Title: AUTO-LEARNING DYNAMIC TELEPHONE FEATURE ACTIVATION PROFILES

Abstract: A method, apparatus and computer program product for auto-learning dynamic telephone feature activation profiles is presented. At least one profile is determined for a telephone, the profile defining behavior for the telephone. Dynamic rules are associated with a profile for the telephone. In accordance with the dynamic rules, the behavior of the telephone is changed according to a call history user status based on a calendar, time of day associated with the telephone. The profile determines whether the call is blocked, put through, the ring tone, the volume of the ringing tone and whether the call is forwarded to another destination such as voicemail. Allledged improvement event driven adaptation of call handling, uses the word auto-learning without explaining how this can be performed technically.
AUTO-LEARNMG DYNAMIC TELEPHONE FEATURE ACTIVATION PROFILES

BACKGROUND

Certain telephones can include a user profile. The user profile can include things such as the user status, the time of day, a call history and calling contacts. The user status can include whether the user is in a meeting, on vacation, at work, at home, or otherwise unavailable. This can be determined by a calendar application associated with the user. A call history may comprise a list of calls recently received or initiated by the user. The calling contacts include a listing of those who have called the user, determined through the use of Automated Number Information (ANI), or a similar service. The user profile can be used to determine certain behavior associated with the phone. The behavior can include a pass through level, a ring volume, a ring tone and a coverage rule.

Auto-learning of events in order to activate features using event driven architecture (EDA) is known. Patterns in streams of events are recognized, analyzed and utilized to change future behavior. Auto-adaptive dynamic behavior driven by the user's history of events is well known by all Microsoft Office® users wherein buttons and menu items that are often used are presented, while more seldom used buttons and menu items are hidden, unless the user presses a small arrow that displays all the buttons and menu items.

SUMMARY

As telephones become more complex, a larger emphasis is put on user comfort in configuring the phone to fit his/ her individual needs. In many cases, phone users do not utilize the phone's feature-activation profile to accurately fit their needs. This may be because only few people know how to phrase the complex behaviors in terms of business rules.

There are solutions that offer dynamic switching between profiles, but not auto-learning. For example, some mobile phones allow the user to change the phone profile for a certain amount of time, after which the phone will return to the previous profile.

Conventional mechanisms such as those explained above suffer from a variety of deficiencies. One such deficiency is that the profiles themselves are static, they do not adjust while being activated. Another such deficiency is that only one profile switching is allowed and only for a predetermined time. Additionally, profile switching is not done automatically, as such profile switching needs to be initiated by the user.
Embodiments of the presently disclosed auto-learning dynamic telephone feature activation profiles simplifies the user experience by enabling the feature-activation profile to dynamically adapt, so the user needs are satisfied without requiring a pre-meditated complex set of rules. Feature activation profiles that dynamically change the phone's behavior based on auto-learning the phone's call history and external information sources (e.g., calendar information on meeting/vacation/holiday status, time of day and day of the week, working hours preferences) provide a more useful and enjoyable experience for the user.

In a particular embodiment of a method for providing auto-learning dynamic telephone feature activation profiles, the method includes defining at least one profile for a telephone, the profile defining behavior for the telephone. The method also includes associating dynamic rules with the at least one profile for the telephone. The method further includes, in accordance with the dynamic rules, changing the behavior of the telephone according to a call history associated with the telephone.

Other embodiments include a computer readable medium having computer readable code thereon for providing dynamic telephone feature activation profiles. The computer readable medium includes instructions for defining at least one profile for a telephone, the profile defining behavior for the telephone. The computer readable medium also includes instructions for associating dynamic rules with the at least one profile for the telephone. Further, the computer readable medium includes instructions wherein, in accordance with the dynamic rules, instructions for changing the behavior of the telephone according to a call history associated with the telephone.

Still other embodiments include a computerized device, configured to process all the method operations disclosed herein as embodiments of the invention. In such embodiments, the computerized device includes a memory system, a processor, communications interface in an interconnection mechanism connecting these components. The memory system is encoded with a process that provides dynamic telephone feature activation profiles as explained herein that when performed (e.g. when executing) on the processor, operates as explained herein within the computerized device to perform all of the method embodiments and operations explained herein as embodiments of the invention. Thus any computerized device that performs or is programmed to perform up processing explained herein is an embodiment of the invention.

Other arrangements of embodiments of the invention that are disclosed herein include software programs to perform the method embodiment steps and operations summarized
above and disclosed in detail below. More particularly, a computer program product is one embodiment that has a computer-readable medium including computer program logic encoded thereon that when performed in a computerized device provides associated operations providing dynamic telephone feature activation profiles as explained herein. The computer program logic, when executed on at least one processor with a computing system, causes the processor to perform the operations (e.g., the methods) indicated herein as embodiments of the invention. Such arrangements of the invention are typically provided as software, code and/or other data structures arranged or encoded on a computer readable medium such as an optical medium (e.g., CD-ROM), floppy or hard disk or other a medium such as firmware or microcode in one or more ROM or RAM or PROM chips or as an Application Specific Integrated Circuit (ASIC) or as downloadable software images in one or more modules, shared libraries, etc. The software or firmware or other such configurations can be installed onto a computerized device to cause one or more processors in the computerized device to perform the techniques explained herein as embodiments of the invention. Software processes that operate in a collection of computerized devices, such as in a group of data communications devices or other entities can also provide the system of the invention. The system of the invention can be distributed between many software processes on several data communications devices, or all processes could run on a small set of dedicated computers, or on one computer alone.

It is to be understood that the embodiments of the invention can be embodied strictly as a software program, as software and hardware, or as hardware and/or circuitry alone, such as within a data communications device. The features of the invention, as explained herein, may be employed in data communications devices and/or software systems for such devices such as those manufactured by Avaya, Inc. of Lincroft, New Jersey.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

Figure 1 depicts a block diagram showing the relationship between a user profile and phone behavior;
Figure 2 depicts a block diagram of an example apparatus that provides dynamic telephone feature activation profiles in accordance with embodiments of the invention;

Figure 3 comprises a flow diagram of a particular embodiment of a method of providing dynamic telephone feature activation profiles in accordance with embodiments of the invention;

Figure 4 comprises a flow diagram of a particular embodiment of a method of providing a user profile in accordance with embodiments of the invention; and

Figure 5 comprises a flow diagram of a particular embodiment of a method of defining behavior for a user in accordance with embodiments of the invention.

DETAILED DESCRIPTION

Most modern handsets (in particular - cellular telephones, or business phones attached to modern Private Branch Exchanges (PBXs)) allow users to configure multiple telephone feature-activation profiles for various working circumstances, and to switch between them easily. However, those profiles are strict and do not adjust the phone behavior while activated.

For example, when a user is going into an important meeting, the user may silence their phone or redirect their calls to a voicemail service. This behavior is definitive until the user changes the phone's profile. However, if a family member tries to call many times in short intervals throughout the meeting, it probably means there is some emergency situation necessitating a reply, hi this case, the user would like the call to pass through even in the middle of the meeting.

By way of embodiments of the presently described dynamic telephone feature activation profiles, profiles can be created with associated dynamic rules that may change the phone's behavior according to the phone's call history. This means the phone profile would adapt and treat certain predefined callers differently at different scenarios. For example, when the phone is silenced but a consecutive number of calls from a specific phone handle are attempted in short intervals, and previous usage history shows that the user tends to take the call in similar conditions, the next call from that handle will not be silenced or redirected.

However, that same call may be silenced in other cases, without actively switching between profiles.
This is applicable in the scenario described above, allowing important callers to pass through in this case, but not in others. The auto-learning feature determines who those important callers are, through observation of previous behavior (i.e., "learning").

Each profile is allowed to have a specified set of rules. The rules would determine the profile's ring tone, ring volume, pass-through level (entirely block, do not disturb, always pass through, pass through after X call attempts in Y minutes), etc., for a chosen time of the day (for example, at night you would want less disturbances), day of the week (do not pass certain contacts at the weekend), date (different set of rules on holidays), or status (in a meeting according to the phone's calendar). Unlike previous art, the association of a profile to a contact (or a group of contacts) as well as some of the properties (pass-though level), is automatically learned by the phone, observing previous user behavior when receiving calls from that contact given certain conditions (e.g., current ring settings, calendar information on current meeting/holiday/vacation status, etc.).

Referring now to Figure 1, a block diagram showing how a user profile 20 is used by profile logic 30 to define behavior 32. Profile 20 includes one or more profile elements. While four profile elements are shown and described, it should be understood that any number of profile elements could be utilized. In this example, the profile elements include a user status 22, a time of day 24, a call history 26 and a calling contact 28. While only these profile elements are shown and described, it should be appreciated that other profile elements could also be used. The user status 22 indicates the status of the user, such as working, at home, on vacation, in a meeting, etc. 

One embodiment the user status 22 can be obtained from a Calendar program associated with the user. The time of day 24 is self-explanatory. The call history 26 contains the information relating to how the user handled calls for various user status, times of day, and calling contacts. The calling contact 28 is the person placing the call to the user. This information may be available via Automatic Number Identification (ANI) or a unique handle such as Universal Resource Locator (URL) or associated email address.

The profile logic 30 dynamically adjusts the device behavior 32 based on the user profile. The auto-learning dynamic telephone feature activation profiles simplifies the user experience by enabling the feature-activation profile to dynamically adapt, so the user needs are satisfied without requiring a pre-meditated complex set of rules. Feature activation profiles dynamically change the phone's behavior based on auto-learning the phone's call history and external information sources (e.g., calendar information on
meeting/vacation/holiday status, time of day and day of the week, working hours
preferences). The behavior 32, in this example contains various functions such as pass-
through level 34, ring volume 36, ring tone 38 and coverage rule 40. While four behavior
elements are shown and described, it should be understood that any number of behavior
elements could be utilized. While only these behavior elements are shown and described, it
should be appreciated that other behavior elements could also be used. Pass-through level 34
includes wherein the call is entirely blocked, do not disturb, always pass through, and pass
through after a predetermined number of attempts within a predetermined time period. Ring
volume defines the volume of the ring and could also include the vibrate option instead of
providing a ring. Ring tone 38 is the associated ring for the caller. Different callers can have
different ring tones associated therewith, which serve to make the identity of the caller known
to the user without looking at the phone. The coverage rule 40 is a list or specification of the
actions taken to divert an incoming call, such as redirect the call to a voicemail service or to a
different service, under certain conditions.

Figure 2 is a block diagram illustrating an example telephone 100 for implementing
dynamic behavior 140 and/or other related processes to carry out the different functionality as
described herein.

As shown, telephone system 100 of the present example includes an interconnect 111
that couples a memory system 112 and a processor 113 an input/output interface 114, and a
communications interface 115.

As shown, memory system 112 is encoded with dynamic behavior application 140-1.
Dynamic behavior application 140-1 can be embodied as software code such as data and/or
logic instructions (e.g., code stored in the memory or on another computer readable medium
such as a disk) that support functionality according to different embodiments described
herein.

During operation, processor 113 of telephone 100 accesses memory system 112 via
the interconnect 111 in order to launch, run, execute, interpret or otherwise perform the logic
instructions of the dynamic behavior application 140-1. Execution of dynamic behavior
application 140-1 produces processing functionality in dynamic behavior process 140-2. In
other words, the dynamic behavior process 140-2 represents one or more portions of the
dynamic behavior application 140-1 (or the entire application) performing within or upon the
processor 113 in the computer system 100.
It should be noted that, in addition to the dynamic behavior process 140-2, embodiments herein include the dynamic behavior application 140-1 itself (i.e., the unexecuted or non-performing logic instructions and/or data). The dynamic behavior application 140-1 can be stored on a computer readable medium such as a floppy disk, hard disk, or optical medium. The dynamic behavior application 140-1 can also be stored in a memory type system such as in firmware, read only memory (ROM), or, as in this example, as executable code within the memory system 112 (e.g., within Random Access Memory or RAM).

In addition to these embodiments, it should also be noted that other embodiments herein include the execution of dynamic behavior application 140-1 in processor 113 as the dynamic behavior process 140-2. Those skilled in the art will understand that the telephone 100 can include other processes and/or software and hardware components, such as an operating system that controls allocation and use of hardware resources associated with the telephone 100. Also an embodiment can include wherein the phone acts a dumb terminal in that all or some of the data storing and processing is performed by a server and then transmitted to the phone.

In certain embodiments the phone user has the option of manually changing or resetting the behavior determined by the dynamic profile for a particular phone handle or group of phone handles. The user may also have the option of switching between using a dynamic profile and a static or conventional profile.

Further still, an embodiment can include wherein dynamic changes in behavior for a handle need to be confirmed by the user. The user is advised on dynamically changing a behavior but doesn't necessarily apply the change. In such an embodiment the user can choose between confirmation levels, from a "fully automated" level to an "ask about any change level", and may include some levels in between.

Flow charts of the presently disclosed method are depicted in Figures 3 through 5. The rectangular elements are herein denoted "processing blocks" and represent computer software instructions or groups of instructions. Alternatively, the processing blocks represent steps performed by functionally equivalent circuits such as a digital signal processor circuit or an application specific integrated circuit (ASIC). The flow diagrams do not depict the syntax of any particular programming language. Rather, the flow diagrams illustrate the functional information one of ordinary skill in the art requires to fabricate circuits or to generate computer software to perform the processing required in accordance with the present
invention. It should be noted that many routine program elements, such as initialization of loops and variables and the use of temporary variables are not shown. It will be appreciated that those of ordinary skill in the art that, unless otherwise indicated herein, the particular sequence of steps described is illustrative only and can be varied without departing from the spirit of the invention. Thus, unless otherwise stated, the steps described below are unordered meaning that, when possible, the steps can be performed in any convenient or desirable order.

Referring now to Figure 3, a flow diagram of a particular embodiment of a method 200 of providing dynamic telephone feature activation profiles in accordance with embodiments of the invention is shown. Method 200 begins with processing block 202 which recites defining at least one profile for a telephone, the profile defining behavior for the telephone.

Processing block 204 discloses associating dynamic rules with the at least one profile for the telephone. Profiles can be created with associated dynamic rules that may change the phone's behavior according to the phone's call history. This means the phone profile would adapt and treat certain predefined phone handles differently at different scenarios. For example, when the phone is silenced but a consecutive number of calls from a specific phone handle are attempted in short intervals, and previous usage history shows that the user tends to take the call in similar conditions, the next call from that handle will not be silenced or redirected. However, that same call may be silenced in other cases, without actively switching between profiles.

Processing block 206 states, in accordance with the dynamic rules, changing the behavior of the telephone according to a call history associated with the telephone. For example, when the phone is silenced but a consecutive number of calls from a specific phone handle are attempted in short intervals, and previous usage history shows that the user tends to take the call in similar conditions, the next call from that handle will not be silenced or redirected. However, that same call may be silenced in other cases, without actively switching between profiles.

Processing block 208 recites the user may also have the option of switching between using a dynamic profile and a static or conventional profile. In certain embodiments the phone user has the option of manually changing or resetting the behavior determined by the dynamic profile for a particular phone handle or group of phone handles.
Processing block 210 recites wherein the associating and changing are performed on a server and the results of the associating and changing are transmitted to the phone. The phone acts a dumb terminal in that all or some of the data storing and processing is performed by a server and then transmitted to the phone.

Processing block 212 recites wherein dynamic changes in behavior for a handle need to be confirmed by the user. The user is advised on dynamically changing a behavior but doesn't necessarily apply the change. In such an embodiment the user can choose between confirmation levels, from a "fully automated" level to an "ask about any change level", and may include some levels in between.

Referring now to Figure 4, a flow diagram of a particular embodiment of a method 250 of providing a user profile in accordance with embodiments of the invention is shown. Method 250 begins with processing block 252, which discloses the profile includes at least one of the group consisting of a user status, a time of day, a call history and a calling contact. Processing block 254 states the user status is determined from a calendar application associated with the user.

Referring now to Figure 5 a flow diagram of a particular embodiment of a method 300 of defining behavior for a phone in accordance with embodiments of the invention is shown. Method 300 begins with processing block 302 which discloses the behavior comprises at least one of the group consisting of a pass-through level, a ring volume, a ring tone and a coverage rule.

Processing block 304 states the pass through level is selected from the group consisting of entirely blocked (do not answer), do not disturb (pass through to a coverage service), always pass through, and pass through after a predetermined number of attempts within a predetermined time period (indicating an emergency situation requiring attention).

Having described preferred embodiments of the invention it will now become apparent to those of ordinary skill in the art that other embodiments incorporating these concepts may be used. Additionally, the software included as part of the invention may be embodied in a computer program product that includes a computer useable medium. For example, such a computer useable medium can include a readable memory device, such as a hard drive device, a CD-ROM, a DVD-ROM, or a computer diskette, having computer readable program code segments stored thereon. The computer readable medium can also include a communications link, either optical, wired, or wireless, having program code segments carried thereon as digital or analog signals. Accordingly, it is submitted that that
the invention should not be limited to the described embodiments but rather should be limited only by the spirit and scope of the appended claims.
1. A method comprising:
   defining at least one profile for a telephone, said profile defining behavior for said telephone;
   associating dynamic rules with said at least one profile for said telephone; and
   in accordance with said dynamic rules, changing the behavior of said telephone according to a call history associated with said telephone.

2. The method of claim 1 wherein said profile includes at least one of the group consisting of a user status, a time of day, a call history and calling contacts.

3. The method of claim 1 wherein said behavior comprises at least one of the group consisting of a pass-through level, a ring volume, a ring tone and a coverage rule.

4. The method of claim 3 wherein said pass through level is selected from the group consisting of entirely blocked, do not disturb, always pass through, and pass through after a predetermined number of attempts within a predetermined time period.

5. The method of claim 2 wherein said user status is determined from a calendar application associated with said user.

6. The method of claim 1 wherein said user can switch between dynamically changing the behavior of said phone and conventional phone behavior.

7. The method of claim 1 wherein said associating and changing are performed on a server and the results of said associating and said changing are transmitted to said phone.

8. The method of claim 1 wherein said changing further comprises receiving confirmation before applying changes to said phone.
9. A computer readable medium having computer readable code thereon for dynamic telephone feature activation profiles, the medium comprising:
   instructions for defining at least one profile for a telephone, said profile defining behavior for said telephone;
   instructions for associating dynamic rules with said at least one profile for said telephone; and
   in accordance with said dynamic rules, instructions for changing the behavior of said telephone according to a call history associated with said telephone.

10. The computer readable medium of claim 9 wherein said profile includes at least one of the group consisting of a user status, a time of day, a call history and calling contacts.

11. The computer readable medium of claim 9 wherein said behavior comprises at least one of the group consisting of a pass-through level, a ring volume, a ring tone and a coverage rule.

12. The computer readable medium of claim 11 wherein said pass through level is selected from the group consisting of entirely blocked, do not disturb, always pass through, and pass through after a predetermined number of attempts within a predetermined time period.

13. The computer readable medium of claim 10 wherein said user status is determined from a calendar application associated with said user.

14. The computer readable medium of claim 9 further comprising instructions wherein said user can switch between dynamically changing the behavior of said phone and conventional phone behavior.

15. The computer readable medium of claim 9 wherein said associating and changing are performed on a server and the results of said associating and said changing are transmitted to said phone.
16. The computer readable medium of claim 9 wherein said changing further comprises receiving confirmation before applying changes to said phone.

17. A computer system comprising:
   a memory;
   a processor;
   a communications interface;
   an interconnection mechanism coupling the memory, the processor and the communications interface; and
   wherein the memory is encoded with an application providing dynamic telephone feature activation profiles, that when performed on the processor, provides a process for processing information, the process causing the computer system to perform the operations of:
   defining at least one profile for a telephone, said profile defining behavior for said telephone;
   associating dynamic rules with said at least one profile for said telephone; and
   in accordance with said dynamic rules, changing the behavior of said telephone according to a call history associated with said telephone.

18. The computer system of claim 17 wherein said profile includes at least one of the group consisting of a user status, a time of day, a call history and calling contacts.

19. The computer system of claim 17 wherein said behavior comprises at least one of the group consisting of a pass-through level, a ring volume, a ring tone and a coverage rule.

20. The computer system of claim 19 wherein said pass through level is selected from the group consisting of entirely blocked, do not disturb, always pass through, and pass through after a predetermined number of attempts within a predetermined time period.

21. The computer system of claim 18 wherein said user can switch between dynamically changing the behavior of said phone and conventional phone behavior.
22. The computer system of claim 18 wherein said changing further comprises receiving confirmation before applying changes to said phone.
FIGURE 1
Figure 2
DEFINING AT LEAST ONE PROFILE FOR A TELEPHONE, THE PROFILE DEFINING BEHAVIOR FOR THE TELEPHONE

ASSOCIATING DYNAMIC RULES WITH THE AT LEAST ONE PROFILE FOR THE TELEPHONE

IN ACCORDANCE WITH THE DYNAMIC RULES, CHANGING THE BEHAVIOR OF THE TELEPHONE ACCORDING TO A CALL HISTORY ASSOCIATED WITH THE TELEPHONE

USER CAN SWITCH BETWEEN DYNAMICALLY CHANGING THE BEHAVIOR OF THE PHONE AND CONVENTIONAL PHONE BEHAVIOR

ASSOCIATING AND CHANGING ARE PERFORMED ON A SERVER AND THE RESULTS OF SAID ASSOCIATING AND SAID CHANGING ARE TRANSMITTED TO SAID PHONE

CHANGING FURTHER COMPRIS ES RECEIVING CONFIRMATION BEFORE APPLYING CHANGES TO SAID PHONE

Figure 3
THE PROFILE INCLUDES AT LEAST ONE OF THE GROUP CONSISTING OF A USER STATUS, A TIME OF DAY, A CALL HISTORY AND A CALLING CONTACT

THE USER STATUS IS DETERMINED FROM A CALENDAR APPLICATION ASSOCIATED WITH THE USER

Figure 4
THE BEHAVIOR COMPRISER AT LEAST ONE OF THE GROUP CONSISTING OF A PASS-THROUGH LEVEL, A RING VOLUME, A RING TONE AND A COVERAGE RULE

THE PASS THROUGH LEVEL IS SELECTED FROM THE GROUP CONSISTING OF ENTIRELY BLOCKED, DO NOT DISTURB, ALWAYS PASS THROUGH, AND PASS THROUGH AFTER A PREDETERMINED NUMBER OF ATTEMPTS WITHIN A PREDETERMINED TIME PERIOD

Figure 5
A. CLASSIFICATION OF SUBJECT MATTER

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

INV. H04M3/42 H04M3/436

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols):

H04M

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further special documents are listed in the continuation of Box C.

See patent family annex.
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