Alcatel·Lucent

Mobilizing Unified Communications and Collaboration in the Dynamic Enterprise

Abstract

The Alcatel-Lucent mobility solution integrates mobile users into a Dynamic Enterprise communication framework, connecting their knowledge, which results in improved business performance. This solution also saves the Dynamic Enterprise money on mobile communications and increases user productivity because of new communication uses introduced at the mobile worker level.

The current competitive environment between mobile carriers makes mobile data services very cost effective for enterprise businesses. This lower cost allows widespread deployment of modern enterprise applications over legacy mobile voice services. Meanwhile, new communication methods that use unified communications and collaboration are being introduced that involve media blending.

A Dynamic Enterprise communications framework built using the Alcatel-Lucent OmniTouch™ 8400 Instant Communications Suite (ICS) for Enterprise and the Alcatel-Lucent OmniTouch 8600 My Instant Communicator (MIC) provides consistent, robust, and secure communications solutions for deployment of modern applications over existing legacy telephony networks while at the same time implementing new unified communications and collaboration services as they emerge on a wide variety of professional smart phones.

This Alcatel-Lucent solution is the first step towards a new communication architecture with unified communication and collaboration services for a Dynamic Enterprise communications framework.

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Introduction

The following application note is an overview of the Alcatel-Lucent enterprise unified communications and collaboration (UC&C) services solution for mobile users.

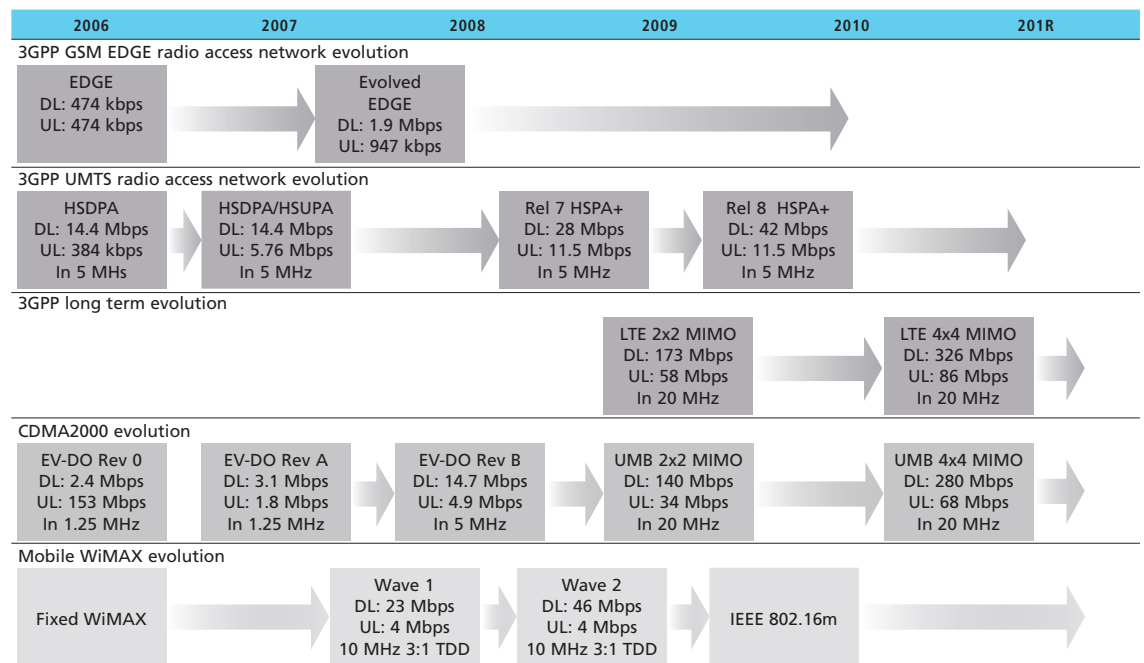# Mobile users and the Dynamic Enterprise communication framework

Regardless of the type of enterprise business (retail, banking, industrial, wholesale, public services), mobile users need direct access to core business and communication processes. The Dynamic Enterprise provides users this direct access through new modes of communication and collaboration enabling them to be "always connected."

One new mode is an integrated wireless environment that offers cost reductions and increases business performance. However, these benefits are balanced by the overall costs of deploying and operating a communication solution.

Mobile data service carriers offer maturity

With the introduction of new mobile network technologies (GPRS, EDGE, 3G), advanced smart-phones, and economical voice and data subscription rates, it is inexpensive for mobile users to employ their wireless devices to access corporate resources, such as unified communication and collaboration (UC&C) services. The most common use of a mobile device is real-time access to email.

Figure 1. Evolution of mobile data services (Rysavy Research via Burton Group)

2006	2007	2008	2009	2010	201R
3GPP GSM EDGE radio access network evolution					
EDGE DL: 474 kbps UL: 474 kbps		Evolved EDGE DL: 1.9 Mbps UL: 947 kbps			
3GPP UMTS radio access network evolution					
HSDPA DL: 14.4 Mbps UL: 384 kbps In 5 MHs	HSDPA/HSUPA DL: 14.4 Mbps UL: 5.76 Mbps In 5 MHz		Rel 7 HSPA+ DL: 28 Mbps UL: 11.5 Mbps In 5 MHz	Rel 8 HSPA+ DL: 42 Mbps UL: 11.5 Mbps In 5 MHz	
3GPP long term evolution					
			LTE 2x2 MIMO DL: 173 Mbps UL: 58 Mbps In 20 MHz	LTE 4x4 MIMO DL: 326 Mbps UL: 86 Mbps In 20 MHz	
CDMA2000 evolution					
EV-DO Rev 0 DL: 2.4 Mbps UL: 153 Mbps In 1.25 MHz	EV-DO Rev A DL: 3.1 Mbps UL: 1.8 Mbps In 1.25 MHz	EV-DO Rev B DL: 14.7 Mbps UL: 4.9 Mbps In 5 MHz	UMB 2x2 MIMO DL: 140 Mbps UL: 34 Mbps In 20 MHz	UMB 4x4 MIMO DL: 280 Mbps UL: 68 Mbps In 20 MHz	
Mobile WiMAX evolution					
Fixed WiMAX		Wave 1 DL: 23 Mbps UL: 4 Mbps 10 MHz 3:1 TDD	Wave 2 DL: 46 Mbps UL: 4 Mbps 10 MHz 3:1 TDD	IEEE 802.16m	

Note: Throughput rates are peak network rates. Radio channel indicated.
Dates refer to initial network deployment except 2006 which shows available technologies that year.

This increase in availability of fast data throughput from mobile network carriers is leading mobile users to expect the same experience from their mobile devices when accessing unified communications and collaboration services as they would at their desktop.

Personal mobile devices raise enterprise security issues

There are two main concerns related to enterprise network access by workers with mobile devices:

1. Enterprise security: Potential for unauthorized access to corporate resources and applications
2. Corporate compliance issues: The lack of distinction and boundaries between personal and professional use of wireless devices may infringe on corporate rights as well as privacy rights of mobile workers

Mobile enterprise devices contain sensitive business information and have access to corporate resources and applications. The main security concerns presented by unauthorized access by a mobile device are:

- Authentication: Assurance the person connecting is the one who is supposed to be accessing the network and its resources
- Corporate compliance issues: The lack of distinction and boundaries between personal and professional use of wireless devices may infringe on corporate rights as well as privacy rights of mobile workers
- Integrity: Data/information that is transmitted should have its integrity assured
- Availability: Access to resources and related services (voice or data) regardless of location

In this paper we will not address non-repudiation because it is an application specific problem.

Corporate compliance issues

A mobile device is a personal device with no clear boundary between professional and private use. Mobile devices store private information such as text messages, pictures, personal email and web content side-by-side with professional material such as presentations and corporate email. While private user data must be protected, some types of personal use could violate corporate security policies. Protecting corporate assets could require a change in how mobile devices are managed by enforcing them as strictly professional endpoints through service provisioning and the implementation of security policies.

Deployment model: Hosted or CPE

The introduction of IP multimedia subsystems (IMS) into carrier network architectures (led by the 3GPP forum but declined in fixed networks by the TISPAN effort) is currently leading the IP transformation allowing the convergence of both fixed and mobile carrier networks.

Future mobile carrier network architectures will create new, fully Session Initiation Protocol (SIP) based services such as presence, instant messaging (IM), real-time voice and video, and fixed mobile convergence.
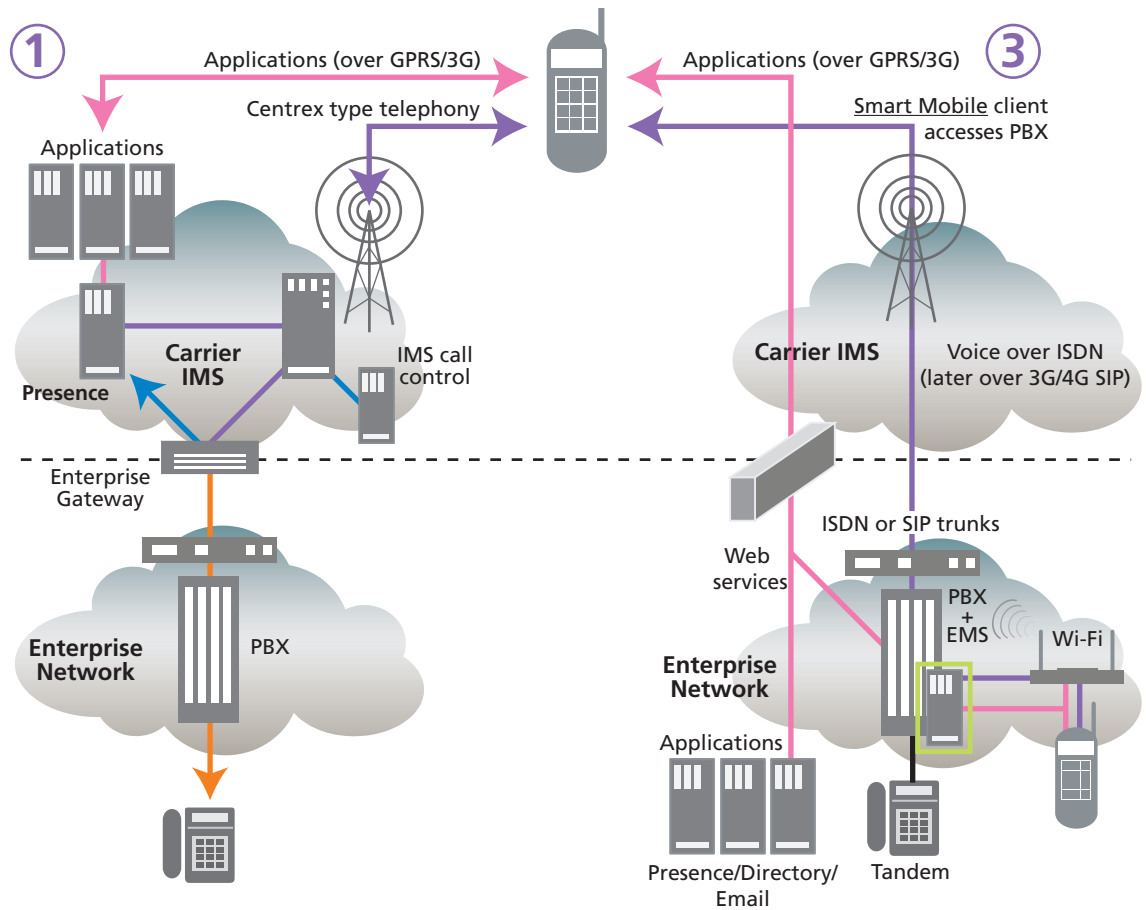
Currently, carriers offer fixed mobile convergence (FMC) services, which may include:

- Simple fixed line and mobile subscription services
- Private branch exchange (PBX)-like, voice-only service
- Wi-Fi to cellular roaming services based on the unlicensed mobile access (UMA) standard

All of which remain far from the current enterprise trend toward SIP implementation.

While cost cutting remains the first priority, mobility is also about improving productivity. Enterprise customer-premises equipment (CPE) solutions provide the best of both worlds by providing full access to enterprise real-time communication, collaboration, messaging and business applications.

Figure 2. Mobile device integration in Dynamic Enterprise communication framework: Hosted or CPE based implementation
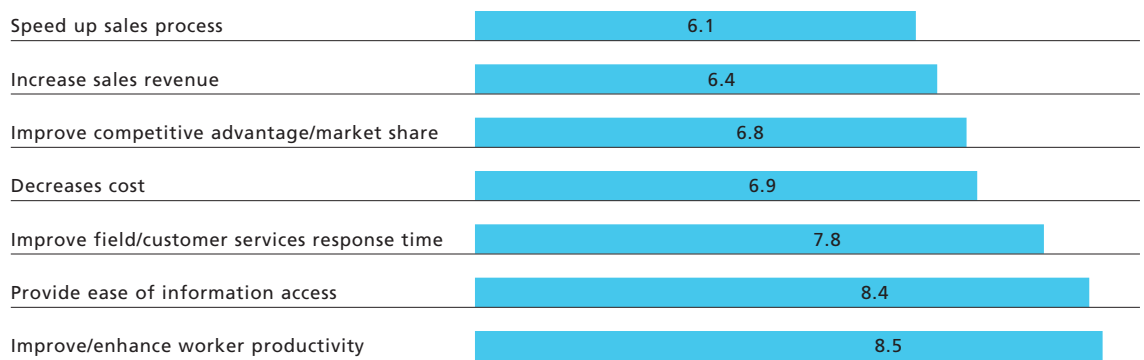

Save and make money: Hard and soft return on investment (ROI)

Return on investment (ROI) is an increasingly key concern for enterprises in the decision making process of implementing a solution. Return on investment can be assessed in two ways: saving money and making money.

Saving money: Hard ROI is the directly measurable benefit realized from the investment in deploying a solution. An example of hard ROI would be a decrease in telecommunication expenses or an increase in business and sales revenue as a direct result of installing a specific solution. Alcatel-Lucent pays specific attention to including hard ROI capable features when designing products and solutions.

Making money: Soft ROI is an indirectly measurable benefit realized from the investment in deploying a solution and is generally related to increasing productivity.

Figure 3. Enterprise expectations from mobility solution. (Source: Gartner Group)

Speed up sales process	6.1
Increase sales revenue	6.4
Improve competitive advantage/market share	6.8
Decreases cost	6.9
Improve field/customer services response time	7.8
Provide ease of information access	8.4
Improve/enhance worker productivity	8.5

How do we measure cost savings related to faster sales processes, ease of information processing and worker productivity? These inherent qualities are more difficult to assess before implementation, but will, in the long run, generate more return on investment than hard ROI.

For example, is it possible to measure the ROI generated by a one number service which allows a sales representative to be reached quickly so they can make a decision on a major deal, when the competitor must be called on their fixed extension and then on their mobile only to be directed to voice mail to leave a message?

According to a Gartner Group survey, enterprise businesses expect soft ROI from mobility through their redefining and accelerating business processes.

Alcatel-Lucent UC&C services solution for mobile users

From telephony to media blending, a new way of communicating and interacting
Whatever the infrastructure (IP, cellular phone or legacy TDM), the way people communicate in real-time communication hasn't changed since the beginning of telephony:

> Alice calls Bob and Bob replies to Alice. Bob can accept and answer the call, reject the call or let call processing forward it accordingly (call filtering by assistant, voice mail forwarding, do not disturb (DND) leading to call rejection).

The need of the enterprise business user to stay connected or always reachable for increased efficiency and effectiveness makes this call processing model obsolete.

New technology introduced with unified communications and collaboration technology is redefining how people communicate in real-time:

- Presence-based technologies are introducing the concept of buddy lists, co-working teams and workgroups, and allow users to see the availability status of collaboration team members.
- Presence introduces a loose informal session between users
- Instant messaging allows quick informal chats between users and has the potential of decreasing email loads
- Collaboration leads to casual working sessions within a team

Real-time voice sessions are one medium of communication among many (instant messaging, video, e-mail, short message service (SMS) or multimedia messaging service (MMS)). Today most of these communication mediums are symmetric, which means an answer to a solicitation uses the same medium as the medium used by a caller.

Symmetric media exchange might not be suited to specific business situations such as:

- Answering an important call while in a meeting may not be appropriate, but answering the incoming call with IM, SMS or email could be

- Attending a voice conference call from a noisy airport prior to boarding is distracting to other attendees, but listening to the call and participating by chat with IM would be more considerate

New communication mediums and the need to increase user productivity have led to the introduction of new communication engines. The creation of new, always connected communication mediums represents a shift in the user experience from legacy telephony to mobile technologies such as unified communication and collaboration.

The cell phone is the favorite communication device of the digital generation. Having never known a world without a cell phone, the digital generation has come to rely on mobile communications for both personal and business needs.

The introduction of the Alcatel-Lucent OmniTouch 8600 MIC, is the first step towards a multi-session communication user experience, which serves the Web 2.0 generation of multi-tasking users who are used to quickly moving to the next level.
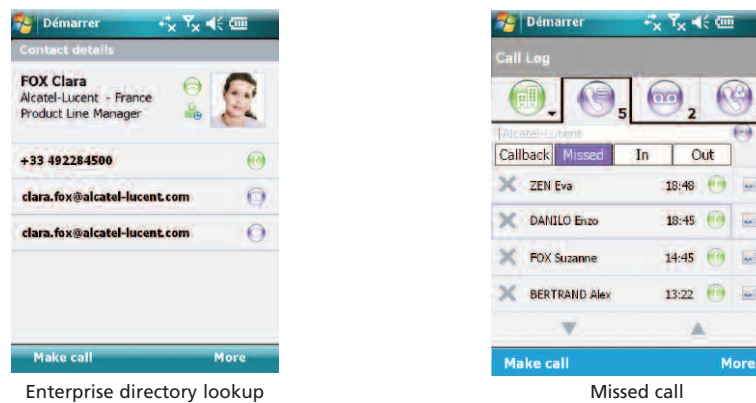
The Alcatel-Lucent OmniTouch 8400 ICS represents the extension of unified communication and collaboration services to mobile users who need to stay connected wherever they are.

Mobilizing unified communications: A stay connected user experience

Example 1: Stay connected while waiting or on the move
A user waiting at the airport or leaving the airport after landing can be immediately connected to an enterprise mobile communication framework using the OmniTouch 8600 MIC for mobile devices.

Figure 4. Example of use on mobile devices

Enterprise directory lookup

Missed call

The OmniTouch 8600 MIC implemented on a mobile device provides a nice suite of services to enhance user productivity.
- When waiting at the airport, the mobile user remains reachable thanks to unique number services that link fixed and mobile extensions
- A user can choose the best way to reach his correspondent such as a direct voice call, or instant messaging for instances when it's too noisy, or traditional email
- Enterprise voice mail notification
- Caller ID is no longer limited to the mobile device contact list. The OmniTouch 8600 MIC for mobile devices extends the caller ID using a corporate directory
- When leaving the airport, missed calls are noted and recorded for future call back
- Call backs are managed using reverse call service, which provides hard ROI by decreasing communication cost thanks to the fixed-line to mobile carrier tariff structure

- Telephony presence status provided by the OmniTouch 8600 MIC for mobile devices allows users to immediately assess corporate party availability
- After landing, switching on the mobile device displays a log of calls missed during a flight (switch-off call log service)

Example 2: Immediate expert support
The OmniTouch 8600 MIC implemented on a mobile device provides a nice suite of services to enhance user productivity.

- Presence of company employees available through corporate directory
- The ability to IM for immediate information and feedback
- Direct access to information experts from any mobile device – Immediate access to coworkers and knowledge experts through OmniTouch 8600MIC for mobile devices enhances the mobile workers' ability to satisfy customer demands and thereby increases productivity.

Example 3: Work@home
OmniTouch 8600 MIC for mobile devices implements dual mode WiFi with mobile network management when used with the enterprise mobility service hosted on OmniTouch 8400 ICS.

Dual mode provides roaming and handover services between aWi-Fi network (corporate, home Wi-Fi Internet access) and a cellular network and vice versa. In dual mode, communication sessions (both voice and data related to presence notification and IM) are seamlessly and transparently maintained when leaving/entering radio coverage areas.

From the mobile user's point of view there is no change in service when moving from cellular to Wi-Fi coverage. Any voice call initiated under cellular coverage is transparently transferred and instant messaging chat sessions and presence status notifications are maintained and updated when moving from cellular to Wi-Fi coverage areas and vice versa.

Moreover, releasing a call from the cellular network to the Wi-Fi network provides dramatic cost savings, because the user finishes communication over the Wi-Fi network.

The implementation dual mode directly generates the following hard ROI:
- Mobile sessions handled by the Wi-Fi infrastructure do not incur communication charges
- Voice calls initiated from mobile devices are routed to benefit from tariffs negotiated for the enterprise by using the Alcatel-Lucent OmniPCX™ Enterprise Communication Server with the automatic route selection (ARS) service
- The OmniTouch 8600 MIC using mobile dual mode management is cost effective because radio network roaming and handover is managed automatically, therefore ROI is not dependent on user acceptance or training

OmniTouch 8600 MIC in the corporate mobile communication framework
Mobile users and the OmniTouch 8600 MIC: A new use of the corporate communication framework
Mobile professionals benefit from the following communication services provided by the corporate communication framework:

- Enterprise grade telephony services such as attendant services, entity call flow management, class of service
- Communication optimization with ARS
- Enterprise voice mail services provided by the Alcatel-Lucent 4645 Voice Messaging Services or the Alcatel-Lucent OmniTouch 8440 Messaging Services.
- Collaboration services provided by the OmniTouch 8400 ICS

The OmniTouch 8600 MIC for mobile devices strengthens the available communications solutions for mobile professionals and enriches user-oriented role-based (Office Worker, Team Worker, On-site Campus Roamer, Executive, Home Workers or Contact Center Agent) implementations.

Securing mobile access with the OmniTouch 8600 MIC

Delivering unified communication and collaboration services to mobile users assumes that a feature-rich signaling channel is available between the Enterprise Mobility Server, (usually implemented on an enterprise server), and the mobile devices operating under the mobile network infrastructure.

To secure mobile communication across the signaling channel the solution must be flexible enough to meet the following constraints:

• Must comply to the most recent security standards and practices

• Should use up-to-date commercially available off the shelf security components

• Must be user friendly and not require unacceptable security hurdles such as having to enter a long password before dialing a phone number

• Should not alter application or device performance

• Must be implemented in both green-field and existing customer security frameworks with minimum interference with the current configuration

Choosing a solution to secure the OmniTouch 8600 MIC for mobile devices depends on the device platform being used for enterprise communication. The following table shows the applicable Alcatel-Lucent recommended security solutions for several current wireless device platforms:

Figure 5. Security recommendations for mobile wireless platforms

DEVICE PLATFORM OMNITOUCH 8600 MIC FOR:	USE	SOLUTION	NOTE
Blackberry™	Cellular	Blackberry Enterprise Server	Note 1
Nokia® E series™	Cellular	VPN IPSec	Note 2
Nokia E series™	VoWiFi/SIP homespot	VPN IPSec	Note 2
Apple® iPhone™	Cellular	Reverse Proxy	Note 3
Windows® Mobile™	Cellular	Reverse Proxy	Note 3
Google™ Android™	Cellular	Reverse Proxy	Note 3

Note 1 - OmniTouch 8600 MIC on Blackberry: This configuration uses the security services embedded in the Blackberry architecture such as AES or triple DES encryption. OmniTouch 8600 MIC is deployed and configured through Blackberry Enterprise Server (BES) policies which usually include security related parameters. BES device management allows security services such as remote device wipe and Bluetooth interface deactivation.

Note 2 - VPN and authentication methods: When implemented on a mobile network, the OmniTouch 8600 MIC is a UC&C application that provides signaling for telephony presence and caller ID services. When a virtual private network (VPN) is present it is assumed that VPN is always connected. When the cellular data connection is lost, (e.g., after handover between Wi-Fi and cellular networks) the VPN connection will need to be reestablished. During the process of re-establishing the VPN tunnel the system will require a user or device to authenticate by one of the following methods:

• Login/password: Username and password are used to authenticate the VPN connection

• Two factor authentication: Authentication is associated with a token card (something you know with something you own). From an end-user standpoint this method might be cumbersome, because it requires the user to enter a PIN on the token card which then provides a session code

that is to be entered on the mobile device. This method is not compatible with OmniTouch 8600 MIC mobile user expectations

- Certificates are issued and used to authenticate the VPN connection. A certification based method is in-line with the OmniTouch 8600 MIC mobile use case, but a properly configured public key infrastructure (PKI) implementation is needed in the enterprise to protect the device certificate store (i.e., time out when mobile device is idle).

Notice that maintaining continuous VPN connections (keep-alive mechanism) have an impact on device power consumption and may decrease device autonomy.

Note 3- Reverse proxy: Another solution to secure an incoming mobile connection is to use a reverse proxy installed in the enterprise firewall DMZ. Connections are protected using secure sockets layer (SSL) encryption. From the user/device point of view, a reverse proxy solution is more transparent and has less constraining than VPN connection management.

A comprehensive list of tested reverse proxy solutions will be published separately.

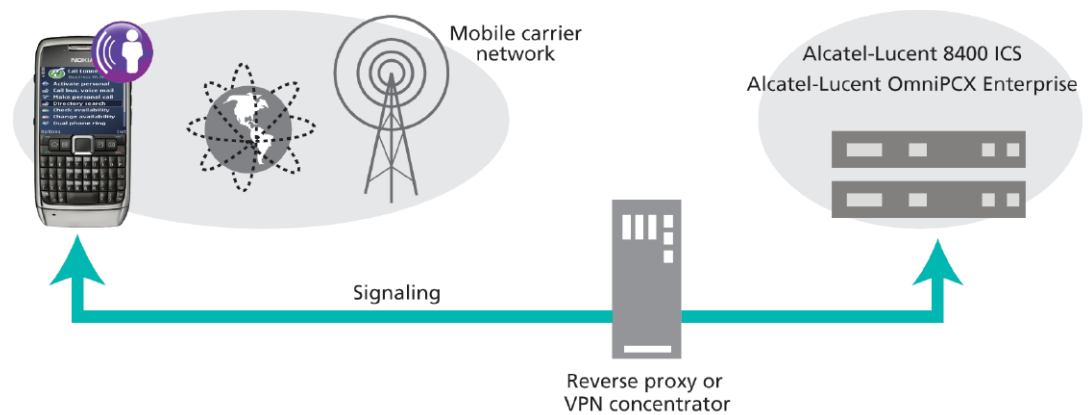**Figure 6. Using OmniTouch 8600 MIC cellular**

Figure 7a. Using OmniTouch 8600 MIC dual mode - home spot example
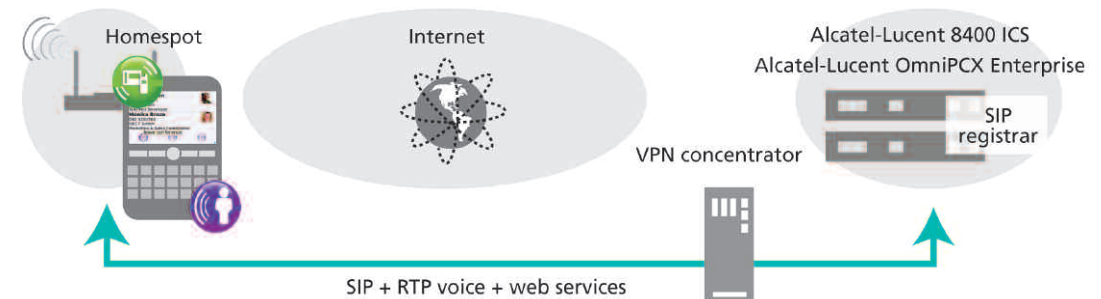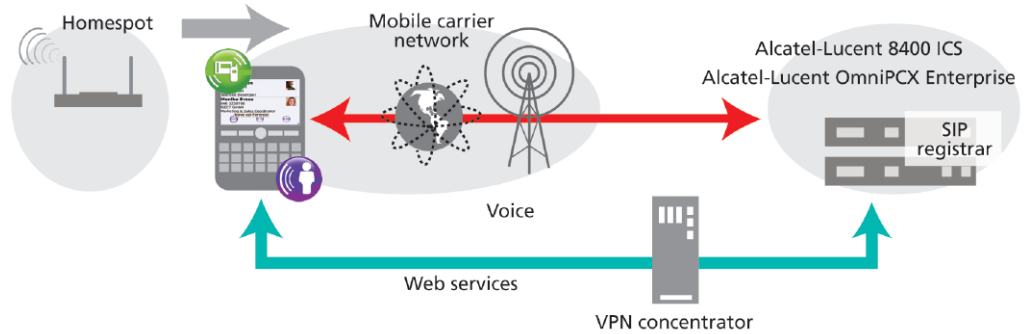
Figure 7b. Using OmniTouch 8600 MIC dual mode - cellular example

Deploying and operating the OmniTouch 8600 MIC

OmniTouch 8600 MIC is a pure software client deployed for mobile devices. It is managed at the following levels:

Device management
Mobile device management should address:

- Provisioning – Configuration of the device (including first time use), enabling and disabling features
- Configuration of device – Allow changes to settings and parameters of the device
- Software upgrades – Provide for new software and/or bug fixes to be loaded on the device, including applications and system software.
- Fault management – Report errors from the device, query about status of device
- Inactivation of lost or stolen devices – Remotely wipe a stolen mobile device

The Open Mobile Alliance – Device Management (OMA-DM) initiative is an emerging standard that provides over-the-air management of mobile devices. Many mobile device vendors who allow access to manageable parameters through OMA-DM protocols accept OMA-DM.

OmniTouch 8600 MIC on the Blackberry is fully compatible and compliant with RIM Blackberry Enterprise Server architecture, which natively provides device management services.

For device platform other than Blackberry, Alcatel-Lucent device client solution is compatible with most of the existing 3rd party vendor of device management solution.

When over-the-air management is not a strong customer expectation, legacy cradle-based solutions are available despite slight limitations regarding serviceability.

Server provisioning and management
Provisioning of a mobile network requires server-level management operations. The OmniTouch 8600 MIC provides unified communication collaboration services while the Enterprise Mobility Services and OmniPCX Enterprise Communication Server provide legacy telephony services.

Management is provided by highly integrated solutions based on the Alcatel-Lucent OmniVista™ 4760 Network Management System with SIP device management extensions and OmniTouch 8400 ICS client management.

The OmniVista 4760 NMS provides cost control surveys, alarm management and notification, past time performance and quality monitoring as well as operating as an SNMP gateway to corporate network management solutions.

The solution is complete with the addition of the Alcatel-Lucent VitalSuite™ product line to meet additional specific network management needs.
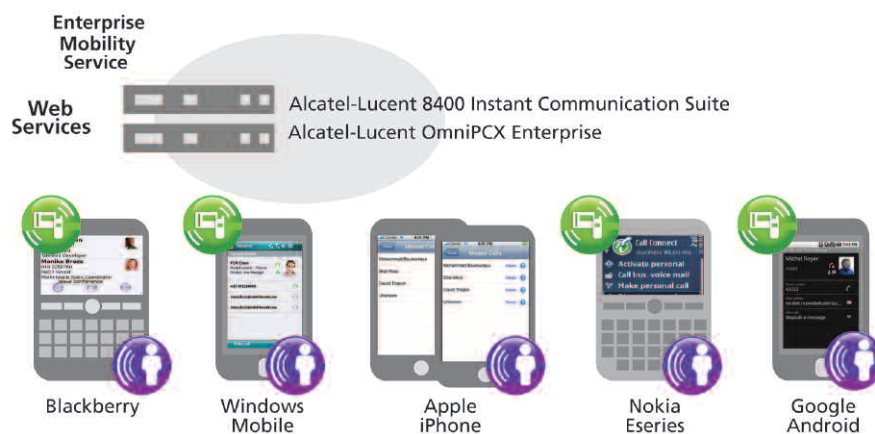
Architecture of the solution - Mobile device clients

OmniTouch 8600 MIC operates as a client of the UC&C framework. Unified communication services are available in two versions:

- Alcatel-Lucent 8622 My Cellular Extension provides enterprise grade OmniPCX Enterprise telephony services to mobile devices thanks to an in-band signaling scheme

- OmniTouch 8600 MIC provides unified communication and collaboration services, including access to OmniPCX Enterprise telephony services, thanks to a feature rich, secured data signaling channel

Alcatel-Lucent 8622 My Cellular Extension and OmniTouch 8600 MIC run as clients of both OmniTouch 8400 ICS for UC&C services and the enterprise mobility service and OmniPCX Enterprise Communications Server for enterprise grade legacy telephony services.

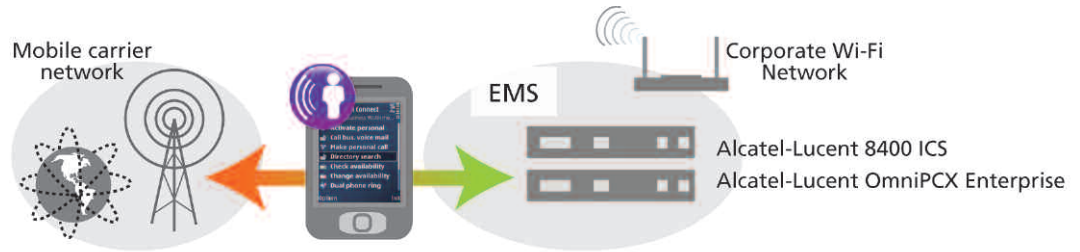**Figure 8. Mobile device clients**

Alcatel-Lucent 8622 My Cellular Extension and OmniTouch 8600 MIC is available in 2009 for the following mobile devices:

- Nokia® Eseries™
- RIM Blackberry™
- Apple® iPhone™
- Microsoft® Windows® Mobile
- Google™ Android™

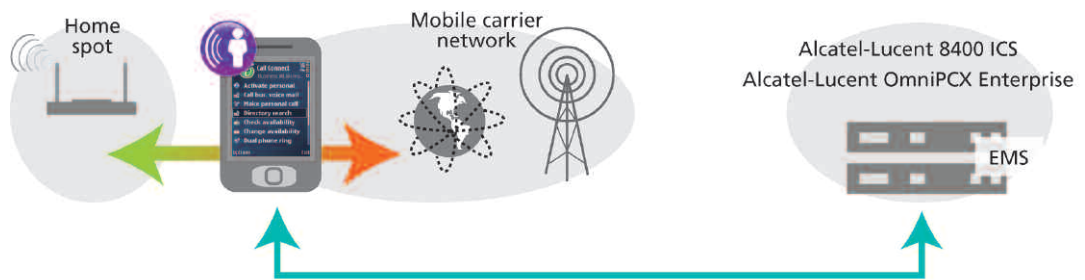**Dual mode WLAN/cellular mobile roaming and handover management: Enterprise Mobility Service**

Enterprise Mobility Service is a service running on OmniTouch 8400 ICS to provide convenient relevant roaming and seamless handover between a mobile carrier network and corporate or host spot/home spot WLAN infrastructure.

Figure 9. Corporate Wi-Fi to mobile handover

Controlling the handover from the server allows maximum efficiency in a reliable SIP-standard based solution that has consistent integration with enterprise telephony services.

Figure 10. Home spot Wi-Fi to mobile handover

Resilience and reliability

Redundancy for service availability

As an enterprise grade communication solution, OmniTouch 8400 ICS architecture satisfies the requirements for service availability. It is Red Hat® Linux® based with an N+1 redundancy architecture. In addition, telephony services benefit from the OmniPCX Enterprise duplication architecture which provides 5x9s of availability.

Fallback mode

Mobile users are considered to be full enterprise users and are integrated within the enterprise communication framework to provide a high level of availability. In spite of the increase in quality mobile carrier coverage, mobile networks may not be able to provide an adequate data signaling channel which could prevent mobile devices from getting information and signaling from the OmniTouch 8400 ICS. In such a case, OmniTouch 8600 MIC for mobile devices is able to fallback to a dual-tone multi-frequency (DTMF) signaling mode to maintain enterprise grade telephony services to mobile users. When an adequate data signaling channel becomes available, signaling synchronization occurs to maintain mobile device user environment consistency.
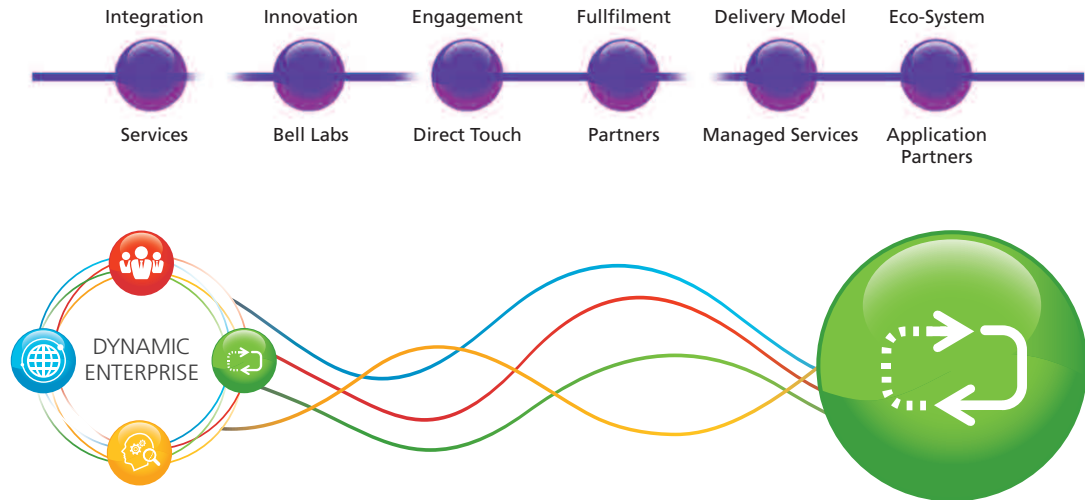
Future proof architecture

The OmniTouch 8400 ICS is the first step toward the Dynamic Enterprise architecture for real-time/mission-critical communication.

Future solution will push SIP usage far beyond basic voice service with enriched media blending and support for enterprise mission-critical real-time communication such as video communication.

Deployment model

OmniTouch 8400 ICS deployment is aligned with the Alcatel-Lucent engagement model in accordance with customer (end user) needs.

Figure 11. Alcatel-Lucent deployment model

The OmniTouch 8600 MIC for mobile devices was first deployed internally for Alcatel-Lucent enterprise sales and direct touch staff in accordance with the "Fly our Own Jet" policy in order to educate Alcatel-Lucent employees on current solutions, provide a consistent feedback on solution effectiveness and strengthen product reliability.

The solutions detailed above are fully supported by business partners and can be deployed in capital expenditure (CAPEX) mode or through managed service offerings. A wide variety of application partner solutions are available for integration with the OmniTouch 8400 ICS for solutions that meet specific customer mobility needs.

Acronyms

3G	third generation cellular network	MIC	My Instant Communicator
ARS	automatic route selection	MMS	multimedia messaging service
BES	Blackberry Enterprise Server	OMA-DM	Open Mobile Alliance – Device Management
CPE	customer premises equipment	PKI	public key infrastructure
DMZ	DeMilitarized zone	ROI	return on investment
DND	do not disturb	SMS	short message service
EDGE	enhanced data rates for GSM equipment	SSI	secure socket layer
FMC	fixed mobile convergence	TDM	time division multiplexing
GPRS	General Packet Radio Service	UC&C	unified communication and collaboration
ICS	Instant Communication Suite	UMA	unlicensed mobile access
IM	instant message	VPN	virtual private network
IMS	IP multimedia subsystem		