To compete in the world of business, Enterprises will need to improve their internal and external communication flows between employees, customers and suppliers. This article unveils the next generation of Unified Communications applications for Enterprises and Service Providers improving relationships, interactions and communications of Businesses: The e-Communication Center.

This software suite is made of four applications handling real time and non real time applications as well as personal assistant and personal information management. All these applications are accessible anywhere on any terminal. e-Communication Center uses the latest Internet technologies and leverages existing data and Voice infrastructures and applications.
New communication applications that are accessible on any device are helping businesses to be more competitive in the age of the borderless enterprise.

Introduction

The Internet and the proliferation of mobile devices, such as mobile phones and wireless Personal Digital Assistants (PDA), are changing the way businesses communicate. Free sitting, mobility, responsiveness, customer satisfaction and cost optimization are key challenges that all enterprises are facing today. However, emerging technologies, such as the Session Initiation Protocol (SIP), Voice eXtensible Markup Language (VXML), web services and speech recognition, are being used to develop a new generation of multimedia applications and services that can help businesses to face these challenges.

This article reviews the present and future needs of businesses for unified communications applications, and looks at the next generation of Alcatel communication applications that anticipate and meet these new requirements.

Adapting Enterprises to New Challenges

User Working Environment

In all types of company, the users’ working environment is becoming increasingly complex. According to a US survey conducted by the Pitney Bowes consulting group in 2000, on average, employees in any company use more than eight different communication tools: business phone, wireless business phone, mobile phone, fax, e-mail, voice mail, Short Messaging System (SMS), paper and memos. These will be augmented by new methods of communication, such as Instant Messaging (IM), video mail and Multimedia Messaging Systems (MMS) when they become available in the corporate environment in the near future. However, while an employee is on the move, even if he or she has an Internet-enabled device, it is still difficult to keep in touch with a company to receive urgent calls, information, news and messages.

According to the same survey, on average users receive more than 60 messages per day, making it a challenge to determine which of them should have priority.

As a result of this situation, it is ever more difficult to obtain the right information, and to contact the right people at the right time in order to take the right decision. Customers are complaining that it is difficult to reach the people to whom they need to talk. Thus there is clearly a need for new applications and services to improve communications and relationships, and to help users to handle all the new media.

Different User Profiles

Mobility will certainly be one of the main concerns of enterprises in the coming months and years. According to the Gartner Group “By 2005, more than 30% of employees worldwide will use some form of remote access technology in the performance of their jobs”. IDC estimates that the remote and mobile worker population in the US will grow to 55.4 million in 2004.

In view of the increasing importance of mobility, we need to better understand users’ “work place and mobility profiles”. Although each enterprise is a special case, it is possible to define three main profiles. Figure 1 illustrates these profiles and shows how different categories of employee spend their time.

Fig. 1 Three main profiles for mobile employees

<table>
<thead>
<tr>
<th>Employee Profiles</th>
<th>At desk</th>
<th>Somewhere on site</th>
<th>On the move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desk Soldier</td>
<td>90%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Accountant</td>
<td>70%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Assistant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home worker</td>
<td>100%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Tele-agent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road Warrior Salesman</td>
<td>10%</td>
<td>10%</td>
<td>80%</td>
</tr>
<tr>
<td>Off-site Rover Consultant</td>
<td>30%</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Global Hopper Marketing, pre-sales</td>
<td>25%</td>
<td>25%</td>
<td>50%</td>
</tr>
</tbody>
</table>

1 Free sitting means that an employee can sit in any office and use any PC and any phone set to access his or her personalized working environment, and to retrieve applications, communication tools, messages, etc.
**People often at their desk**
This profile encompasses three types of employee:

- **Desk soldiers** are people who work almost entirely at their desks (e.g. accountants).
- **On-site rovers** are people who are sometimes at their desks and sometime elsewhere in the company (e.g. assistants).
- **Teleworkers (or home workers)** are included in this profile because their desk is a virtual office at their remote location.

For these employees, it is no longer important whether they are working inside the company or off-site. The most important factor is their ability to access the same communication facilities, information and services from a remote location that are available to them on the company premises. Communication applications required by these users are mainly those related to real-time communication and messaging.

**People often on the move**

**Road warriors** and **off-site rovers** are people who spend most of their time outside the company (e.g. salespeople, maintenance personnel, consultants). These users need messaging applications, personal information management, applications for filtering information, messages and calls, and notification applications. They must be able to access these on any device.

**People with a mixed profile**

**Global hoppers** are people with a mix of the two previous profiles because they sometimes work inside and sometimes outside the company. They frequently have management responsibilities (e.g. corporate executive, top management). Clearly their needs are a mix of the two previous ones. In addition, because of their positions within their companies, they have specific needs, such as personalization of their working environments.

**Summary**
Users with these mobility profiles require specific applications and services. All have an increasing need for always-on communication and seamless access to information. While mobile telephony provides a solution for real-time voice communication, there is now an emerging need for “anywhere, anytime” data communication.

**Boost Responsiveness and Improve Customer Satisfaction**
Employees are increasingly mobile, the number of communication tools is expanding, and users need to take faster decisions and respond more rapidly. Improving communication and collaboration between users and being more efficient in relationship management with customers will increase customer satisfaction and therefore profits.

**Optimize Costs**
Reducing costs is another way to increase profits. One way to cut costs when acquiring new applications is to minimize the total cost of ownership. Deployment, training, administration, support and upgrade costs all have a direct impact on the bottom line. Leveraging the existing voice and data infrastructures, as well as reusing and adding value to existing applications used in corporate environments, also help to minimize costs and encourage users to accept new solutions.

**“Owned” or “Outsourced” Applications**
Small enterprises are likely to outsource at least some of their information technology and networking activities to achieve a suitable balance between in-house and outsourced resources. The decision about whether to own or lease applications is a strategic choice for a company. Whatever the decision – full customer premises equipment, fully outsourced services hosted by a service provider, or a mix of the two – all business users have the same needs in terms of desktop tools, applications and seamless integration with existing corporate resources.

**Networking the Knowledge**

All businesses are now realizing that the value of a company resides in the knowledge and expertise of its people, hence the term “Knowledge Worker”. A knowledge worker is, in principle, anyone in a company who has some know how that must be shared by other employees, partners or customers.

One of the biggest challenge of businesses will be the ability to team work people in order to network the entire knowledge of the company with the objective of providing first class services to customers and developing innovative products and services. If this is to be achieved, there will be a huge demand for collaboration tools as well as for solutions that can locate people and establish multimedia communications anywhere on any device. In other words, solutions that effectively eliminate the borders of the company.

**Unified Communications for Borderless Enterprises**

A “borderless enterprise” is a company in which the geographical, business and technical borders have been broken down to achieve real-time interaction with customers, employees and partners. Enterprises require more efficient communication tools that enable all those involved to share information, to communicate in real-time and to make faster business decisions.

The differentiating factor will be the ability to efficiently manage unified multimedia communications and interactions so that the company can carry out its business anytime, anywhere.
New Technologies for Building New Services

Some recent technologies, mainly from the Internet world, are paving the way for new services and applications that will help enterprises to improve their employees’ communication flows and working environment. Here we look at several of them to understand some of the innovative services that can be defined in the area of unified communications.

Session Initiation Protocol

SIP is a new signaling protocol, the main function of which is to set up multimedia communications by establishing the Internet Protocol (IP) addresses and port numbers at which the end systems can send and receive data. SIP supports session descriptions that allow participants to agree on a set of compatible media types. It also supports user mobility by proxying and redirecting requests to the user’s current location. Using SIP, new communication applications can be defined using media-blending (the ability to mix voice, instant messaging, video conferencing and other media during a “call”) and presence information, for instance.

Voice eXtensible Markup Language

VXML is a language that makes Internet content and information accessible via voice. Web applications can be accessed via a VXML browser running on a media server. VXML has features to control audio output/input, presentation logic and control flow, as well as event handling and telephony connections.

A common language enables developers to benefit from code portability; end users can use new services and applications with media-blending between voice and web. Typical examples of such applications are a voice portal and unified messaging.

XML, SOAP and Web Services

The eXtensible Markup Language (XML) is a language for data exchange and description on the web. The Single Object Access Protocol (SOAP), also known as the Service Oriented Architecture Protocol, is used for exchanging structured information in a decentralized and distributed environment. It uses XML to format the transmitted data. Because SOAP invokes low level functions, the Web Services Description Language (WSDL) has been defined to make it easier to describe web services. WSDL is a complement to SOAP as it facilitates interoperability between web services. Web services enable heterogeneous remote systems and applications to communicate via standard technical communications objects.

XML, SOAP and web services are the main pieces in the puzzle for developing new web applications and imaginative new multimedia communication services.

J2EE Application Server

Java 2 Enterprise Edition (J2EE) defines the standard for developing multi-tier enterprise applications. It simplifies applications by basing them on standard modular components, by providing a complete set of services to these components, and by automatically handling many details of application behavior, without complex programming. A component in Java terminology is called a Java Bean.

An application server is the middleware for web-based applications. A J2EE application server comprises a run time providing common services and a common application infrastructure.

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development environment. It provides the next generation of components, tools and systems (software and hardware) for implementing new generation applications.

The global architecture of a solution using all these new technologies has to be built on three layers (see Figure 2). The network infrastructure layer provides physical access to various networks and terminals. In addition there is a common application infrastructure layer, which includes an application server, and the application layer, which provides the services.

**Next Generation of Unified Communications**

To help businesses to face these new challenges, Alcatel is proposing a new generation of unified communication applications, based on the latest Internet technologies, to improve relationships, interactions and communications.

**Alcatel e-Communication Center**

The e-Communication Center is a software suite, using the latest technologies, that provides a full set of IP-based unified communication applications. These applications allow subscribers to tailor, control and manage calls, messages, directories, collaboration tools and information from any location using any device and any interface, in ways never previously thought of.

The Alcatel e-Communication Center comprises four groups of applications (see Figure 3):

- unified messaging;
- softphone (a PC-based telephony application);
- personal assistant;
- Personal Information Manager (PIM).

**Unified messaging**

This is a true VXML unified messaging application for Microsoft Exchange™ and Lotus Domino™. It is an ideal solution that leverages existing mail servers for handling non-real-time communication tools with a single multimedia mail box (see Figure 4).

**Softphone**

This PC telephony application supports a Web client coupled with Microsoft Exchange/Outlook™ and Lotus Domino/Notes™ (see Figure 5). It is an excellent tool for improving real-time communication flow with all types of associated devices: analog, digital, mobile phones and Voice over Internet Protocol (VoIP).
For calls routed to a mobile phone or any other phone, while conversing the user can access the mobile extension services to transfer calls to colleagues, set up conference calls, check e-mails and access the corporate directory.

**Personal information manager**

This front end to the Microsoft and Lotus PIMs can be accessed on any device. It helps users to organize their activities and to access their directories, personal contacts and calendar wherever they are (see Figure 7).

**Open Architecture and Committed to Standards**

The e-Communication Center comprises four functional blocks which run under the Linux operating system: a media server, a CTI server, a run-time application server and the applications (see Figure 8).

The media server consists of a resource management server and a resource server. The former handles SIP access, interprets VXML scripts and requests media resources from the resource server, while the latter provides play/record functions and Real Time Protocol (RTP) access as well as Automatic Speech Recognition (ASR) and Text To Speech (TTS) resources.

The CTI server (computer telephony server) provides a call control Application Programming Interface (API) for accessing the telephony services of the OmniPCX call server.

The application server is a run time providing an application middleware with common services and standardized components to web applications.

Finally, the application layer comprises the four e-Communication Center applications. The e-Communication Center uses the latest Internet standards and technologies, including Java, XML/SOAP, VXML, SIP, RTP and the Real Time Streaming Protocol (RTSP). This makes it future proof, that is to say, compatible with both today's and tomorrow's IP multimedia communication networks.

**Leverage Existing Resources and Investments**

The e-Communication Center integrates seamlessly with existing corporate resources and applications (corporate mail servers, PBXs, web content and applications, directories, Outlook™, Notes™, etc). Consequently it leverages existing investments and therefore minimizes any additional expenditure.

**User Interfaces**

Users can choose their own interface as the e-Communication Center imposes no constraints. This encourages user acceptance of the product and minimizes training costs. The interface can be: web, mobile phone, wireless PDA, Outlook™, Lotus Notes™, Outlook Web Access™, iNotes™, or any kind of phone for voice access (see Figure 9).

Alcatel has developed a unique concept for web access: a multi-device dashboard (or home page) that enables the user to access all the e-Communication Center applications via one screen. Such an application is called a portlet. This home page meets the needs for free sitting, mobility and personalization as it enables users on the move to access their complete working environment as if they were in the office (see Figure 10).
Personalize your Business World

The e-Communication Center also allows a user to customize his or her multi-device home page to design a personalized day-to-day communication applications and information environment (bookmarks, e-news, etc). A tool, known as the Content and Terminal Studio, is available to information system teams or web designers to aggregate any web content on any device by generating the relevant markup language for each device: PC, webphone, web TV, PDA, mobile phone, VXML browser for voice access and IP phones with XML screen (See Figure 11).

This innovative tool makes it easy to deploy services and makes it possible to utilize existing web content without the need to republish it.

Boost Productivity

Whatever the employee's profile, be it mobile worker, desk-based employee or manager, the e-Communication Center lets that employee optimize the way he or she communicates, shares and accesses information. Consequently employees are well organized, and therefore more efficient, and don't need to change the tools they already use.

New Services with the e-Communication Center

Imagine some of the capabilities of this innovative open application suite:

- You are stuck in traffic every morning: Using your cell phone you can manage your e-mails and voice mails using text to speech and speech recognition. You can also manage your diary and call customers from your personal address book.
- While you are on a business trip, urgent information is posted on the intranet or an urgent message is left for you. You can stay in touch with your company using the device of your choice and be notified automatically of such events. You can call back the message sender in real-time.
- When leaving the office on a long business trip, you can route calls to your voice mail and let callers know (from your diary) on what date you will be returning.
- In transit at the airport, your flight is delayed. Remotely, you can temporarily route business calls to your mobile phone, thereby avoiding any lost time.
- If you want to improve your company greetings, you
can use the powerful VXML automated attendant services of the unified messaging application to provide a first class personalized and interactive welcome service to your customers.

- At home you need to make a long distance business call without being charged. Via the Internet you can access the corporate directory or personal contacts, use click to call and contact your correspondent on your home phone. Your business phone is then charged for the call.
- While at another company site, you can use any PC, the phone in a meeting room or your mobile phone to access all your communication tools, as if you were in your own office.
- In your office, you are overloaded with work, but need to be reached for urgent calls. At your desk, the screen pop up function of your softphone shows you who is calling, enabling you to react accordingly.
- You are on the move and have forgotten to forward calls to your business phone to your voice mail box. You can send an SMS to forward or screen your calls.
- You are organizing a meeting from Outlook™ or Lotus Notes™; using your PIM, you can define how you want your calls to be routed or screened during the meeting.
- While attending an important meeting, you are expecting an urgent call. You can screen your calls to accept only callers you need to talk to on your mobile phone. All other callers are routed to your voice mail.
- In a meeting, you need to call a customer for a conference call. Using your PDA, you access your corporate directory and click to call. The conference call is established using the phone in the meeting room.

### Conclusion

The business of any enterprise involves extensive relationships and interactions with customers, suppliers and employees. To compete in today’s competitive business world, to meet the changing needs of customers, to improve internal and external communication flows, and to face new challenges (e.g. mobility and responsiveness), enterprises will need to implement major changes to their communication systems.

Alcatel’s e-Communication Center software suite is unique in its ability to provide organizations and service providers with next generation unified communication applications based on the latest future-proof technologies. By providing the most advanced communication applications, which can be accessed on any device, the e-Communication Center helps businesses to be more competitive in the age of the borderless enterprise.
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>ASR</td>
<td>Automatic Speech Recognition</td>
</tr>
<tr>
<td>CTI</td>
<td>Computer Telephony Integration</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
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<tr>
<td>GSM</td>
<td>Global System for Mobile Communication</td>
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<tr>
<td>IM</td>
<td>Instant Messaging</td>
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<tr>
<td>IP</td>
<td>Internet Protocol</td>
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<td>J2EE</td>
<td>Java 2 Enterprise Edition</td>
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<tr>
<td>LAN</td>
<td>Local Area Network</td>
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<tr>
<td>LDAP</td>
<td>Lightweight Directory Access Protocol</td>
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<td>MMS</td>
<td>Multimedia Messaging Systems</td>
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<td>PDA</td>
<td>Personal Digital Assistant</td>
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<td>PIM</td>
<td>Personal Information Manager</td>
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<tr>
<td>PLMN</td>
<td>Public Land Mobile Network</td>
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<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
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<td>RTP</td>
<td>Real-Time Protocol</td>
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<td>RTSP</td>
<td>Real Time Streaming Protocol</td>
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<td>Session Initiation Protocol</td>
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<td>SOAP</td>
<td>Service Oriented Architecture Protocol</td>
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<td>SOAP</td>
<td>Single Object Access Protocol</td>
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<td>TTS</td>
<td>Text To Speech</td>
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<td>UDDI</td>
<td>Universal Description, Discovery and Integration</td>
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<td>Universal Mobile Telecommunications System</td>
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<td>VoIP</td>
<td>Voice over Internet Protocol</td>
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<td>WSDL</td>
<td>Web Services Description Language</td>
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