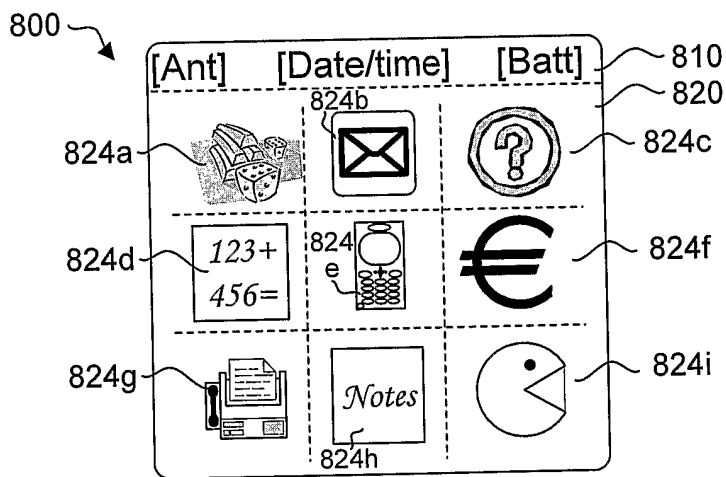


Fig 8b

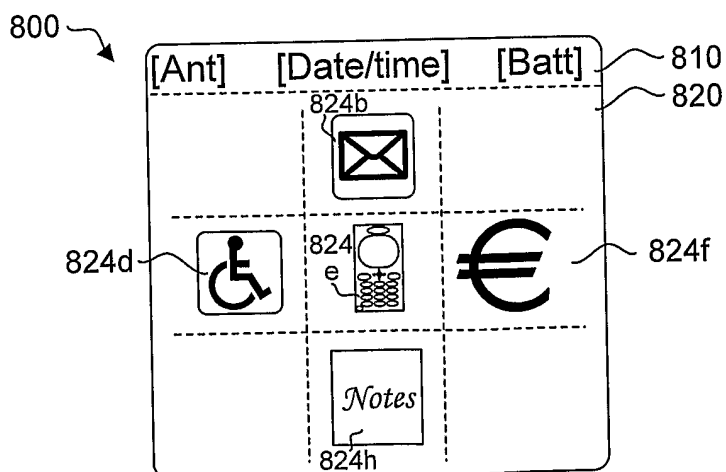


Fig 8c

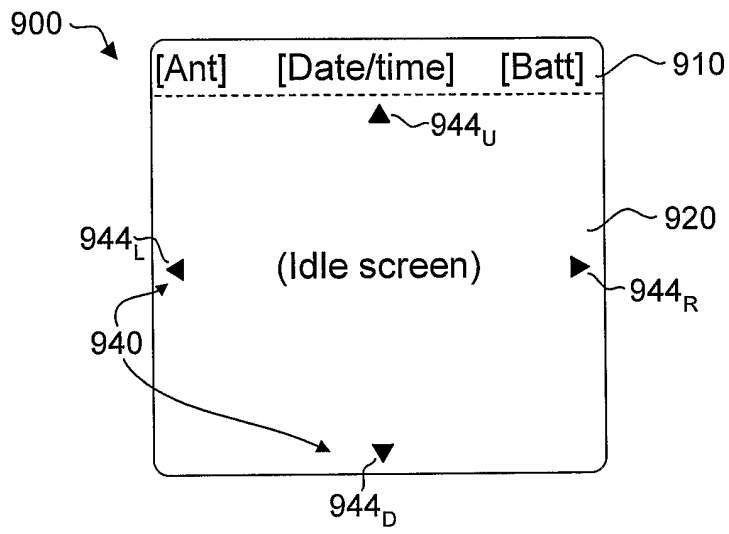


Fig 9a

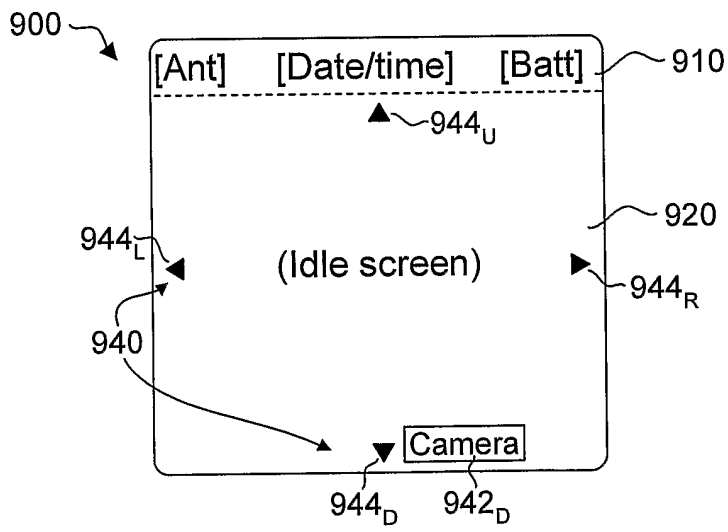


Fig 9b

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2005/003740

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 179 944 A (SONY CORPORATION) 13 February 2002 (2002-02-13) paragraphs '0018! - '0020!; figure 1 paragraphs '0091! - '0103!; figures 10,11 paragraphs '0119!, '0120!; figure 15 -----	1-5, 10, 13-15, 18-26, 29, 30, 32, 34-41, 43-46
X	EP 1 004 957 A (MITSUBISHI DENKI KABUSHIKI KAISHA) 31 May 2000 (2000-05-31) paragraphs '0025! - '0027!; figure 4 paragraph '0031! paragraph '0071!; figure 9 paragraphs '0093! - '0095!; figures 16,17 paragraph '0100! -----	1,2,4-6, 8,9,12, 18,19, 21,23, 25,26,37
Y	-----	7
Y	US 2004/189597 A1 (AMITANI YOSHIKO ET AL) 30 September 2004 (2004-09-30) paragraph '0011!; figures 1,2 paragraphs '0039!, '0040! paragraphs '0045!, '0046! -----	17,27, 28,42

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/JP2005/003740

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1359495	A	05-11-2003	CN 1455611 A	12-11-2003
			FI 20020847 A	04-11-2003
			US 2003206199 A1	06-11-2003
EP 1179944	A	13-02-2002	CN 1338853 A	06-03-2002
			JP 2002062859 A	28-02-2002
			US 2002067352 A1	06-06-2002
EP 1004957	A	31-05-2000	AU 2185099 A	20-09-1999
			CN 1292898 A	25-04-2001
			WO 9945459 A1	10-09-1999
			JP 3356786 B2	16-12-2002
			US 6332024 B1	18-12-2001
US 2004189597	A1	30-09-2004	CN 1534965 A	06-10-2004
			JP 2004297417 A	21-10-2004