

Enterprise Mobility

Why a compelling end-user experience demands integration of network-based and premises-based solutions.

By P. Carden

Mobility represents an area of great change and opportunity for enterprises and their service providers. What is a mobile enterprise? It is an enterprise where users are as productive as possible wherever they are – which means they have consistent access to the services and technologies they need to do their jobs, regardless of the device they are using or their location. To realize that goal, an effective enterprise mobility solution must provide tight integration of both IMS and circuit-switched mobile phones with a broad range of existing premises solutions (including PBXs, directories, messaging and presence servers). An effective mobile enterprise must implement a true unified communications solution that, among other things, provides simplification of phone numbers, contact lists, messaging and bills.

New Technologies, New Strategies

Until recently, the world of mobile phones existed largely as an island of automation separate from the mainland of enterprise telecommunications. Technology changes are rapidly bringing to an end the era of the “mobile island,” however.

Wireless technology developments enable a variety of new strategies – both for service providers and for enterprises.

On one hand, mobile service providers may pursue “substitution” strategies. For example, the mobile phone takes over completely from the fixed phone via so-called wireless PBX services. Alternatively, the mobile phone may become an extension of the existing corporate PBX – a partial substitution that may be an attractive option for larger enterprises where PBX replacement is not a practical alternative, such as in the case of a mobile workforce and branch offices.

On the other hand, today’s fixed-service providers (working with their own mobile arms or as a mobile virtual network operator [MVNO]) can leverage their existing fixed business to win over competitors’ mobile business by offering fixed/mobile convergence (FMC) or one-phone services. Such services combine dual-mode WiFi/mobile terminals with network-based call continuity, so that users enjoy seamless handover between WiFi and mobile modes.

A third option is that the enterprise may not rely on service providers at all for its indoor wireless solutions. Instead, it may simply follow a do-it-yourself strategy using dual-mode phones and a PBX-based WiFi mobility solution. Service providers therefore face a battle on two fronts: they must not only provide services that are more compelling than their competitors; they must also offer services that go beyond what the enterprise can deliver on its own. Beneath each of these different approaches to fixed/mobile convergence services is the combined requirement for mobile access and a broadband IP services network.

New service alternatives introduce new ways for service providers to leverage existing assets, while also necessitating new partnerships or network investments.

User Experience is Key

End-to-end enterprise mobility solutions bring together several very different technological worlds. They include:

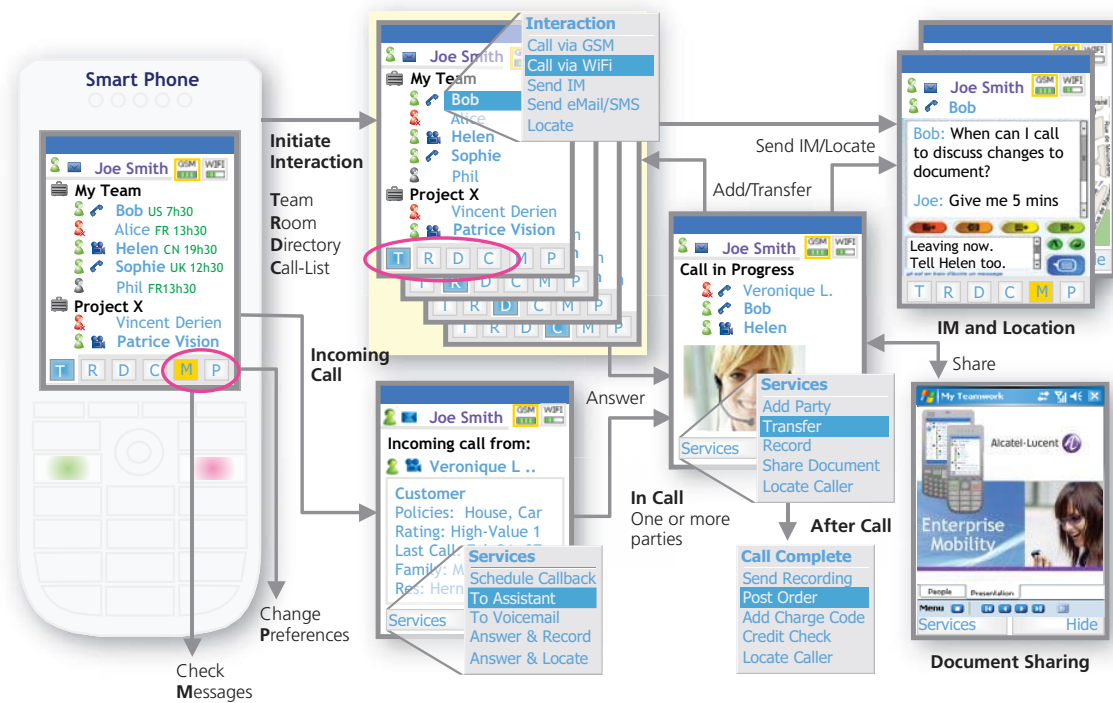
- Public and private IP networks.
- IT solutions like directory and email.
- Premises-based telecommunications solutions.
- Public land mobile networks (PLMNs).

Before examining some of the very real technology challenges involved in bringing together these different realms, it is useful to consider first how to improve the user experience.

First, it is important to realize that the enterprise mobility user experience is not just about mobile phones. The goal is to enable people to work and collaborate effectively from wherever they are using whichever device(s) they have available. The user experience should enhance productivity regardless of the device being used – whether it's a PC, a desk phone or a mobile phone.

Figure 1 illustrates some example elements of user experience as they might appear on a mobile device. On a desk phone or PC the interface design would be different, but the functions are equivalent.

Figure 1: Building a consistent user experience that enhances productivity



While this article does not detail all the elements of a next-generation user experience, there are some elements that have significant technology management consequences. Critical elements include:

- **Initiating Interactions.** In a mobile enterprise, there are several new ways of initiating calls, instead of simply entering a phone or extension number:
 - *Directory and Contact List.* Enterprise users have their own set of contacts outside the organization (customers, suppliers, personal) as well as the need to locate colleagues inside the organization easily. In either case, the information should be available and consistent regardless of the location or device from which the communication comes. In practice, this means that contact lists should be network-based (as opposed to device-based) and that lookups need to be linked to the corporate directory.
 - *Team “Buddy Lists.”* In the enterprise version of a “buddy list,” the employee organizes contacts into teams or groups. This means that colleagues associated with a particular project are visible, along with their current network status, improving the ability to choose a communications channel that is likely to succeed (for example, sending an IM if the person is already on the phone). Network management can enhance such presence information to improve efficiency. For example, by showing the time in the country where a colleague’s mobile phone is currently located.
 - *Call Logging.* Recent and missed calls are the most popular ways of initiating calls on mobile phones today. However, as we give users more control over how their calls are handled through easy-to-use, presence-based “personal assistants” (such as advanced call forwarding features), many calls will not reach the mobile device. A mobile phone call-list solution, for instance, is limited to the individual phone. This drives the need for a network-based call list that spans the different communications channels an employee might use.
 - *Conferencing Rooms.* We can also move well beyond the traditional – but limited – model of enterprise conferencing. Not only can we see who is connected and who is speaking, but also we can share documents, record the session and even leave the virtual conference room intact so that meetings on the same subject maintain the content and the context of the meeting from one week to another. The room concept itself becomes a new mechanism to initiate interactions.
- **Incoming Calls.** When the phone rings today, the mobile phone client may translate the calling number using the local contact list into a recognizable name. However, much more valuable context information can be provided for the incoming call. By linking into the call-center application, it is possible to display on a salesperson’s mobile phone any of the information about a customer that might usually be available to a call-center agent. At the same time, different options can be provided for handling the call – for example, immediately forwarding to voicemail or to an assistant.
- **In a Call.** The functions available to a typical enterprise mobile phone user today are limited when compared to the functions available from a desk phone. Mobile phone usefulness can move beyond basic features like call-transfer and call hold, and be enhanced by more sophisticated features like ringback-when-free and manager-secretary. However, it is possible to go much further than extending the reach of PBX-like features. A growing number of mobile phones can run sophisticated client applications, including multimedia services like instant messaging and mobile email, as well as collaboration and conferencing applications.

Deliver Consistent Rich Services and User Experience, Even When Roaming

In an all-IP architecture model, the mobile network is simply another form of broadband access. However, there are some very real constraints specific to the mobile network, such as those associated with roaming between networks and QoS.

The good news is that many basic issues are addressed by standards. For example, roaming issues are, almost by definition, covered by standards. Indeed, it was the requirement to handle roaming elegantly in an IP-based mobile world that largely drove the development of the IMS standards that provided a standard architecture for the IP control plane in service provider networks.

As such, IMS provides a well-defined IP control plane that:

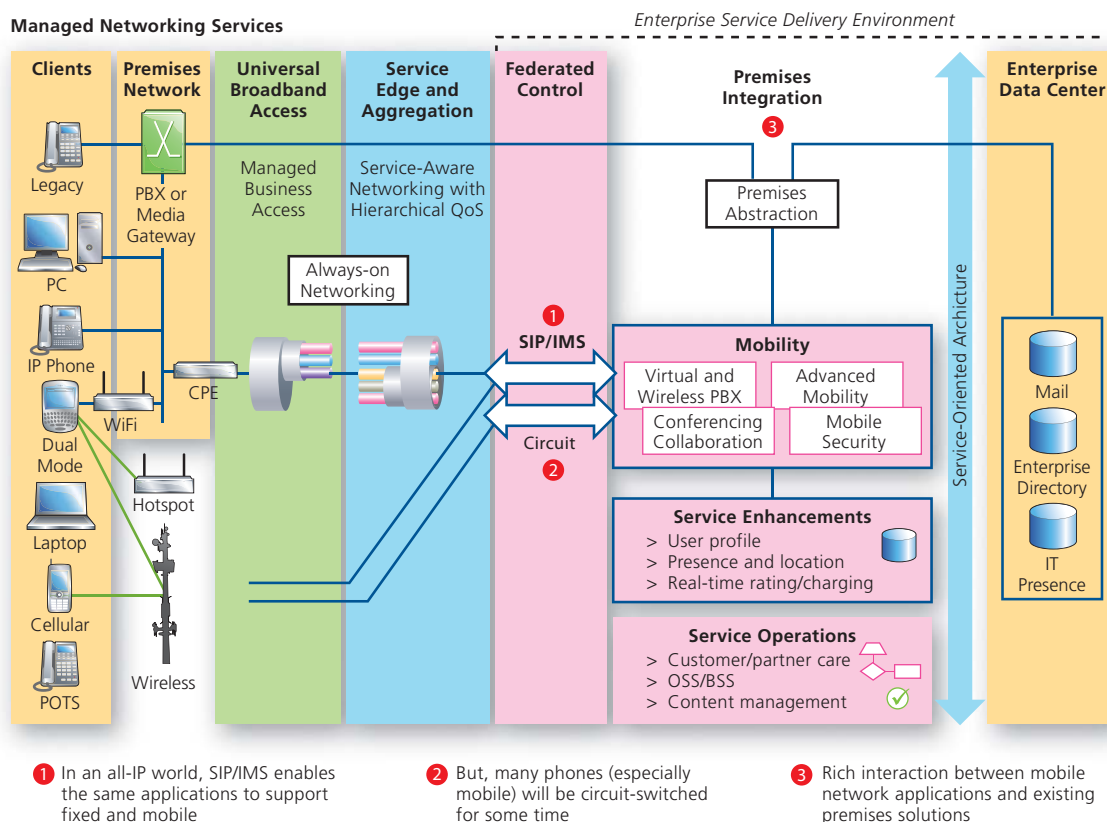
- Supports roaming.
- Provides consistency between fixed and mobile networks.
- Provides the ability to scale to the level of replacing today's global circuit-switched network.

That is why IMS is a key element in an enterprise mobility strategy. Unfortunately, IMS is not widely available in mobile networks today, and since mobile phone users roam into networks outside the control of a particular operator, it will be necessary to accommodate circuit-switched devices and networks for several years to come.

To accommodate these requirements, Alcatel-Lucent has defined an end-to-end reference architecture – the MCS Delivery Architecture – that describes the network, service delivery, management and support systems capabilities as an integrated solution for delivering a complete suite of services for enterprises, including enterprise mobility.

Figure 2 illustrates the main components of the MCS Delivery Architecture involved in delivering enterprise mobility services.

Figure 2: Delivering enterprise mobility with the MCS Delivery Architecture



In this architecture, support of circuit-switched mobile phones can be provided in two ways:

- The first option is an IMS-centric approach that is appropriate if the majority of traffic is already IP-based. In fact, this is the same mechanism by which IMS enables the “voice over IP” (VoIP) environment to place calls to and from the PSTN and PLMN. With this approach, circuit-switched voice calls are handled by an IMS application connected through trunk gateways under the control of the IMS media gateway control function (MGCF).
- The second option is to have both IMS and IN control interfaces on the feature server. This is recommended when the majority of mobile voice calls are circuit-switched. Under these circumstances, there are two reasons for adopting this approach. First, the media gateway approach is inefficient in terms of network resources – it is necessary to use relatively expensive media gateways simply to trombone calls in and out of the IP domain. Second, media gateways do not participate in “intelligent network-level” protocols (e.g. CAMEL for mobile GSM networks). This means that applications often can’t deliver as rich a set of user features or provide an appropriate level of billing granularity, especially when users are roaming.

Dual-Mode Voice Call Continuity Mechanisms

Another area where the MCS Delivery Architecture provides engineering flexibility for enterprise mobility is in the choice of mechanisms for voice call continuity (VCC) – that is, the ability to continue a session when moving between WiFi coverage and cellular coverage (primarily in the case of dual-mode phones).

Session continuity can be provided at the network-level via unlicensed mobile access (UMA). In this case, WiFi is used to transport standard GSM signaling. Such phones appear as standard GSM phones to enterprise feature servers such as the Alcatel-Lucent 8640 Corporate Mobility Manager (CMM), which provides network-based private numbering, billing and virtual PBX services for enterprise users.

But because the 8640 CMM supports both circuit-switched GSM (via CAMEL) and IMS phones directly, it can also support session continuity at the application level using an “intelligent mobile redirect” (IMR) module running alongside its other application modules. This is the recommended approach for enterprise users. It is aligned to the 3GPP VCC standard and enables more sophisticated changes in feature operation based on access type.

A similar application-level solution is available for premises-based deployments (the Alcatel-Lucent OmniPCX Enterprise Mobility Server). The application-level solutions provide a richer feature set, while the UMA approach can be attractive in terms of its simplicity and the associated speed-to-market advantage for mobile service providers. Either way, the MCS Delivery Architecture provides an elegant migration for “one-phone” services as mobile networks move from circuit-switched to IMS environments.

Cross-Leverage Between Network-Based and Premises-Based Solutions

The emergence of compelling “wireless PBX” applications (such as the CMM Virtual PBX) means that, for some enterprises, it is no longer necessary to maintain their own on-site PBX. However, for some larger enterprises, that might not be a practical option. In those cases, the key question to address is how to make the mobile phone interoperate seamlessly with the existing premises solutions, including PBX, email, calendaring, directories and presence – illustrated by circle (3) in Figure 2.

PBX integration presents significant architectural challenges due to the number of different approaches available. Protocol suites that can be used for such PBX integration include the session initiation protocol (SIP) and related standards for VoIP; Q-SIG, which supports interoperation of different vendors' PBXs over TDM; and Computer Telephony Integration (CTI) mechanisms. Because of its broad enterprise portfolio, Alcatel-Lucent can support each of these PBX integration approaches.

The ability to work with such a broad range of PBXs is a strong differentiator for the Alcatel-Lucent MCS Delivery Architecture, and allows service providers to maximize their potential market. However, in many situations the service provider (perhaps in combination with other channel partners) will deliver an end-to-end solution combining network-based services with premises-based solutions. These would include Alcatel-Lucent's OmniPCX Enterprise and OmniPCX Office, for larger and smaller businesses respectively.

In such situations, the MCS Delivery Architecture ensures that an end-to-end Alcatel-Lucent solution delivers an even richer and more consistent user experience, especially for mobile users.

End-to-end enterprise mobility solutions that leverage both network and premises solutions will not exist in isolation of other telecommunications services demanded by enterprises. To maintain the cost competitiveness of such services it becomes increasingly important to leverage the same broadband network access as other enterprise telecommunications services, including private data services, Internet access, business voice and hosted services. Alcatel-Lucent's MCS Delivery Architecture addresses enterprise mobility as one element in the context of a holistic approach to enterprise services. ❁

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