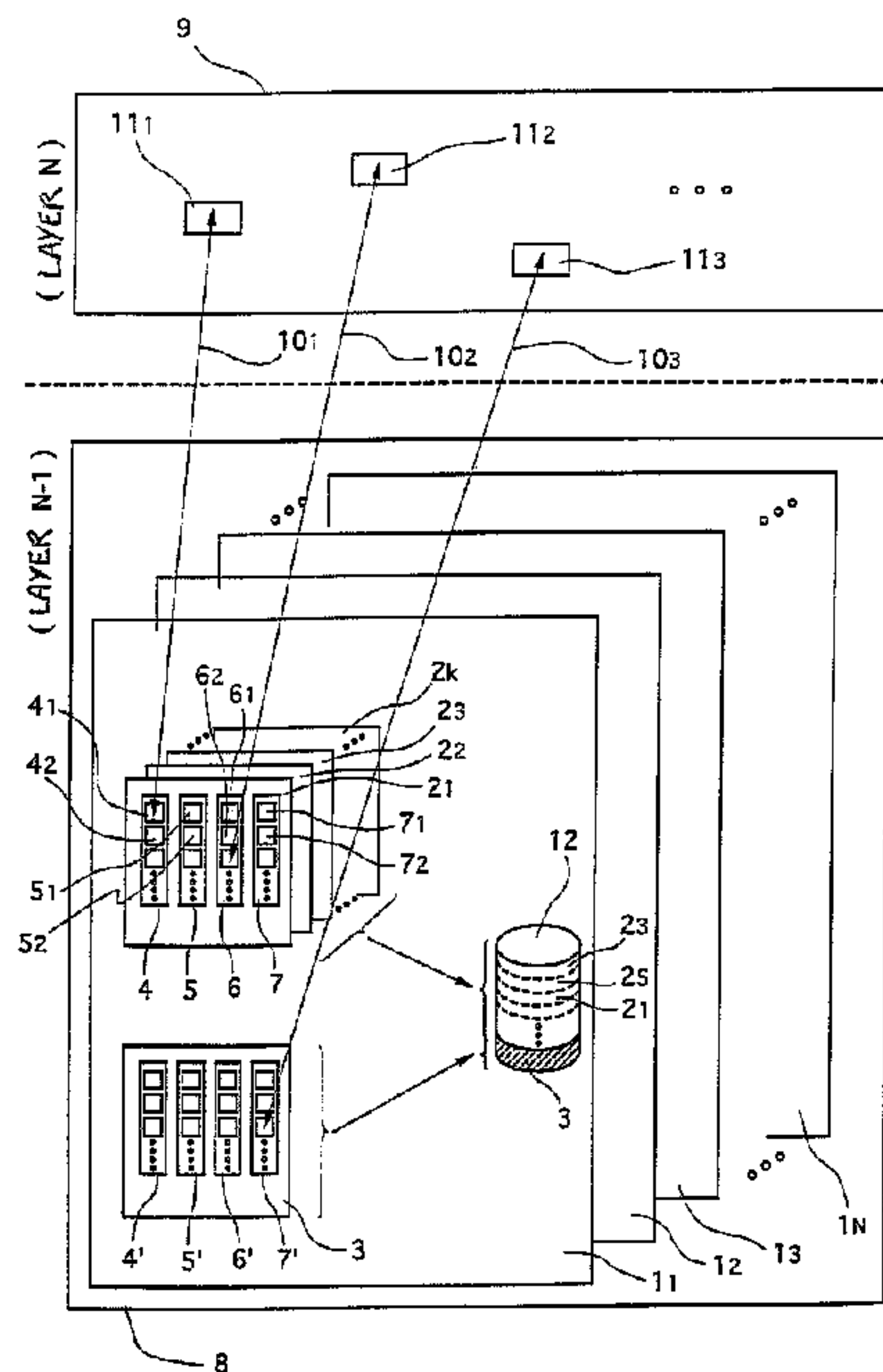




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(54) Titre : GESTION D'INTERFACES UTILISATEURS MULTICONTEXTES DE TERMINAUX DE TELECOMMUNICATION
 (54) Title: MANAGEMENT OF MULTI-CONTEXT USER INTERFACES OF TELECOMMUNICATION TERMINALS



(57) **Abrégé/Abstract:**

The invention relates to a method for the multiple-context management of the user interfaces of a plurality of user terminals connected to an automatic branch exchange. It enables the user interface of each terminal to be matched with one or more distinct and possibly simultaneous contexts of use imposed on the terminal. In a particular mode of application, for each terminal there is defined at least one total interaction profile (1_1 to 1_N) comprising at least one interaction panel (2_1 to 2_k). Each interaction panel is associated with a distinct context of use. The activation, by the automatic branch exchange, of a given interaction panel results in a matching of the user interface of said terminal with the context of use associated with this given interaction panel. In operation, the automatic branch exchange, within said at least one total interaction profile, activates the interaction panel or panels associated with the context or contexts of use imposed on the terminal.



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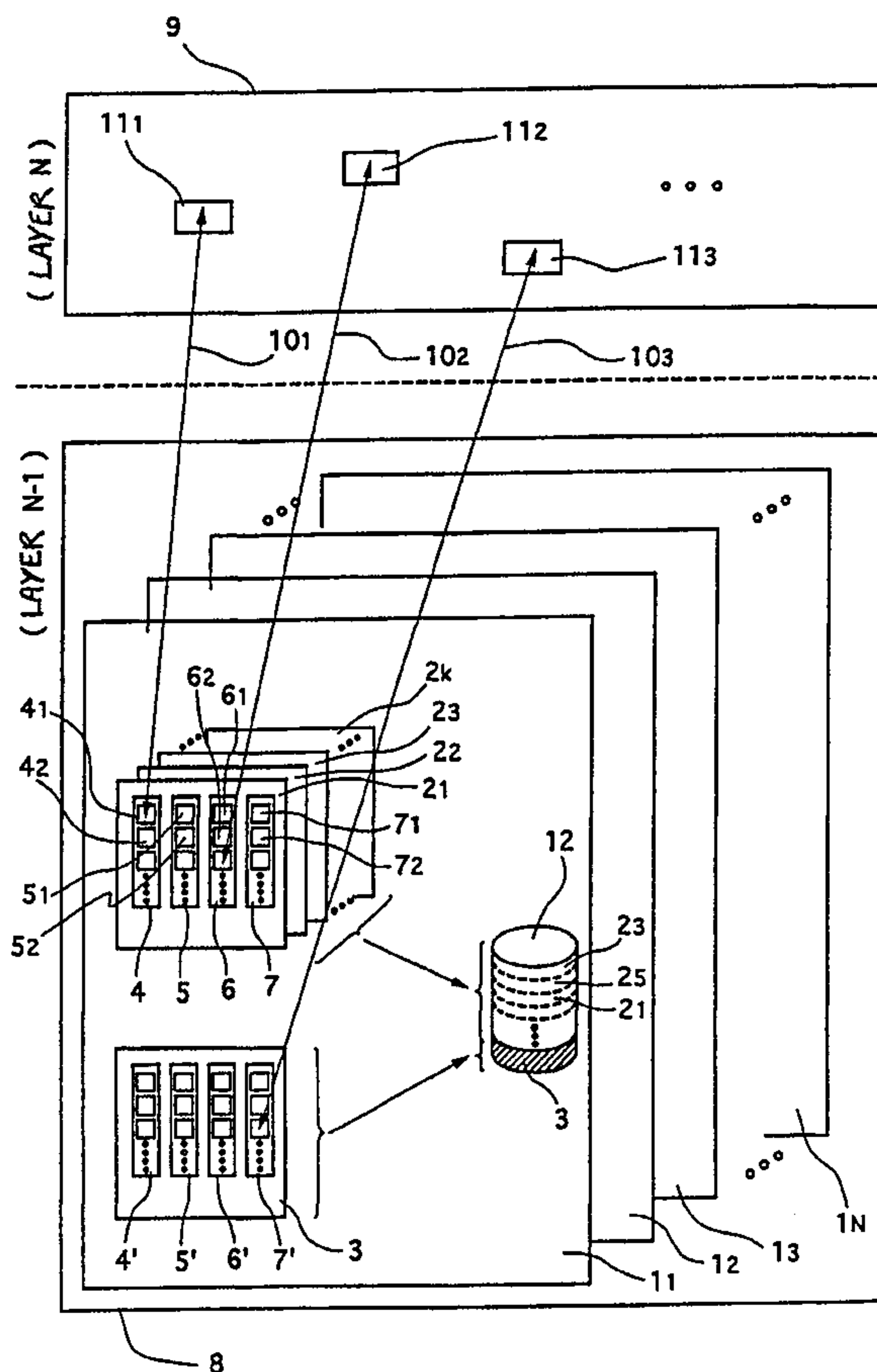
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(54) Title: MANAGEMENT OF MULTI-CONTEXT USER INTERFACES OF TELECOMMUNICATION TERMINALS

(57) Abstract

The invention relates to a method for the multiple-context management of the user interfaces of a plurality of user terminals connected to an automatic branch exchange. It enables the user interface of each terminal to be matched with one or more distinct and possibly simultaneous contexts of use imposed on the terminal. In a particular mode of application, for each terminal there is defined at least one total interaction profile (1₁ to 1_N) comprising at least one interaction panel (2₁ to 2_k). Each interaction panel is associated with a distinct context of use. The activation, by the automatic branch exchange, of a given interaction panel results in a matching of the user interface of said terminal with the context of use associated with this given interaction panel. In operation, the automatic branch exchange, within said at least one total interaction profile, activates the interaction panel or panels associated with the context or contexts of use imposed on the terminal.



MANAGEMENT OF MULTI-CONTEXT USER INTERFACES OF TELECOMMUNICATION TERMINALS

5 The field of the invention is that of automatic branch exchanges for telecommunication systems and especially but not exclusively private automatic branch exchanges or PABXs.

More specifically, the invention relates to a method for the management of the user interfaces of a plurality of user terminals connected to an automatic branch exchange.

10 In general, an automatic branch exchange interacts with a plurality of users by means of a plurality of user terminals. Typically, these terminals are distributed geographically within the premises of a firm. In general, it is possible to distinguish between two types of user terminals, namely "internal" user terminals that are directly connected to the automatic branch exchange and "external" user terminals that are connected to the automatic branch exchange by means of a bus or a telephone network line (STN, ISDN, etc.).

15 In the present description, the term « user terminal » is understood to mean any type of telecommunications equipment placed at the disposal of users. Such equipment includes especially but not exclusively telephone type terminals (for example simple or enhanced-function telephone sets) and computer type terminals (for example microcomputers emulating telecommunications functions). With a view to simplification, the expression "user terminal" is sometimes replaced by "terminal".

20 Conventionally, the automatic branch exchange carries out a single-context management of the user interface of each terminal. In other words, at present the automatic branch exchange can adapt the user interface of each terminal to only one context of use, sometimes also called a working context.

25 The term « user interface » of a terminal is understood to mean a man-machine interface of this terminal. This term covers all types of input resources (keyboard keys, control buttons, etc.) and output resources (display screens, loudspeakers, light indicators, etc.) of the terminal whose use enables the automatic branch exchange and/or the terminal itself to communicate with the user. For example, the screen of the terminal displays a scrolling menu with a plurality of items corresponding to different possible functions or choices and, through the keys of the keyboard or the control buttons, the user can select and validate one of the items so that the corresponding function or choice can be activated (this may be, for example, the activation of the "add-on third party" function or again the choice of a volume of sound).

35 It can be seen that the present technique of single-context management of user interfaces has several drawbacks.

Indeed, in general, each new potential activity (for example an incoming call) is a troublesome interruption that could cause a loss of the working context in progress. At present, two ways are proposed for processing such interruptions but neither of them is satisfactory. Either the new activity effectively replaces the activity in progress (in the above-mentioned example, the call goes through) in which case its working context is imposed at the expense of the working context in progress which is then lost, or else the new activity is rejected so long as the activity in progress is not over (in the above-mentioned example, the terminal is seen to be busy and the call does not go through), and this is hardly acceptable.

It can therefore be understood that it is impossible for the user to achieve « true simultaneity », i.e. to carry out several activities at the same time, if these activities are associated with different contexts of use (because, for example, they correspond to independent applications). For example, the user cannot consult an internal directory of the automatic branch exchange during a call.

Similarly, it is impossible for the user to interrupt an activity and then later return to it without losing the associated context. In this case, the term used is "false" simultaneity of activities as compared with the above-mentioned "true" simultaneity.

Finally, the ergonomics of interaction of the user terminal is relatively low owing to the fact that each context is generally associated with a distinct interface mechanism. The term "interface mechanism" is understood to mean a particular management of the user interface of the terminal, enabling this terminal to be matched with a given context of use. This lack of consistency between interface mechanisms can be explained by the fact that, to date, there are no efficient production tools. Indeed, different interface mechanisms are presently being developed independently of each other, and they are generally developed directly within a unique and complex main application that is implemented by the automatic branch exchange.

It is a goal of the invention in particular to mitigate these different drawbacks of the prior art.

More specifically, one of the goals of the present invention is to provide a method enabling a multiple-context management of the user interfaces of a plurality of user terminals connected to an automatic branch exchange.

It is also a goal of the invention to provide a method of this kind enabling both « true » and « false » simultaneity of activities without any loss of context of use.

Another goal of the invention is to provide a method of this kind enabling an improvement in the ergonomics of the user interfaces.

An additional goal of the invention is to provide a method of this kind enabling the implementation of efficient production tools, providing for the consistent development of the interface mechanisms.

These different goals as well as others that shall appear hereinafter are achieved according to the invention by means of a method for the management of the user interfaces of a plurality of user terminals connected to an automatic branch exchange. According to the invention, said method comprises a step wherein said automatic branch exchange provides for a multiple-context management of the user interface of each terminal, enabling the user interface of each terminal to be matched with one or more distinct and possibly simultaneous contexts of use imposed on said terminal.

The general principle of the invention therefore consists in passing from a single-context management to a multiple-context management of the user interface of each terminal. In this way, the user of the terminal is provided with a simultaneity of activities having different working contexts without there being any consequent loss of one of the working contexts. This simultaneity may be real (the user carries out several activities at the same time) or "false" (the user carries out several activities successively but wishes to be able to return to one of the previous activities without any loss of context).

Advantageously, said step of multiple-context management itself comprises the following steps for each terminal:

- the defining of at least one total interaction profile comprising at least one interaction panel, each interaction panel being associated with a distinct context of use, the activation, by the automatic branch exchange, of a given interaction panel resulting in a matching of the user interface of said terminal with the context of use associated with said given interaction panel;

- the activating by said automatic branch exchange, within said at least one total interaction profile, of the interaction panels associated with said distinct and possibly simultaneous context or contexts of use imposed on the terminal.

Thus, an interaction model is designed, based on the notions of total interaction profile and interaction panel. This interaction model is not linked to a particular context, and is independent of the underlying means actually implemented in the user terminals. It therefore enables the setting up of efficient production tools providing for the consistent development of all the interface mechanisms and for an improvement in the ergonomics of the user interfaces.

The interaction panels are means for combining interactions pertaining to one and the same user activity, having its own context of use. An interaction panel is not necessarily associated with the entire interaction context of a feature (or function). Indeed, if a feature requires a complex interaction, it may be subdivided into several contexts of activities, each associated with an interaction panel. Conversely, several features related to each other may be combined within one and the same context of use and may therefore be associated with one and the same interaction panel.

Advantageously, said at least one total interaction profile furthermore comprises at least one interaction background that is not associated with any specific context of use of said terminal. Said automatic branch exchange, within said at least one total interaction profile, permanently activates said at least one interaction background so that the user interface of said terminal always provides at least one form of interaction that is independent of said contexts of use and especially of the activated context or contexts of use.

Preferably, said at least one total interaction profile comprises a single interaction background.

In a preferred embodiment of the invention, each interaction panel and/or each interaction background comprises at least one interaction element belonging to the group comprising:

- composition elements each enabling the organization of a grouping of at least one interaction element included in said interaction panel;

- output elements each enabling the automatic branch exchange and/or one of said terminals to communicate fixed and/or variable information elements to a user by means of at least one terminal output resource;

- input elements, each enabling a user to provide information to the automatic branch exchange and/or to one of said terminals by means of at least one terminal input resource;

- triggering means, each enabling a user to trigger at least one action in the automatic branch exchange and/or in one of said terminals by means of at least one terminal input resource.

Thus, an interaction panel combines all that is needed for a user to interact in a specific context. It may therefore include several types of interaction elements, on both the input and output aspects. The four categories of interaction elements mentioned here above (namely « composition », « output », « input » and « interaction ») may naturally each include a plurality of distinct interaction elements.

Preferably, said total interaction profiles of said terminals are managed by said automatic branch exchange in an intermediate applications layer proposing generic services to at least one higher level applications layer.

Preferably, said at least one total interaction profile furthermore comprises a plurality of links each bearing at least one connection between at least one of said interaction elements and at least one object of an application included in said at least one higher level applications layer.

These links bear protocols for each category of information enabling the updating of the output data elements (communicated to the user) or the taking into account of the input data (given by the user) or of triggering operations (requested by the user).

Preferably, each connection bears at least one object component belonging to the group comprising: attributes, associations and operations. The term "object" is herein understood in the sense of the software development technique.

Preferably, when a total interaction profile comprises at least two activated interaction panels, said method comprises the following steps:

- a distinct rank within a stack is assigned dynamically to each of said activated interaction panels;

- said activated interaction panels use the input and/or output resources of said terminals according to a predetermined strategy of use as a function of the ranks assigned to them.

Other characteristics and advantages of the invention shall appear from the following description of a preferred mode of application of the invention, given by way of a non-restrictive indication, and from the appended drawings in which the single figure illustrates a particular mode of application of the method according to the invention.

The invention therefore relates to a method for the multiple-context management of the user interfaces of a plurality of user terminals connected to an automatic branch exchange.

In the particular mode of operation that shall now be described, illustrated in the single figure, the method comprises a step of multiple-context management which itself comprises the following steps:

- the defining, for each terminal, of a total interaction profile 1_1 to 1_N comprising one or more interaction panels 2_1 to 2_k and an interaction background 3;

- the activation by the automatic branch exchange, within the total interaction profile defined for each terminal, (see detailed discussion here below), of :

* selectively, the interaction panels (for example those referenced 2_3 , 2_5 , 2_1) associated with the different contexts of use imposed on the terminal. The activated interaction panels of course change in the course of time as a function of changes of context;

* permanently, the interaction background 3 which is not associated with any specific context of use of the terminal.

With a view to simplification, only the total interaction profile referenced 1_1 is illustrated in detail. The other total interaction profiles are built on the same model. It is clear however that each total interaction profile may include any number of interaction panels and any number of interaction backgrounds (even if the most frequent case of use is that of a single interaction background).

The different contexts of use imposed on the terminal may be imposed simultaneously (if the user is carrying out several activities simultaneously) or successively

(if the user passes from one activity to another while wishing to return, without any loss of context, to one of his or her previous activities).

It is clear that the present invention also includes the case where only one context of use is imposed on the terminal. In this case, apart from the interaction background, only the interaction panel associated with this context is activated.

It must be noted that, according to one variant of the invention, several total interaction profiles may be defined for one and the same terminal. Only one total interaction profile however is used at a time. This situation corresponds for example to the case where several users share one and the same terminal or where each of the total interaction profiles is defined for one of the common users. The automatic branch exchange then makes a choice, from among the different total interaction profiles possible, of the profile defined for the current user.

The interaction panels 2_1 to 2_k shall now be presented in greater detail. Each interaction panel is associated with a particular context of use and its activation by the automatic branch exchange entails a matching of the user interface of the terminal to this particular context of use. Each panel has one or more interaction elements. Each interaction element controls a part of the user interface of the terminal so that this interface part is adapted to the context associated with the panel in which this interaction element is included. By adding up the checks made by the different interaction elements included in one and the same panel, there is thus obtained a full control of the user interface for a given activity of the user having its own context of use.

In the mode of application illustrated, the interaction elements are distributed into four groups 4 to 7, respectively comprising composition elements 4_1 , 4_2 , etc. output elements 5_1 , 5_2 , etc., input elements 6_1 , 6_2 , etc. and triggering elements 7_1 , 7_2 , etc.

Each composition element 4_1 , 4_2 , etc. makes it possible to organize a grouping of at least one interaction element included in one and the same interaction panel. What has to be done for example is to organize the display, on one or more lines of a display screen, of a plurality of visual interaction elements so that they are all visible simultaneously or, on the contrary, so that only some of them are visible (if the size of the screen is not sufficient).

By way of an exemplary non-restrictive indication, the following composition elements may be mentioned:

- the "row" composition elements enabling the organization of the visual interaction elements on a screen by placing them for example one after the other from left to right;

- the "flashing" composition elements enabling the alternative display, for a predetermined period, of several visual interaction elements on a screen;

- the "list" or "menu" composition elements that enable the display of the visual interaction elements on a screen, for example one by one, with the possibility for the user of going from one to the other by means of the navigation keys.

Each output element 5_1 , 5_2 , etc. enables the automatic branch exchange and/or terminal to communicate information to a user, by means of at least one terminal output resource. The information elements communicated are for example sounds, ringing or again messages displayed on a screen. They may be fixed or variable. In the latter case, they enable for example the user to be informed of a current value of a data element. The term « output resources of the terminal » must be understood to mean especially but not exclusively display units, portions of display units (for example screen lines), loudspeakers, ringing bells and light indicators (for example LEDs).

Each input element 6_1 , 6_2 , etc. enables a user to give information to the system (namely to the automatic branch exchange and/or terminal) by means of at least one terminal input resource. The information given is for example data that the user enters through the keyboard. The term « terminal input resources » is understood to mean especially but not exclusively keys, touch screen pads, preprogrammed control buttons and programmable menu buttons.

It must be noted that it is possible, while remaining within the context of the present invention, to combine the input and output aspects within one and the same element called an input/output element. This for example enables the user to have feedback (for example visual feedback) on the information that he has just entered (by the keyboard for example).

Each triggering element 7_1 , 7_2 , etc. enables a user to trigger at least one action in the system by means of at least one terminal input resource.

Just like the interaction panels 2_1 to 2_k , the interaction background 3 comprises interaction elements. These elements are for example divided into four groups $4'$ to $7'$ of the same nature as the above-mentioned groups 4 to 7. They enable the user to be permanently provided with forms of interaction that are independent of the contexts of use imposed on the terminal by the application executed by the automatic branch exchange. These forms of interaction which are always available pertain, for example, to the functions of "hot dialing", navigation keys or again light indicators (LEDs). It will be recalled that the interaction forms provided by the user interface, when an interface panel is activated, are on the contrary dependent on the context associated with this panel. They may therefore very often vary with the frequency of the changes of active panels.

We shall now discuss the resolution of conflicts between interaction elements of one and the same total interaction profile that may arise from the simultaneous activation of several panels included in this total profile.

As illustrated in the single figure according to the invention, a distinct rank within a stack 12 is assigned dynamically to each of the interaction panels activated. The activated interaction panels then use the input and/or output resources of the terminal according to a predetermined strategy of use as a function of the ranks assigned to them.

A detailed example shall now be given of an exemplary strategy of use of the resources of the terminals. During its activation (or "opening"), the panel (for example the one referenced 2₃) is placed at the top of the stack 12. The other panels are then automatically shifted by one position downwards within the stack. The various types of conflicts and their associated rules are described successively here below.

The first type of conflict occurs when several output elements seek to make simultaneous use of one and the same output resource. A conflict of this kind occurs for example when two output elements of two panels require the simultaneous use of one and the same portion of display screen which of course is impossible. It will be noted first of all that each output resource is either indivisible (this is for example the case of a loudspeaker, a bell ringing system or again a light indicator) or can be broken down into a plurality of output resource elements (this is the case for example of a display screen). The following is the rule adopted: at each instant, each output resource (if it is indivisible) or each output resource element (if the output resource can be subdivided) is used by the output element included in the panel which, among those likely to use it at this point in time, occupies the highest position within the stack. This amounts to saying that one panel placed on top of another may conceal it partially or entirely if these two panels wish to use, at the same point in time, the same output resources. It must be noted that the term "conceal" must be understood here in the broad sense of the term, namely whatever the nature of the output resources. In other words, this term "conceal" is not limited to the visual aspect.

The second type of conflict occurs when several input elements seek to make simultaneous use of one and the same input resource. The rule adopted is as follows: only the interaction panel placed at the top of the stack 12 can use the input resource of the terminal.

The third type of conflict occurs between the interaction panels 2₁ to 2_k and the interaction background 3. The rule adopted is as follows: with regard to the outputs, the interaction background 3 acts as if it were a panel placed at the bottom of the stack 12; with regard to the inputs, the interaction background 3 always receives the inputs if the panel placed at the top of the stack does not use the events.

As illustrated in the single figure, it is furthermore assumed that the application performed by the automatic branch exchange (which takes the form of a software program) is divided into a plurality of application layers including especially an upper application layer ("layer N") and an intermediate application layer ("layer N-1").

In order to implement the method according to the invention, the intermediate applications layer comprises a man-machine interface management module 8 that manages the total interaction profiles 1₁ to 1_N. This module 8 provides generic services to another module 9 included in the upper applications layer. This other module 9 manages the core of

the application executed by the automatic branch exchange, according to different predetermined scenarios expressed in detailed specifications.

The generic services built around the above-mentioned notions of interaction panels and interaction background generally relate to:

- 5 - the management of the information outputs on a terminal intended for a user;
- the management of the information inputs on a terminal, coming from a user;
- the management of the triggering of actions performed by means of a terminal, by a user.

10 In order to enable exchanges between the modules 8 and 9 of the layers N and N-1, links 10_1 , 10_2 , 10_3 , ... are used between firstly the interaction elements included in the interaction panels and, secondly, objects 11_1 , 11_2 , 11_3 , ... included in the module 9 included in the upper application layer N. The links enable the updating of the information communicated by the output elements as well as the taking into account of the information received by the input elements or action triggering requests received by the triggering

15 elements. Each total interaction profile comprises its own set of links. Each link generally bears a connection between an interaction element and an object. It is clear however that the connection made by one and the same link may relate to several interaction elements and/or several objects. Furthermore, each connection generally bears one of the following object components (or information categories): attribute, association or operation. It is clear

20 however that one and the same connection can simultaneously bear several of these components.

WHAT IS CLAIMED IS:

1. Method for the management of the user interfaces of a plurality of user terminals connected to an automatic branch exchange comprising a step according to which said automatic branch exchange provides for a multiple-
5 context management of the user interface of each terminal, enabling the user interface of each terminal to be matched with one or more distinct and possibly simultaneous contexts of use imposed on said terminal.

2. Method according to claim 1, further comprising that when more than one simultaneous contexts of use are imposed on a terminal, a plurality of
10 interaction elements which each control a part of said terminal and relate to at least one context use the part of the interface of said terminal according to a function of a distinct rank assigned to a plurality of interaction panels on which said interaction elements are included.

3. Method according to claim 1, further comprising that said step of
15 multiple-context management itself comprises the following steps for each terminal:

- defining of at least one total interaction profile (1_1 to 1_N) comprising at least one interaction panel (2_1 to 2_K), each interaction panel being associated with a distinct context of use, the activation, by the automatic branch exchange, of a
20 given interaction panel resulting in a matching of the user interface of said terminal with the context of use associated with said given interaction panel;

- the activating by said automatic branch exchange, within said at least one total interaction profile, of the interaction panel or panels associated with said
25 distinct and possibly simultaneous context or contexts of use imposed on the terminal.

4. Method according to claim 3, further comprising that at least one total interaction profile (1_1 to 1_N) furthermore comprises at least one interaction background (3) that is not associated with any specific context of use of said
terminal

30 and in that said automatic branch exchange, within said at least one total interaction profile, permanently activates said at least one interaction background so that the user interface of said terminal always provides at least one form of

interaction that is independent of said contexts of use and especially of the activated context of contexts of use.

5. Method according to any one of the claims 3 and 4, further comprising interaction panel (2_1 to 2_k) and/or each interaction background (3) comprises at least one interaction element belonging to the group comprising:

- composition elements ($4_1, 4_2, \dots$) each enabling the organization of a grouping of at least one interaction element included in said interaction panel;

- output elements ($5_1, 5_2, \dots$) each enabling the automatic branch exchange and/or one of said terminals to communicate fixed and/or variable information elements to a user by means of at least one terminal output resource;

- input elements ($6_1, 6_2, \dots$) each enabling a user to provide information to the automatic branch exchange and/or to one of said terminals by means of at least one terminal input resource;

- triggering means ($7_1, 7_2, \dots$) each enabling a user to trigger at least one action in the automatic branch exchange and/or in one of said terminals by means of at least one terminal input resource.

6. Method according to claim 5, further comprising that said at least one terminal output resource belongs to the group comprising:

- display screens;

- portions of display screens;

- loudspeakers;

- ringing bell systems;

- light indicators.

7. Method according to any of the claims 5 and 6 further comprising that said at least one terminal output resource belongs to the group comprising:

- keys;

-touch screen pads;

-programmed control buttons;

- programmable menu buttons.

8. Method according to any of the claims 3 to 7 further comprising that said total interaction profiles (1_1 to 1_N) of said terminals are managed by said

automatic branch exchange in an intermediate applications layer (layer N-1) proposing generic services to at least one higher level applications layer (layer N).

9. Method according to claim 8, further comprising that said at least one total interaction profile (1_1 to 1_N) furthermore comprises a plurality of links (10₁, 10₂, 10₃,...) each bearing at least one connection between at least one of said interaction elements and at least one object (11₁, 11₂, 11₃,...) of an application included in said at least one higher level applications layer.

10. Method according to claim 9, further comprising that each connection bears at least one object component belonging to the group comprising:

- attributes;
- associations;
- operations.

11. Method according to any of the claims 3 to 10 further comprising that when a total interaction profile (1_1 to 1_N) comprises at least two activated interaction panels, said method comprises the following steps:

- a distinct rank within a stack (12) is assigned dynamically to each of said activated interaction panels;
- said activated interaction panels use the input and/or output resources of said terminals according to a predetermined strategy of use as a function of the ranks assigned to them.

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