

Virtual Personal Assistant (VPA) for Mobile Users

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Abstract

Virtual Personal Assistant (VPA) is the next generation of carrier services for mobile users. VPA is believed to be the intelligent evolution of services to meet the ever increasing demand by the mobile professionals for mobility and connectivity. This new generation of services will allow mobile users to remotely access and manage information using speech recognition technology over telephones. VPA responds to conversational voice commands and delivers a single point of contact that seamlessly engages a wide range of information. The VPA controls the telephone calls, manages the personal activities through calendar, enables the user to access his task manager via voice interface, and includes all the functions of Unified Messaging. The VPA enables the user to optimize the user resources (time, cost), enhance his/her overall productivity, and minimize the interruptions to his regular workflow. The Virtual Personal Assistant (VPA) will enable the user to efficiently handle increasing demand of telephone calls, messages, meetings and other activities. The paper provides an overview of the VPA applications, and the expected features and future trends. The paper proposes as well a unified decision model based on a quantitative assessment of the importance of the requests and the availability of the user.

1. Introduction

As a result of the intense competition for market-share among wireline and wireless telephone service providers, many analysts believe that to thrive in this competitive landscape, carriers must differentiate themselves through value-added enhanced service offerings that attract new customers, improve retention, and increase revenue streams. New Services such as the Virtual Personal Assistant (VPA) has the potential for attracting new customers, improving retention, increasing the minutes of use, and for creating new revenue streams¹ [1].

VPA is conceived to be a computerized equivalent of a personal assistant or secretary that interacts with the remote users using telephones and cell phones. Telephone and cell phone users access the Web using Voice User Interface (VUI) often specified with VoiceXML. VUI allows users to access and manage information using speech recognition and speech synthesis. The traditional Graphical User Interface (GUI) is targeted to the large screen

¹ The material presented here is based on the author's investigation work for Mitel Networks (2000-2002), and his later continued research work at KFUPM.

available on PCs, and is used by the VPA for user account management over Internet. With the integration of cell phones with the hand-held PDAs, a third type of user interface emerges, Multi-Modal User Interface (MMUI), that enables users to both speak and hear, as well as read and click. The much smaller screens on the wireless PDAs limit the capability of the GUI and instigate MMUI for future PDAs interface.

The initial market segments for the VPA include professionals as doctors, lawyers, sales representatives, maintenance crew, small offices, and home businesses. VPA allows mobile professionals to remotely access and manage information over telephones. Using a VPA, information that resides on the Internet, corporate intranet or any internal network or database can be accessed. The VPA concept has been envisioned by a number of investigators as intelligent software agents [2-6]. Software agents differ from conventional software in that they are semi-autonomous, proactive, and adaptive. Software agents could perform certain tasks on behalf of its user [7]. It could also interact with other intelligent agents and/or human in performing its tasks [8]. The VPA is expected to support and enhance the following features:

Messaging - Mobile professionals can manage voice-mail, e-mail and faxes using their VPA from the road.

Contact Management - Scheduling, planning, group calendar, contact and referral organization, all can be managed with the VPA. It's compatibility with Microsoft Exchange/Outlook make it an ideal contact management solution.

Call Control - The VPA enables remote users to perform conference calling and call management. Notification and forwarding features allow remote users to be notified immediately when they receive specific voice-mails, e-mails, faxes, or pages [9].

Internet Applications - The VPA allows personnel to access and engage the internet to help them source information ranging from weather, directions and schedules, to stock performance, competitive data and news. All using simple, conversational voice commands.

Intranet Applications - Important information contained on the corporate network can be acquired remotely using the VPA. Customer data, shipping and inventory information, sales reports, financial data and more, all can be seamlessly accessed and utilized by mobile professionals.

Another market driver for the electronic assistant is that the automobile has become a mobile office, making safety an increasingly important issue. Using voice commands instead of touch-tones is not only a convenience, it is being perceived by consumers as a safety necessity. The global market for unified messaging services is expected to be a considerable share of the telecomm applications. It is estimated that it will be worth several billions by 2007. While indirect revenues for the carriers will be several folds. A few companies has started offering converging products in the VPA direction, e.g. Conita, WildFire, VoxSurf, VoiceGeneie, and VoiceTel, and Mitel Networks, though one or two provide solutions for mobile carrier environment.

In summary, VPA promises to provide hands-free, eyes-free access to the web anywhere, any time, from any phone.

3- Features of VPA

Virtual Personal Assistant VPA allows mobile professionals to manage voice-mail, e-mail, fax, contact information, and scheduling of meetings and tasks via Voice User Interface (VUI). Using a VPA, information that resides on the internet, corporate intranet or any internal network or database can be accessed. The core of VPA is a voiced enabled unified messaging (UM) platform to support voice/video Mail, Email and Fax.. Fig.1 shows the VPA from the user perspective. The VPA package integrates and manages the Microsoft

Exchange/Outlook office automation suite, including the user Inbox, contact list, calendar, and task manager, according to a set of policies and filters set by the user [10,11]. In the subsequent sections we cover in more detail some of the perceived features of the new generation of VPAs.

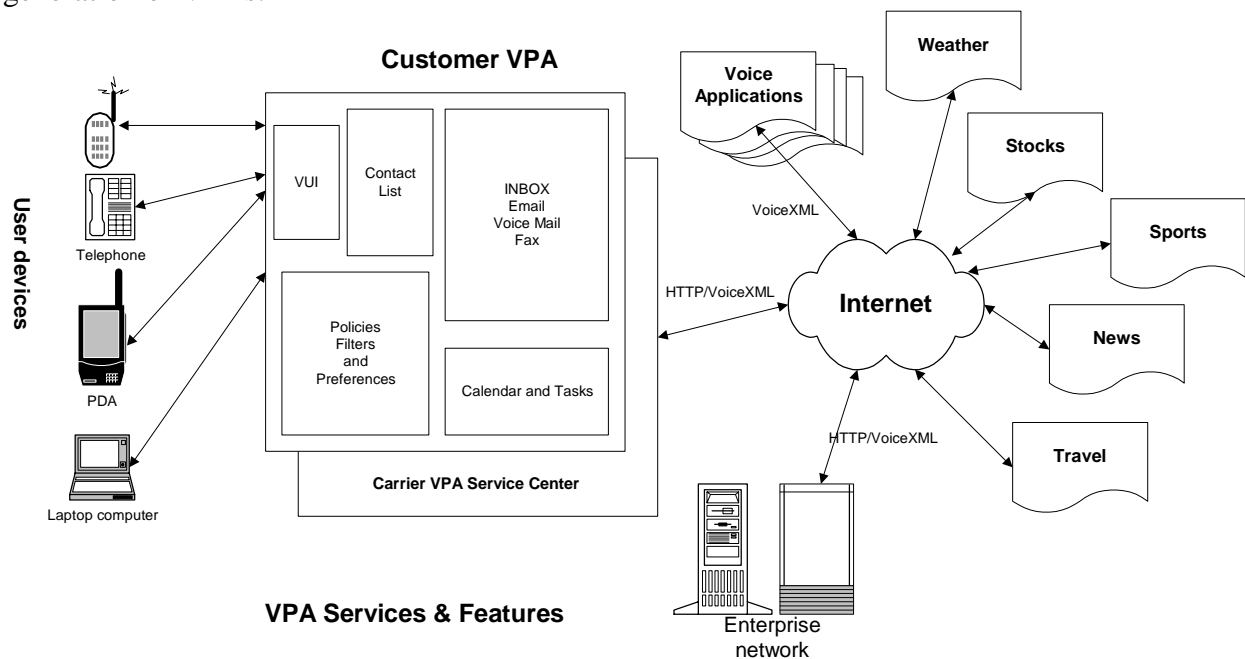


Fig. 1 Virtual Personal Assistant from user's perspective.

3.1 Unified Messaging

In unified messaging (UM), the Outlook Inbox represents a multipurpose container for Voice Mail, Email and Fax. Subscribers should be able to access their Inbox via phone and through a standard internet browser interface. Mobile professionals can manage voice-mail, video-mail, e-mail and faxes using their VPA from the road. Inbox management and creation of filters and policies are usually handled through the user windows or his internet webpage. However certain rules can be enabled/disabled through the user voice interface [11]. Among the desirable features; customized greetings, reading email with Text-To-Speech (TTS), unified commands and message management tools for voice mail, email, and faxes, group mail boxes, versatile messaged notification options, and intuitive VUI navigation commands.

3.2 Contact Management

Among the important functions of the VPA is the management and organization of the user contact list. As a minimum, VPA should provide VUI with Microsoft Exchange/Outlook contact management solutions. The next generation of the VPAs organize the contact list into preference groups, or domains, with assigned profiles, e.g., VIPs, family, team, colleagues, friends, customers, vendors, emergency, service providers, information, etc. Based on the group profiles, and set of policies, the VPA enables the user to efficiently utilize his time, and minimize interruption of his work flow [12]. The VPA not only helps the user to find people in the user contact list, but can also search the corporate directory, or internet based directory. The VPA utilizes the policies for call screening, message notification, and out of office assistant (how incoming messages should be handled). With the wide spread of

wireless PDAs, the VPA can provide as well immediate information about the call, and help the user to retrieve the caller information during the conversation.

3.3 Calendar

VPA manages the user Outlook calendar, including meetings and appointments. The VPA should be able to assist user to organize group meetings, respond to meeting requests, schedule appointments, remind the user of important dates, and keeps track of user daily schedule and activities. Each scheduled activities may have the following states:

Under processing : It is acknowledged by the VPA, but still under processing. The VPA is still trying to collect enough information to take an appropriate course of action.

Waiting: e.g. an appointment request is placed in awaiting list.

Tentative: the activity is assigned a tentative time slot, but it has not been confirmed yet.

Pending : The activity is scheduled and assigned a confirmed time slot.

Running: the activity is now running, i.e., being processed by the user.

Suspended : the activity is temporarily suspended by, say, a telephone call.

Completed : the activity is completed.

Non-scheduled walk-in meetings and telephone calls are treated similarly, except that they could skip the tentative state or the tentative and the pending states. They jump directly from the waiting to the pending or running states. More about activities will be covered in the following sections.

3.4 Activities

Intelligence is an important ingredient in the successful implementation of VPA. Classification and characterization of the various user activities is an important step in understanding the importance and significance of the user activities. Knowledge about an activity includes the user availability, location, duration, whether he can be interrupted or reached, and how can he be reached. A proposed parameterization of the user activities will be presented later in this paper. Activities can be grouped into “general activities” and “profession-specific activities”. A list of common activities is listed below

- In a meeting (with a client, with colleagues, with an employee, with boss, team, with his group, with VIPs)
- Stepped out from his desk (e.g. WC).
- Normal work activities, in duty.
- On telephone.
- Out of town , traveling
- Off for the day
- On vacation
- In Prayer
- In a seminar, presentation, short course, conference
- Went for lunch, dinner etc
- In party (business party, friend & colleagues, family)
- Went for exercise (golf, jogging, etc)
- Has doctor appointment
- Went to the dentist
- He is sick for today

- at home
- Normal work activities, in duty, etc
- Invited by a friend
- Taking nap, sleeping
- Unconditional Busy, not available
- Unconditional Available.
- Emergency situation
- Other (not listed)

3.5 Tasks

A task is a personal or work-related assignment you want to track through completion. A task can occur once or repeat (a recurring task). A recurring task can repeat at regular intervals or repeat based on the date you mark the task complete. For example, you might want to send a status report to your manager on the last Friday of every month, and get a haircut when one month has passed since your last haircut. Recurring tasks are added one at a time to the task list. When you mark one occurrence of the task complete, the next occurrence appears in the list.

Users can also create Task Requests. A task request enables the user to assign tasks to the other people, and to receive task requests from others. When someone assigns a task, that person gives up ownership of the task (unless the task is declined). Anyone who assigns a task can keep an updated copy in their task list and receive status reports for the task. Associated with task requests is a task list. A list that includes the name of the person who originally sent the task request plus the names of everyone who also received the task request, reassigned the task to someone else, and chose to keep an updated copy of the task in their task lists. VPA provides VUI to the MS Outlook task manager. However, enhanced features need to be introduced for intelligent management of the user tasks.

3.6 Internet Applications

The VPA allows personnel to access, customize, and engage the internet to help them source information ranging from weather, directions and schedules, to stock performance, competitive data and news. All using simple, conversational voice commands, e.g. trip management, airline reservation and hotel reservations. The convergence of the richness of the internet and the accessibility and mobility of the phone is now forming a vast new network - a **Voice Web** - where Internet content can be accessed from any phone, anywhere, using human voice. A voice portal can be defined as "speech-enabled access to Web-based information." In other words, a voice portal provides telephone users with a natural-language interface to access and retrieve Web content. An Internet browser can provide Web access from a computer but not from a telephone. A voice portal is a way to do that. The emerging Voice Web (or voice portals) is all about distributed voice-enabled content known as voice sites that can be accessed from any telephone using a standard voice browser. This emerging technology creates a new model for business applications known as V-Commerce.

3.7 Corporate Applications

Important information contained on the corporate network (inside the company firewall) can be acquired remotely using the VPA. Customer data, shipping and inventory information, sales reports, financial data and more, all can be seamlessly accessed and utilized by mobile professionals.

4. Architecture

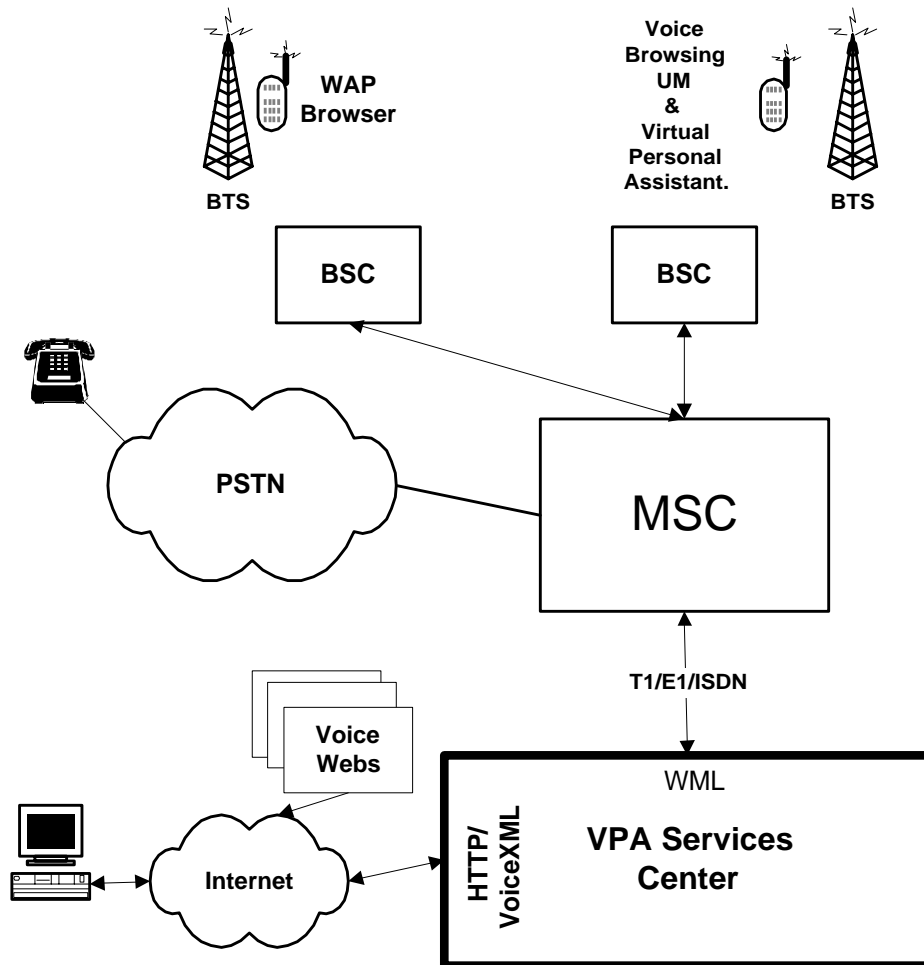
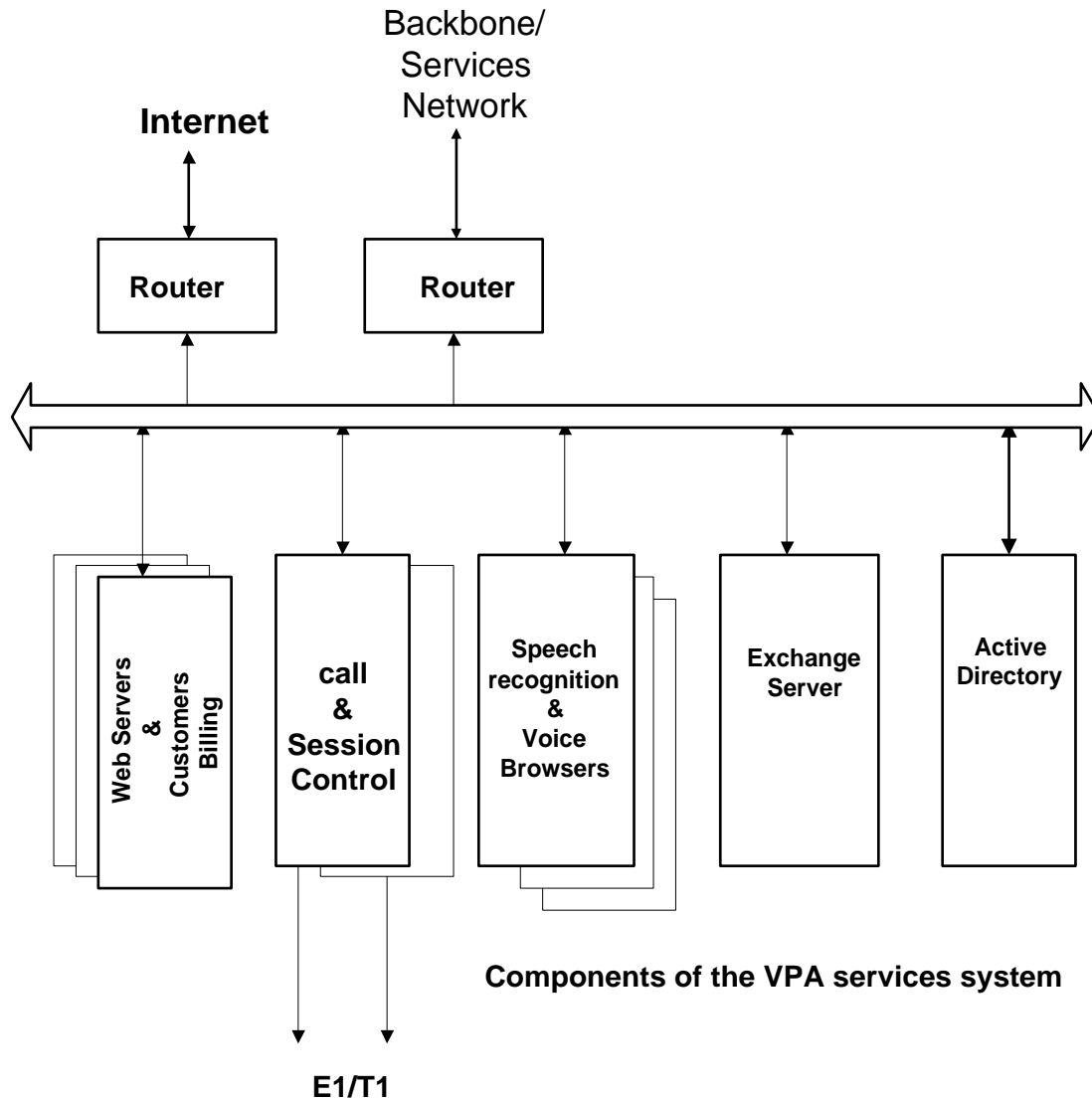


Fig.2 The VPA service center for mobile carriers.

Figure 2 provides a conceptual illustration of the VPA service center for a mobile carrier. The interface to the Mobile Switch Center (MSC) could be via multiple of T1/E1/ISDN. This configuration is suitable when the VPA service cluster is remotely located from the MSC and when the customer access their mailboxes through a single 800 number. However, when the VPA service center is located within the MSC premise, the system can be connected directly through the carrier backbone network.

The proposed system utilizes the distributed architecture of Microsoft Exchange® and MS Active Directory, as well as distributed speech recognition servers. By fully utilizing these features, a large scale system can be built with high availability and using low cost hardware solutions. Figure 3 shows the structure of the VPA service center cluster. The proposed system is a scalable solution to meet the carrier current and future needs. The flexibility of the proposed architecture would allow both **horizontal scalability** and **vertical scalability**. Horizontal scalability allows the carrier to start with a small hardware configuration and expand it as the demand for the service increases.



The vertical scalability allows the carrier to start with some basic functionality and incrementally add more services to meet the growing expectations of its. This approach would encourage the carriers to start offering market differentiating services with relatively low initial investment. The VPA service center provides the customer web access to the user unified message inbox, the user profile and VPA management and policies. The connection to the internet provides the mobile customers with access to internet services and to the voice portal applications.

The VPA service cluster consists of distributed servers and components communicating via TCP/IP across a LAN. It is important to have fast, reliable network connections between all of the machines in the system configuration. The call and session control server is responsible for managing the user session and executes the conversation navigation logic. It is also responsible for managing the call start, call end, call transfer, and user authentication. The MS Exchange server(s) provides the rich functionality of the MS office Outlook, and offers mobile, remote, and desktop e-mail access, and ensures security and privacy. MS Active Directory allows a single point of administration for all users and network resources,

messaging, including e-mail, and mailbox information, configuration information, files, peripheral devices, host connections, databases, Web access, users, other arbitrary objects, services, and more.

The speech recognition system utilizes a distributed Client/Server architecture. This architecture optimizes the use of memory and CPU resources because each Recognition Server can support multiple clients. A Resource Manager evenly distributes calls among several Recognition Servers. Recognition Servers perform speech recognition and interpretation as requested by an application via a Recognition Client. Each Recognition Server provides recognition support for one or more grammars based on a specific recognition task. When an application requests recognition, it specifies the recognition grammar to use. The Resource Manager keeps track of the grammars supported by each Recognition Server and directs recognition requests accordingly.

The proposed system can also integrate a **voice web server**, creating dual sources of revenues from mobile customers and from hosting voice portals for small business. Voice server enables the customers to brows voice web applications over internet via their mobile phones. This feature can generate a number of revenues for the mobile carriers; for example service subscriptions, Commerce transaction fees, advertising and referral fees, hosting and outsourcing services, etc. Customers can easily access their corporate information via the voice web server. The voice web pages can also be stored and managed by the corporation, while the carrier **voice web browser** enables the user to interact orally with these sources of voice-enabled applications.

5. Decision Making Model

In this section we propose a decision making model, which tries to minimize the user interruption and maximizes the utilization of the user's time.

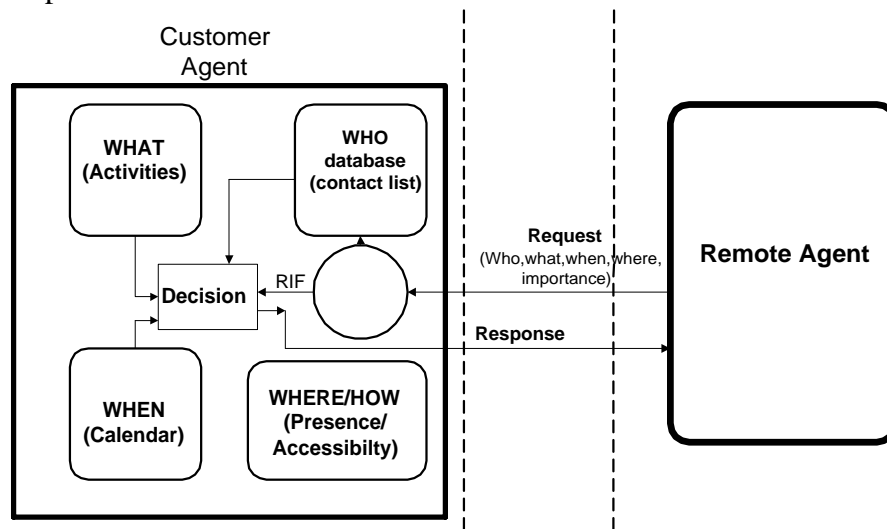


Fig. 4. The Decision Model

The VPA model or “agent”, handles the incoming requests, whether it is a telephone call, an invitation, or a meeting request, and provides an appropriate response based on the importance of the request, and the availability of the user. A request can be initiated by the user, or by another agent or person. A request is described by one or more of the following attributes:

Type : Appointment, meeting, telephone call

Who : Identity of the initiator of the request.

What : that is the subject of the request

When : now, ASAP, between, after, before, in the (morning ,evening, afternoon), on, about.

How long: expected duration of the activity.

Importance (urgent, important, business, scale from 0 to 10.0).

Upon receiving a request, the agent will try to collect as much information as possible about the request, from the caller ID, person name, from the agent database, from the caller, and from the calling agent.

When the user's agent receives a request, the actions taken will be based on a calculated **Request Importance Factor (RIF)** as compared to a **Personal Availability Threshold (PAT)**. If the RIF exceeds the PAT, the agent will interrupt the user and notify him of the coming call or message. Meetings and appointment requests will be setup according a similar scheme. As mentioned before, the calendar is used to manage meetings, appointments, and personal activities. The user marks the free time slots in his calendar with convenience score (most convenient, acceptable, inconvenient, never, in a scale 0 to 10). A request with RIF exceeding the time slot convenience threshold will be granted, other wise will be advised of the next available convenient time slot.

The agent will in general try to schedule the meeting starting from the best convenient time, according to some user defined convenience scale.

Similarly, if a call is coming while the user is on another call, the new call can be directed to the voice mail box, or directed to the call waiting feature depending on the RIF of the coming call.

The WHO database is basically the personal "contact list", organized into groups (domains), as described in Section 3. Groups are assigned a default **Group Importance Factor (GIF)**, a **Group Accessibility Time Window GATW**, and **Group Accessibility Devices (GAD)**. GATW provides a time dependent masking for the group, while GAD determines whether the group can access the user via a cellular phone, home phone, office phone(s), secretary, or any other temporarily phone. Each person in the contact list is assigned to a contact group and a default important factor. The user can modify the person important factor within the group, or temporarily assign to him an override importance factor. If a person is associated with more than one group (Role) , the importance of the person at any moment is calculated as the maximum value of the importance returned from each of his roles, e.g., suppose a person, who is a friend and a client, calls in the week end. His role as client would return very low importance factor, because the user prefers to receive his clients during the office hours only. On the other hand, the caller role as a friend would give him a high priority and accessibility during the week end.

Each scheduled activity is assigned two attributes, an **Activity Priority Factor APF**, and an **Activity Availability Factor AAF**. APF is related to scheduling, whether the task can replace another scheduled task or occupies certain inconvenient (preferred) time slots. APF is active during the activity waiting state, tentative state, and the pending states. On the other hand, AAF is related to whether the task can be interrupted/suspended once it starts. For example a dentist appointment for regular check up may have a low importance factor, and can probably be rescheduled or cancelled, however, once it is running, the user is considered unavailable and can not be interrupted by his cellular phone.

Each activity is also associated with an **Activity Accessibility Devices AAD**. AAD determines the primary telephone and the secondary telephone(s) that can be used to access the user during the execution of the activity.

It is also desirable that scheduled activities be assigned time-dependent APF that make the activity more important as it approaches its due time and more robust against cancellation by

other activities of slightly higher APF. The time dependent APF can also help in scheduling activities that need to be performed before certain deadline, e.g., purchasing an airline ticket, or a gift for the wife birthday. Another desirable feature is to allow time flexibility in start/end of scheduled tasks, and possibly scheduling of overlapping appointments as in doctor offices.

For telephone requests, several actions can be taken based of the RIF value of the caller. For example :

- 1- Denied immediately and transferred to a voice box. (RIF is too low to be accepted)
- 2- Accepted immediately and transferred to the User. (RIF is urgent, e.g., expected call).
- 3- Accepted by the agent to confirm identity, then one of the following actions
 - a) Delegated actions Get information /advice user of the available time slot to call/fix appointment/ Special message to caller.
 - b) Transfer caller to the user immediately
 - c) Put caller on hold to check availability of the user
 - d) Put caller on hold to accept/process another call.
 - e) Put caller in call waiting until the user finishes his current call.
 - f) Transfer caller to secretary or another phone number
 - g) Page the user for the caller
 - h) Transfer caller to mailbox

6. Advanced Features

Presence, as defined in telecommunications, refers to the ability to know the availability and reachability of a user in heterogeneous communications systems. This means that with presence-enabled systems, users can discover whether other users are available to communicate and through which media they can do this. Presence information, closely related to instant messaging, enables one computer user to see whether another user is currently logged onto a network, corporate LAN, or the Internet. Presence information can be set by the user to indicate a particular status. Presence information is important not only for the VPA to track the user, but also to help the user to locate other people and to suggest the best, or the least cost device to reach them.

Instant Messaging refers to the capability to send an immediate, text-based message to another user on a computer network. Unlike e-mail messages, instant messages are posted immediately to the other user's screen, providing the basis for new forms of collaboration.

Multi-modal communication. With the fast increasing capabilities of wireless PDAs, and the spread of wide band mobile communication, multi-modal communication, such as MS NetMeeting, can be a very useful online tool. For example, users can review a document or open an application during their telephone conversation. In another example, when receiving a call from a known customer, the VPA can bring the customer file for reading by the user, when it is transferring the call to the user PDA, or desktop PC..

Audio and Video Conferencing. MS Exchange provides an integrated support for scheduling online meetings and real-time collaboration. Using the standard meeting request form in Outlook, users can set up a data or videoconference and invite participants from the Exchange directory. Meetings can be either public or private, letting the meeting organizer decide whether the meeting is restricted to the invitees or publicly accessible

VPA Personality. In VUI the "voice" of the system is the most influential aspect of the system. The "voice" can make or break a system as well as directly affecting the mood of the user and callers, and possibly their attitude toward the products. The user need to enjoy interacting with the VPA and should feel comfortable engaging in dialog with it. It may be useful to let the user select the voice from several personalities with different genders, and different personality traits as well.

Standardization of Agent communication protocol. When a VPA agent receives a call it starts the greeting message with a "Voice Icon", which signals the caller that an agent is in charge. Accordingly, when an agent initiates a call it does not speak immediately, but waits until he called party finishes his greeting message.

Now, when the calling agent recognizes the initial voice icon, it realizes that the other party is also an agent. They can then switch to a more efficient computer-to-computer signaling and protocol. With the expected wide spread offering of the VPA services by mobile carriers and by many vendors, there will be a growing need for a communication standard between VPA-to-VPA across the spectrum of vendors. The protocol should cover possible interaction media as phones, internet, and multi-modal devices. Security, privacy, and authenticity are also crucial issues in the design of such protocol.

Conclusion

The paper describes a new emerging service for mobile user. The Virtual Personal Assistance provides an intelligent computer secretarial service for mobile professionals. The new service is based on convergence of internet, speech recognition technology and mobile technologies. The VPA minimizes the interruption of the user, improves the utilization of his time, and provides a single point of communication for all his messages, contacts, schedule, and source of information. The paper proposes as well a decision structure for call screening, as well as handling requests for meetings and appointment. The system initially targets lawyers, doctors, sales personnel, small offices, maintenance crews, etc. However, it is expected to become a standard feature for millions of other users.

Acknowledgement

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Appendix

Examples

- 1- The user is in a meeting. Telephone rings, the systems checks the caller ID and finds that it is coming from an important person. If the RIF is equal or exceeds the current PAT, the system accepts the call

Sara > This is the office of Mr. Elshafei. I am his computer assistant. May I know who is calling?

Caller> Essam Ali.

Sara> I am sorry, Mr Elshafei is in a meeting now. Let me check if the meeting is over. Please hold.

(Sara whispers to Mr. Elshafei if he wants to accept the call)

Sara > I am sorry, he is still in the meeting. Do you like to leave a voice message for him?

On the other hand, if the caller has higher importance than the meeting, the call is directed to the user cell phone or to the meeting room phone. Less important calls are directed automatically to the voice mail box, or to an alternative number.

- 2- The user is on telephone. If the coming call has the same or higher importance as the current call, Sara whispers to user of the incoming call to see if he wants to accept the call, hold the call, or deny the call. Here is the dialog for the three cases.

Sara > This is the office of Mr. Elshafei. I am his computer assistant. May I know who is calling?

Caller> Essam Ali.

Sara> Mr Elshafei is on the other phone now. Let me check if the call is over. Please hold.

(Sara whispers to Mr. Elshafei if he wants to accept the call)

Declined

Sara > I am sorry, it seems that it's a conference call I expect it will take a while. You can call him tomorrow morning between nine and eleven o'clock. Do you like to leave a voice message for him now?

Caller> no thanks.

The conversation should not block the callers, but advice the caller on how and when he can reach the user.

Put on hold

Sara> I am sorry, he is still in the on the phone, but it will finish shortly. Do you like to stay on hold ?

Accepted

Sara> Please stay on the line. I will transfer the call to Mr. Elshafei

3- If an unknown caller requests an urgent message, VPA, checks first with the user if he wants to accept the call. Let us have this example:

The user is not in his office, the telephone rings, Sara could not recognize the caller from his caller ID.

Sara > This is the office of Mr. Elshafei. I am his computer assistant. May I know who is calling?

Caller> Essam Ali.

(Sara could not recognize the caller from his name)

Sara> I am sorry, Mr. Elshafei is out of his office at the moment. Is that urgent?

Caller> yes please!

Sara> Please hold. I will try to find him for you.

(Sara calls Mr. Elshafei, to check if he wants to accept the call from Jack Smith).

(Sara could not reach Mr. Elshafei, or He declined to take the call)

Sara> I am sorry! I could not locate him. I will page him for you. Mr. Elshafei will be in his office tomorrow morning until eleven o'clock. Do you want to leave a voice message for him now?

4- Changing PAF temporarily.

User> Sara! I am expecting an Important call from Mr. Essam Ali before 6 PM.

Sara will set the importance of Mr. Elshafei maximum until 6 o'clock

Implicit Commands

Sara! I am going home now.

I am busy until 3:00 o'clock.

Sara! I am out for 10 minutes.

Calendar

List my activities <specify time, period>

List my meetings for today

List my appointments <specify date or day> < specify time or duration>

Cancel my appointments with <specify person> < specify time or duration>

When am I available < specify time>.

Schedule an appointment with < specify person> <specify time>.

User> Sara! Schedule an appointment with Mohammad Sherif

Sara> When?

User> tomorrow afternoon

Sara checks the calendar of *Mohammad Sherif*, and figures out he has a time slot at 3:00 o'clock.

Sara> He has a time slot at three o'clock. Do you want me to reserve it.

User> yes.

Sara> Do you want me to call you when it is confirmed?

User> No

Sara> Any thing else?

User> No. Good Bye.

Examples:

Telephone rings.

Sara > This is the office of Mr. Elshafei. I am his computer assistant. May I know who is calling?
(call is in the processing state)

Caller> Essam Ali.

Sara> I am sorry, Mr Elshafei is in a meeting now. Let me check if the meeting is over. Please hold.
(call is now waiting, Sara whispers to Mr. Elshafei if he wants to accept the call)

(request denied)

Sara> I am sorry, Mr. Elshafei is still in the meeting. He will be available Tomorrow from 9 to 11. Do like to leave a message for him?

Caller> No thanks.

(request accepted)

Sara> I am sorry for keeping you waiting, Mr. Elshafei will be with you in a moment. Please hold.

(call is now pending, when the call is answered by Mr. Elshafei it becomes in the running state. Clearly it can also be transferred to Mr. Elshafei without going into the pending state).

Examples of Tasks VUI

User> Sara! Create a task!

Sara> What is it about?

User> VPA report.

Sara will further ask the user about the starting date, the due date, whether is its, priority, and how and when she is supposed to remind the user about it. And whether it is recurrent or not.

User> Sara! List my < all pending, overdue, completed, urgent> tasks.

User> Mark this task as < x%> complete.

User> Remind me of this task <tomorrow, date><afternoon, morning, time>

User> Delete this task.