Market Clarity

Australia's Source for Telecommunications Intelligence

IP Telephony: Driving Business Transformation

16 April 2007

Market Clarity Pty Ltd
Suite 1404, Level 14, 33 Bligh Street
Sydney NSW 2000 Australia
Internet: www.marketclarity.com.au
Email: info@marketclarity.com.au
Phone: (02) 9221-9211
Fax: (02) 9221-9222
ABN 18 117 524 366

Publication Number: 06096

Sponsored by:

macquarie TELECOM

Market Clarity

Contents

Foreword 3
1 Introduction --- IP Telephony as a Transforming Technology 4
Beyond Telephony 4
The First Wave: Infrastructure Enablement 4
The Second Wave: Application Integration and Business Process Re-Engineering 5
The Third Wave: Anytime, Any Place, Any Device 7
2 Understanding Unified Communications 8
Elements of Unified Communications 8
Application Integration 11
The Benefits of Application Integration 12
3 IP Telephony — Enabling Organisational Mobility 14
Defining Mobility 14
Presence Services 15
Security 16
Any Time, Any Place, Any Device 17
Mobility in Practise: Un-tethering the User from the Desk 18

Figures

Figure 1. — The Three Waves of IP Telephony 4
Figure 2. — IP Telephony Drivers: Unified Communications 6
Figure 3. — Unified Communications Components 8
Figure 4. — Desktop Videoconferencing with Presence (Source: Cisco) 10
Figure 5. — Application Integration and Unified Communications 11
Figure 6. — Mobility Features in IP Telephony Implementations 14

Market Clarity

Foreword

VoIP is a current hot topic, but there is a great deal of confusion over what it actually means for business. This paper aims to provide you with clarity and valuable knowledge capital.

Macquarie Telecom has invested deeply in identifying problems and issues businesses face and understands the value Thought Leadership can provide businesses in strategic growth.

This paper explains what VoIP and unified communications really are, how they can drive your business and why organizations are implementing it to improve business performance. Market Clarity is an independent, Australia-based research company and a recognised authority in IP Telephony.

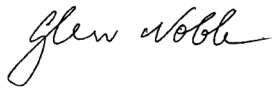
VoIP (Voice over Internet protocol) is not just about cutting call costs; it is the first wave of the IP Telephony journey; enabling your infrastructure to form the basis of completely unified communications architecture. VoIP is available now and can be working for your business today. By leveraging their engineering knowledge Market Clarity provides insight, intelligence and advice on all aspects of the Australian telecommunications market including traditional, converged and future technologies

Application integration is the second wave of the IP Telephony journey. Integrating your business applications such as email, fax, voicemail, and instant messaging simplifies the various forms of information you receive to provide you with a single view of the world. And today's third wave of the IP Telephony journey is around connectivity, anytime, anywhere, with any device. You may know this as unified communications; Macquarie Telecom refers to it as business class VoIP.

Unified communications can solve many issues businesses face, one of which is 100% mobilisation of your people. In today's corporate world where flexible working arrangements and multiple communication tools reflect our working environment, enabling your staff to be mobile is essential. So whether they are at home, in the office, or in the car, they can make and receive calls, pick up and respond to voicemails, receive and send emails and be 100% accessible.

Market Clarity has produced a refreshing and focused white paper, which clarifies the benefits of unified communications in everyday business use, underlining its value to the Australian business community. We hope you find the paper both stimulating and informative.

Glen Noble



Chief Technology Officer
Macquarie Telecom

1 Introduction — IP Telephony as a Transforming Technology

Beyond Telephony

IP Telephony is not only a technology; it is also a journey. For some companies, the journey begins with the need to replace or upgrade an aging PABX or key telephone system. Others are driven by a desire to reduce call costs by using their IP networks to carry inter-office traffic.

The most important characteristic of IP Telephony, however, lies further along the journey, when a company realises that a successful IP telephony implementation brings with it an infrastructure that can form the basis of a completely unified communications architecture. Market Clarity believes this journey can be represented as three distinct "waves" of implementation, as outlined in Figure 1, below.

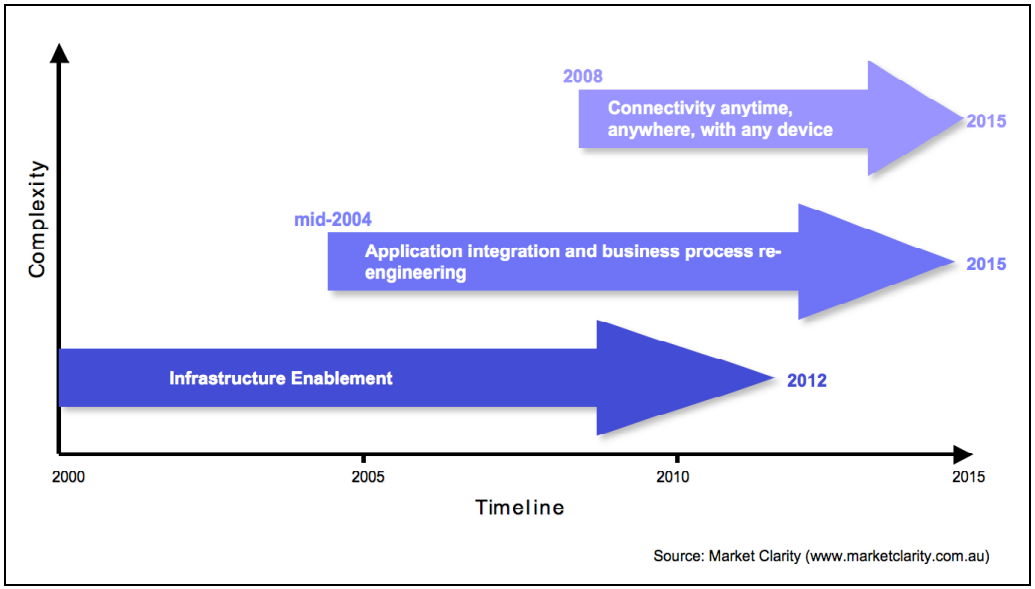
The First Wave: Infrastructure Enablement

Since the advent of technologies such as ISDN, ATM and Frame Relay, system designers have worked to create interfaces between voice and data networks. This process began with the development of suitable gateways between data networks and PABXs.

These gateways provided a mechanism to send voice across an organisation's wide area data network (WAN), but did little to enhance the way that organisations used their voice infrastructure. The primary driver here was cost savings (toll bypass).

With the advent of IP Telephony, these voice/data gateways were integrated directly into telephony systems using the ubiquitous TCP/IP data networking protocol. Now, instead of limiting voice/data integration to wide area networks, converged data streams are sent all the way to the end user's IP phone, softphone, or any other IP-enabled device or application.

Figure 1. — The Three Waves of IP Telephony



However, to achieve good quality voice, organisations needed to re-jig their LAN and WAN infrastructure to handle real-time information streams. In technical terms, this means implementing a Quality of Service (QoS) based network architecture.

Network enablement includes three broad areas:

- **LAN/WAN Technology —** High-speed LAN technologies (such as 100 Mbps and 1000 Mbps Ethernet), high-performance WAN technologies (such as carrier IP/MPLS services), and a sophisticated QoS architecture allow IP Telephony systems to deliver high conversation quality, while maintaining sufficient capacity for high performance unified communications and other applications.
- **Carriage Services —** The IP Telephony-enablement of carriage services (either across QoS-based data networks, or via a direct IP feed to a carrier softswitch) provides full interconnection between IP Telephony systems.
- **Protocols —** End users with suitable client software can establish audio or video "conversations" over IP networks. The development of standard protocols is fundamental to allowing users to deploy IP Telephony confident that they will be able to communicate with other organisations, without knowing anything about each other's environments. In the IP Telephony world, the most important protocol is SIP (Session Initiation Protocol), which provides the ability to set and tear down "calls," as well as specify the technical parameters for each "call" session. As an industry standard protocol, SIP underpins interoperability between vendor equipment, third party software and carrier IPT/VoIP services.

Most of the technologies, protocols, and systems needed for Infrastructure Enablement exist now. Because of the long lifetime of the installed base of PABXs and key systems, and conservatism among some customers, Market Clarity believes the first wave of IP Telephony won't reach its conclusion for at least another five years.

The Second Wave: Application Integration and Business Process Re-Engineering

In the second wave of IP Telephony, there is a focus on Application Integration. The generic term "application integration" indicates that applications offer hooks (called Application Programming Interfaces or APIs) for use with and by other applications.

A simple example may be a spreadsheet, which, through interfaces such as ODBC or JDBC, could issue queries directly to a relational database. This eliminates the manual step of exporting data from the spreadsheet for re-import into the relational database. Even in more sophisticated environments, application integration eliminates manual steps between different applications, and in doing so delivers productivity gains.

The infrastructure that delivers IP Telephony (IPT) can also enable a new wave of application integration. Indeed, one can say that the capabilities inherent in a Unified Communications architecture — a key feature of many IP Telephony systems — is a building block which can support the integration of additional applications and databases.

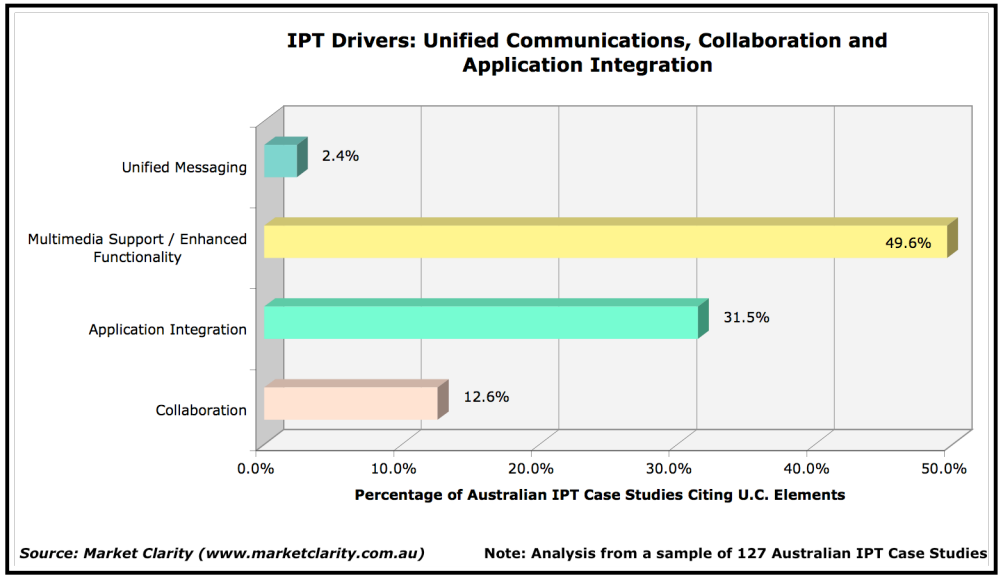
Examples of IPT-based application integration range from the relatively simple, to highly complex. For instance, adding interoperability between directory and email applications, such as Microsoft Outlook, with the IPT system can provide end users with click-to-dial, click-to-conference or click-to-videoconference capabilities with little fuss, and all within the integrated application (in this case Outlook).

Indeed, many organisations that have embarked on the second wave of IP Telephony cite deeper integration with desktop applications as a key reason to implement a unified communications platform.

However, the power of a unified communications strategy goes much beyond this. For instance, information from a Customer Relationship Management (CRM) system can be integrated with the IPT system to play specific welcome messages to callers, or to provide greetings that also integrate information from the recipient's calendar to provide highly customised information about the recipient's schedule for the day.

Figure 2, below, shows the results of a Market Clarity study into IP Telephony deployment at 127 Australian organisations between 2003 and 2006. This Figure shows the capabilities sought by customers in their Unified Communications implementations.

Figure 2. — IP Telephony Drivers: Unified Communications



This clearly shows strong interest multimedia support among users now implementing IP Telephony. Application integration is also highly important to the user base. Interestingly, although both of these are closely associated with unified messaging, users to date don't strongly identify unified messaging as an implementation driver. Although, we note that many of the surveyed organisations have implemented most or all of the individual components of unified messaging (integrated email, voicemail, fax) in their IP Telephony system.

Collaboration is also relatively low on users' current interests. However, it is worth noting that most collaborative technologies need an environment which already supports multimedia communications.

As IP Telephony implementations become increasingly sophisticated we will start to see standardised APIs (Application Programming Interfaces) for major applications, and middleware designed to ease the systems integration burden. With these tools in place, businesses will begin to experiment with business applications that harness the power of voice, data and video information streams.

Today this type of application integration is inhibited by the need for customised system integration, and a focus on cost savings rather than service innovation on the part of end-user organisations.

The Third Wave: Anytime, Any Place, Any Device

As the first two waves gather pace, they will align with an emerging generation of new, more capable devices designed to take advantage of the new capabilities of networks, infrastructure, and application integration.

When organisations reach this stage of IPT deployment, business applications will incorporate presence, mobility and rich media collaboration.

For each organisation, company-specific business drivers will underpin the selection and timing of application integration.

Unified Communications Futures

Tele-Presence — Beyond Videoconferencing

Teleconferencing vendors are now beginning to roll out the next level of videoconference technology, known as “tele-presence”. Tele-presence systems take advantage of the fast growth in network bandwidth (both in enterprise LANs and in carrier IP networks) to deliver a vastly improved conference experience. Tele-presence systems deliver:

- **Performance —** Near-studio quality audio and video;
- **Experience —** Support for large-screen video to greatly enhance the “face-to-face” experience (referred to as an “immersive” experience);
- **Application Integration —** Full support for collaboration, deeply integrated into end user desktop and enterprise applications;
- **Interoperability —** Modern tele-presence environments allow a phased migration, with interoperability across vendors and with older teleconferencing environments.

A successful tele-presence strategy also requires the identification (and implementation) of cognitive and perceptual factors for optimal human-machine interaction, as they pertain to specific business activities.

2 Understanding Unified Communications

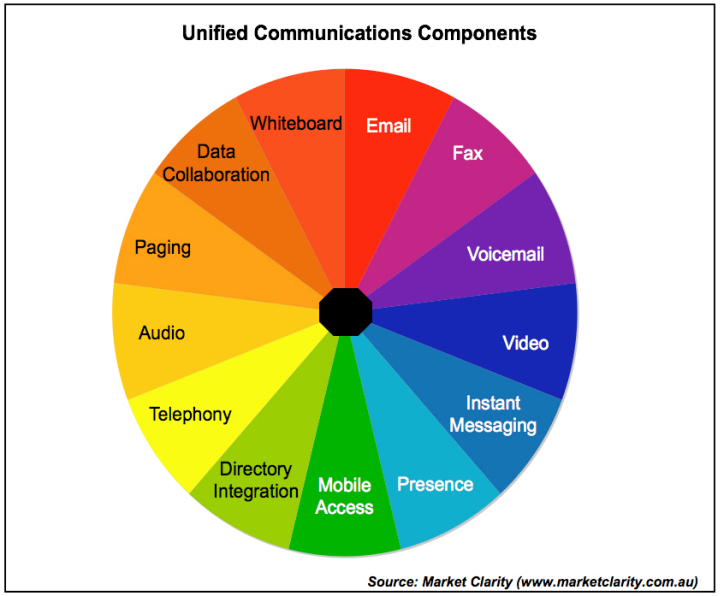
Unified Communications represents a new model in communications. Traditional telephone networks place the device at the centre of the communications model: calls are routed to handsets, mobile telephones or fax machines. This makes a traditional network highly location-specific, and demands a heavy investment in "intelligent network" technologies to provide partial workarounds (such as follow-me and call diversion).

The Internet popularised a new model that elevates the user to pride-of-place in the communications environment. Email, for example, is associated with a user rather than a device or a location. As long as user@mynetwork.net.au is able to access an Internet connection, he or she can use an email account. With the user at the centre of the communications model, we can create a plethora of IP-based communications-oriented applications that enable human interaction.

Elements of Unified Communications

Unified communications applications enable a variety of interpersonal communications across an IP network, as represented on the colour wheel in Figure 3.

Figure 3. — Unified Communications Components



- **Telephony —** This is the entry point to IP Telephony, but all too often it's seen as the destination. A successful telephony implementation will realise some savings in system costs and call charges, but in isolation, a new telephony system is not enough to deliver all of the business communication benefits of unified communications.
- **Audio —** In addition to telephony, a unified communications platform can support other audio applications such as simple chat clients. Easy application hooks (APIs) mean that somebody editing a document can place a quick chat call to the author to confirm a correction without having to reach for the phone.
- **Paging —** Systems such as nurse-call paging can be integrated with both fixed and mobile phones to deliver the most urgent messages to those devices known to be active and logged in.
- **Data Collaboration —** The unified infrastructure means users can talk on a chat session while working together on a single copy of a document, with triggers ensuring that everybody is looking at the same version of the same data. Data collaboration can stretch as far as having

wiki-style servers deployed in the unified communications environment, with email integration so that a document's manager can be alerted to important edits from other team members.

- **Whiteboard —** Whiteboarding is an element of data collaboration. Users can share and annotate sketches within the same whiteboard application space, much as if they were sharing a whiteboard in a standard meeting room.
- **Email —** Email is a key user-facing component of a unified communications environment. Although it doesn't have the immediacy of the telephone or a videoconference, it offers persistence ideal for alerts of all kinds. It also allows for communications to anyone on the planet who has an Internet connection and email address.
- **Fax —** IP integration means faxes can be made as mobile and user-centric as other IP-based communications. A vital fax (for example, a hardcopy of a purchase order) can be delivered to the intended recipient, even though that user is not at his or her desk. Similarly, faxes can be sent directly from within the unified communications environment to any standard fax machine, or broadcast to multiple fax machines. Inbound faxes are typically delivered via email as a scanned image file.
- **Voicemail —** The unified communications environment means the employee only needs one voice mailbox, and this is accessible anywhere the user can log into the network. More importantly, user notification is active rather than passive — "you have a message" can be sent to whatever device is associated with the user's login. Voicemail notification is only part of the picture. Unified communications systems can also send the voicemail message out as a .WAV (or other audio format) attachment to an email message — meaning that an end-user does not even have to connect to the telephony system to hear the voicemail message. Clever organisations go one step further, using voicemail messages to "broadcast" company news to their staff.
- **Video —** Video encompasses a large variety of capabilities, including two-party and multi-party videoconferencing; multicast streaming of pre-prepared video content (for example, training courses); and one-to-many live video sessions (for example, distance education). Video is the "poster child" of unified communications, especially as high-quality, high-capacity networks start to usher in the age of tele-presence (see the sidebar on page 6, Unified Communications Futures). Video is favoured in situations where organisations want to make their internal communications more personal and responsive, since it allows users to see non-verbal cues such as facial expressions when they communicate. Unified communications environments also make it easier to create mixed-media conferences: if someone can't access the high-quality conference system, they could revert to a desktop camera or an audio-session. With video fully integrated into the unified communications system, collaborative systems can add video chat requests to documents, allowing dispersed teams to activate video chats to discuss their work.
- **Instant Messaging —** Instant messaging is most familiar as a consumer Internet application, allowing quick text communications between individuals. Consumer IM environments are also plagued by security problems, often acting as attack vectors for spreading malicious code. Even so, IM can be a worthwhile part of unified communications. For example, it's ideal for quick, simple queries between team members. IM also supports hassle-free file transfer between users, by simply dragging a file into the IM session window. In a business IM environment, organisations can keep control of business IM traffic behind the firewall. Instead of having messages between staff, possibly containing confidential or sensitive data, transmitted via a public IM service, the unified communications server can act as the IM server for intra-company communications.

- **Presence —** Presence describes the ability of the unified communications system to identify that users have logged in, and respond to the users' different location, connection and device characteristics. Presence offers benefits for users both when they're making and when they're receiving calls. Users can manage their own availability to receive calls (and, if they're away from the office, the system can choose the "best" device through which to call users). When making calls, users can see the presence and availability of the person they wish to call, and make that call over the most appropriate connection — initiating an audio or video call or an IM session.

- **Mobile Access —** Mobility is most often associated with the cellular phone. However, users may also need to be mobile within a building, or they may need nomadic remote access while travelling or tele-working. Unified communications environments enable much simpler and more flexible mobility, embracing cellular and WiFi technologies as well as ad-hoc logins from nomadic users with laptops in an airport lounge. The unified communications service can also be configured to identify the best channel for a given user at a given time.

- **Directory Integration —** Unified communications systems rely on a single, authoritative repository for information about users (such as the devices, locations and networks associated with that user; the user's login data; access controls; and communications history such as calls and call costs). This is best stored in a single, integrated enterprise directory.

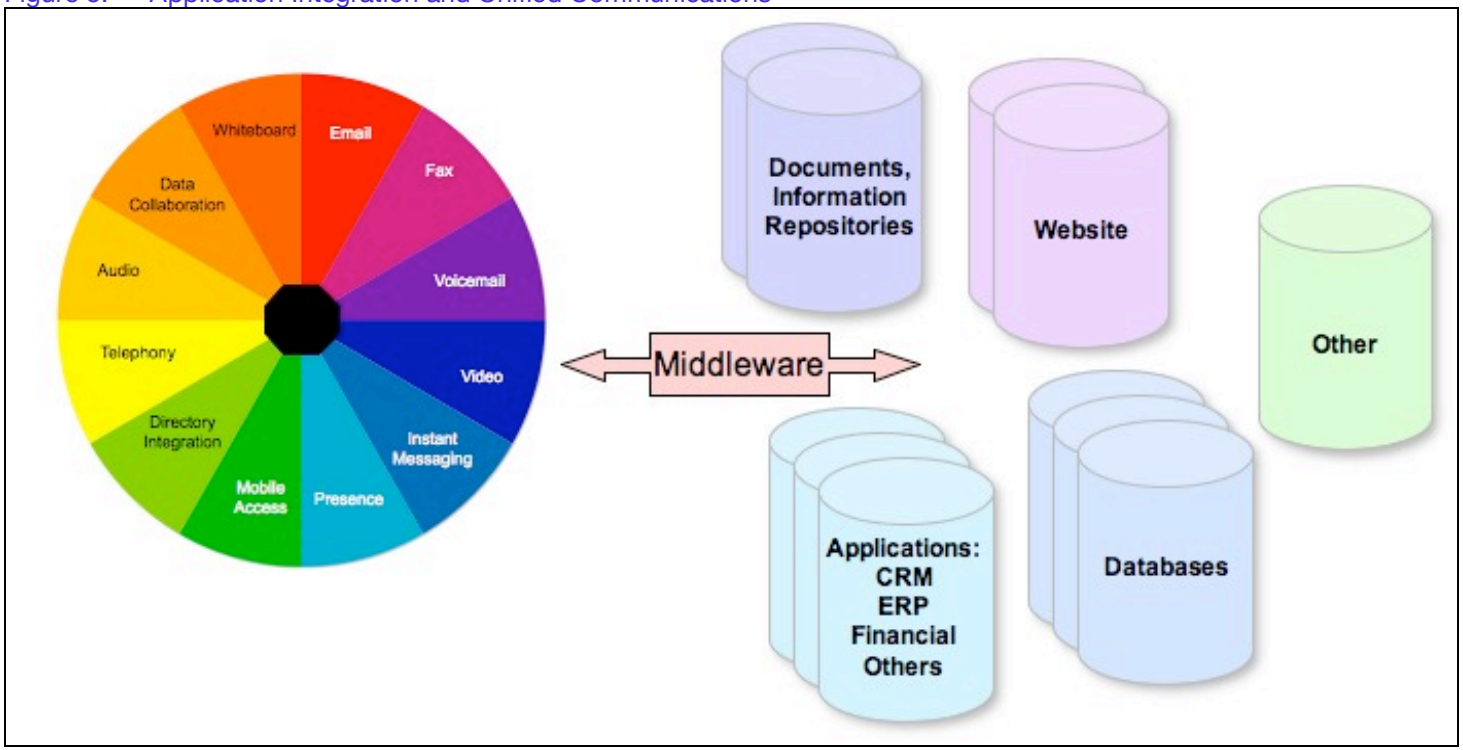
Figure 4. — Desktop Videoconferencing with Presence (Source: Cisco)

Unified Messaging applications from major vendors such as Cisco are increasingly available as "out of the box" integrated components of IP Telephony systems. Such integration is designed to simplify deployment. An integrated directory allows users to be members not just of locations but also of sub-groups (such as the Sales Team group in the contact list above), and the presence server can indicate the availability of groups as well as individuals.

Application Integration

"Application Integration" describes the process of allowing different software environments to exchange data automatically and seamlessly. Generally, this is accomplished by deploying a middleware layer between dissimilar environments. The middleware is responsible for translating the data and file formats of different applications into a common language, and for passing application requests between different systems. This means the application designer only needs to know how to send requests to the middleware, rather than having to create interfaces to many different systems.

Figure 5. — Application Integration and Unified Communications



Application integration provides the infrastructure by which the Unified Communications environment can be integrated into other enterprise applications. The whiteboard or data collaboration applications, for example, can pass requests via the middleware to:

- Office documents (such as word processing files, spreadsheets and presentations);
- Database applications and information;
- Interactive Voice Response (IVR) and Speech Recognition applications, which allow a caller to select from a voice menu and otherwise interact with phone system options by speaking or pressing keys on a phone or computer keypad.
- ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) applications; and
- Internal and external Websites.

Requests can, of course, pass from business applications through the middleware to the Unified Communications environment as well. For example, a set of business rules in the database may trigger an email to a group of individuals. Application integration is increasingly provided "out of the box" in single-vendor environments, but this is generally restricted to SME systems. For the large enterprise, application integration is a challenging problem. Barriers to application integration may include:

- **Proprietary Systems —** Customers may find it difficult or impossible to obtain middleware interfaces for proprietary applications;
- **Bespoke Systems —** Many industries depend on bespoke applications built years, or even decades, ago. In mainframe-centric environments such as airline ticketing and banking, systems may be 20 or 30 years old, and require considerable time and effort to equip with interfaces to more modern middleware;
- **Off-the-Shelf Applications —** Some off-the-shelf applications can also be difficult to integrate. Examples include video or audio applications that depend on proprietary codecs, or applications based on proprietary embedded databases.

The Benefits of Application Integration

In spite of these challenges, application integration offers various important benefits to customers:

- **System Rationalisation —** In particular, companies can consolidate their data repositories, since applications can share access to storage.
- **Reduced Data Handling —** Manual export-import cycles (needed to transport data between applications) are not required. This reduces the risk of error as well as reducing the cost of data sharing.
- **Quicker Data Dissemination —** Since different applications can use the same datasets, users are all presented with the most current data available.

- **New Applications —** Since applications can access data through a single set of interfaces (the middleware interfaces), it is both easier and less expensive to develop new applications.

When combined with a unified communications environment, application integration allows communications to be embedded in a wide range of business applications. These include:

- **Desktop Applications such as Calendaring, Email, Spreadsheets, Documents and Presentations —** Communications in the form of "click-to-dial" functionality can be embedded within these applications, so that users working in an Excel spreadsheet or Microsoft Word document could click on a name and instantly make a voice call. This process efficiency makes end users more productive. Integrating this call functionality with user-friendly directories (such as in Microsoft Outlook) has proven a winner among staff of large public service organisations by eliminating unwieldy, out-of-date paper directories.
- **Customer Relationship Management (CRM) Systems —** For instance, an operator in a contact centre could click on a client's name and make a call directly from the CRM application. A major finance sector organisation commenced an implementation in 2005 that integrated its communications and CRM environments. Not only does this provide operational benefits such as the ability to send calls with data to regional contact centres when the main centre is at overflow levels, it also supports more customer-specific interaction (including customised Web pages for customers and triggers for birthday wishes).
- **Enterprise Resource Planning (ERP) Systems —** By integrating communications into systems such as SAP or Oracle, contact centre operators can advise callers of product availability with real-time data reflecting the current state of warehouse or store stock levels, whilst viewing complete information about a customer's previous orders from a CRM system. With a bit of software smarts, all of this information can be presented to a contact centre operator in conjunction with the inbound call. This type of voice and data integration can also benefit supply chain management, online team meetings, and any other business process that leverages ERP-based data with real-time voice, video or collaborative communications.
- **Company Websites and Web 2.0 —** Companies are increasingly adding click-to-call or click-to-chat buttons to Websites, which provide the chance to turn browsing into sales. As Web 2.0 applications such as Wikis, blogs and podcasts become more mature, they will also gain greater integration into the capabilities of the unified communications environment

Unified Communications Futures
The Softphone as an Internet Browser

The consumer market is turning into a proving ground for ways in which communications applications can integrate with an ever-growing range of other application domains.

For example, high-profile VoIP provider Skype is launching a range of marketplace and user-driven services. Its *SkypeFind* service, for example, allows users to create directories of recommended businesses, visible from within the Skype client. In *SkypeFind*, a listed business will be rated by user recommendations (similarly to how ratings are applied in the business of Skype's parent, eBay), and these recommendations will be combined with traffic measurements to provide rankings of businesses. The result is a business search with all of its components — search, results, rankings, recommendations, and calls — integrated into a single interface. Skype is also adding a low-value funds transfer capability to the client.

Such capabilities could be translated to a business environment. For example, enterprise IP Telephony could easily add a "Place Order" button to a PC softphone interface, so that a caller could identify, order, and pay for a product during a call without having to leave the communications environment (for example, to launch a separate application).

3 IP Telephony — Enabling Organisational Mobility

Mobility is not a new concept in the world of telecommunications, but when companies combine an IP Telephony-capable infrastructure with a Unified Communications architecture, they gain a level of mobility almost unheard-of in the world of disparate telephony and data networks. The user-centred nature of IP networks means that once "mobile" devices have access to the infrastructure, they can be full members of the unified communications environment.

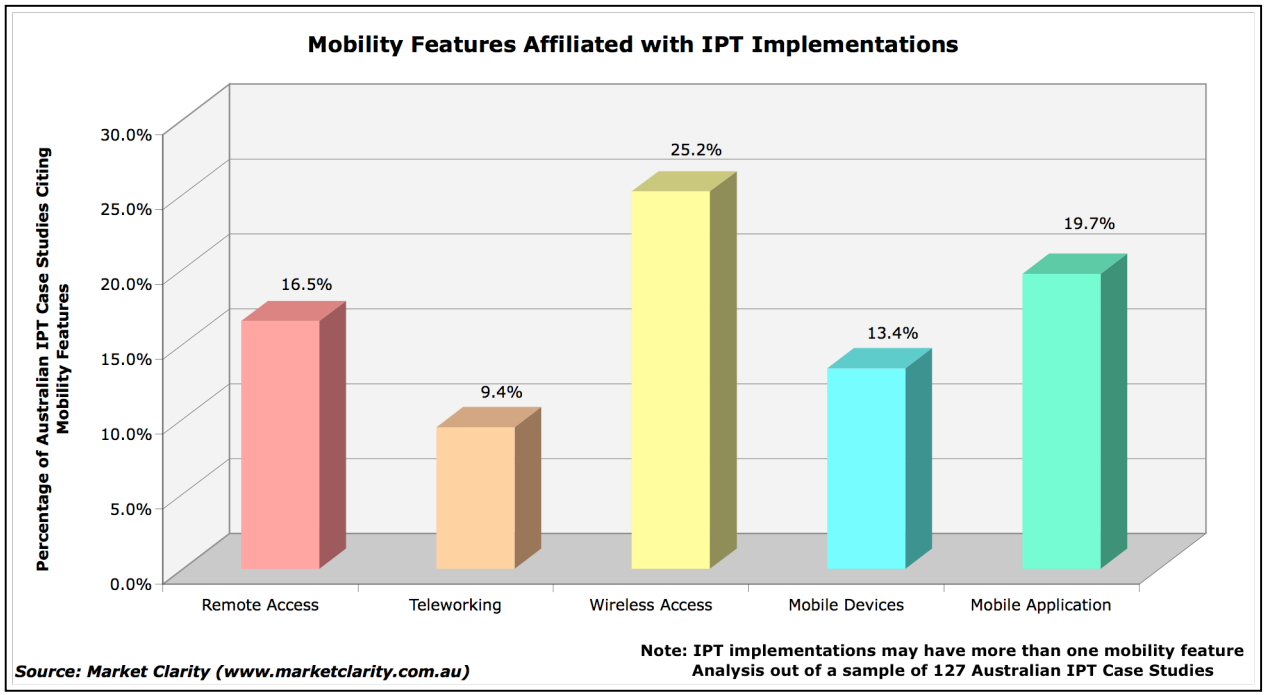
As Figure 6 shows, customers now associate "mobility" with features that reach far beyond the use of mobile phones. These features are discussed in greater detail below.

Defining Mobility

In the unified communications environment, mobility means far more than merely the ability to communicate "on the move". It embraces different devices, communication types, locations, applications, and capabilities. Mobility now encompasses:

- Wireless (WiFi) access within a building;
- "Mobile" devices such as laptops, PDAs, and cellphones;
- Bluetooth connected headsets;
- Remote access;
- Teleworking; and
- Hot-Desking.

Figure 6. — Mobility Features in IP Telephony Implementations



These different communication modes are supported by a variety of channels and end devices:

- **Mobile Voice Communications —** A unified communications mobility architecture can take into account the availability of different networks, and choose the most efficient path between the user and their services. For example, WiFi-capable laptops or mobile phones with VoIP clients can identify the availability of a suitable network and make use of that network.
- **Mobile Computing —** Once the user is visible to the network, the unified communications environment can provide full desktop access to the company's application suite. This includes communications platforms that depend on the user's PC or laptop (for example, softphones, videoconferencing, data conferencing, and collaborative applications).
- **PDAs and Smartphones —** Devices like PDAs and smartphones are increasingly important to corporate data access strategies, and need to be accommodated in the unified communications environment.

Presence Services

The key to all of this is to build a comprehensive system of presence management into the unified communications environment.

A simple and familiar example of presence is in Internet messaging clients such as Microsoft Instant Messenger and Apple iChat. Once a user is logged into the messaging network, that user's buddies can see whether he or she is available for chat sessions — in unified messaging parlance, they can see that the user is "present" on the network.

More sophisticated presence technologies lie at the heart of enterprise unified communications environments. Road warriors need their unified communications experience to be as seamless as possible.

Unified Communications Futures: ENUM

Another key part of the Unified Communications future is the ability to consolidate all of a user's numbers into one. Instead of calling through a list of numbers that may be associated with a user (office desk number, mobile number, home number, VoIP number), a caller needs only one number to contact someone. All of the called party's numbers might ring, or the presence server may determine which number is currently available, and place the call to only that number.

Many of these capabilities already exist, but they are often associated with specific IP Telephony environments, implementations or services. Companies like GrandCentral (www.grandcentral.com) in America have launched public unified communications services. These provide "single number" services for their customers, but without a standard, public lookup system like the Internet's Domain Name System (DNS), they suffer from some shortcomings: for example, users can find themselves dealing with their GrandCentral number not as a replacement for their existing numbers, but as an additional number (at least while they teach friends, family and business contacts to use their GrandCentral number).

ENUM (an abbreviation of electronic numbering) provides a standard bridge between PSTN telephone numbers and users' identity in IP Telephony systems. It uses the Internet's DNS to resolve a PSTN number to the IP Telephony user. It provides a platform to transform "one number for all channels" capabilities into part of the communications infrastructure. Currently, ENUM trials have been conducted in a number of countries, including Australia (under the management of the Australian Communications and Media Authority). Australia's ENUM trial is due to conclude on 30 June 2007.

The unified communications environment needs to manage factors such as:

- **Network Profile —** What is known about the network from which the user is accessing the unified communications environment? What bandwidth is available to the user? Is the login coming from a trusted or untrusted network? Are multiple connections available to the user (for example, both 3G cellular data and a WiFi connection), and if so, which is the most appropriate to use for this communication?
- **Device Profile —** As well as the network capabilities, the system needs to understand the devices associated with individual users. In this way, employees within the unified communications environment are presented with applications, capabilities, and interfaces suitable to the device they're using. This is crucial for access to both computing applications and communications applications. If the employee is using a PDA to access a database, the interface should be built to suit that device; if the employee is taking part in a videoconference from a mobile phone in a taxi, the system needs to understand whether there is sufficient bandwidth to videoconference, otherwise dropping back into audio-only mode.
- **User Profile —** Once the user's presence is registered on the network, the system should be able to relate the user's identity and network profile to the individual user's applications, data, and access rights.

Security

The success of a mobility strategy will depend as much on security as it will on the capabilities of the underlying infrastructure and applications. Companies considering a unified communications-based mobility rollout need to determine their security needs before they begin, and test all aspects of the rollout against that security policy. While space precludes a comprehensive analysis of security, the basic principles of a suitable policy can be easily stated and evangelised to IT management. The security environment must:

- **Manage access to the enterprise network —** The security policies that apply to users logging into the enterprise network from their desks must also be applied to external access. This means security systems such as firewalls and enterprise directories must be made aware of the rules associated with roaming network access.
- **Ensure the identity of all users accessing the network —** The user's presence needs to be closely associated to strong identification and authentication procedures.
- **Maintain the integrity of devices accessing the network —** As well as protecting devices against threats such as email viruses and phishing attacks, the device profile must cover all the communication capabilities of mobile devices. For example, it is no use securing the WiFi card in a laptop if its built-in Bluetooth remains accessible and unsecured. The same applies to all devices: the enterprise's PDAs, smartphones, and other handheld computers should only communicate within the security rules of the organisation.
- **Protect data against unauthorised access or alteration —** Remember that authorised users need to have their access to data managed according not only to the mobility strategy, but also according to enterprise policies covering individual roles, responsibilities and rights.

Any Time, Any Place, Any Device

Companies interested in "any time, any place, any device" mobility are seeking to optimise customer service, optimise staff flexibility, or optimise business operations.

Some companies will never experience the business drivers leading them through the third wave. A single-office, small business or companies working in fields such as manufacturing rather than in the knowledge economy, may not have any need to create a fully mobile workforce in an IP-enabled unified communications environment.

The "Any Time, Any Place, Any Device" ideal is a response to business drivers associated with:

- **Valuable Customers —** If customer-facing staff are responsible for high-value face-to-face interactions, the ability to deliver instant access to information through any available communication channel provides a clear competitive advantage.
- **Valuable Transactions —** If connectivity helps complete high-value transactions, it makes good economic sense to make that connectivity available to your staff as widely as possible.
- **Valuable Staff —** Knowledge industries for whom staff retention is a competitive advantage can better accommodate the needs of their personnel if they can use technology to offer workplace flexibility without sacrificing staff productivity.

These business drivers encourage both bottom-up as well as top-down deployment of "Any Time, Any Place, Any Device" environments.

Logistics applications provide a good example. Although the customer or staff value associated with a particular delivery may be far lower than in banking or finance, there may be a huge gap between the cost of transport and the value of the goods in transit (imagine, for example, the impact of $50 worth of failed delivery of a $10,000 enterprise server). Spread over a large number of deliveries, a fully-mobilised unified communications environment is just as valuable in the logistics industry as it is to a senior banking executive.

Unified Communications Futures:

Ubiquitous, Uninterrupted Mobility

The power of a unified communications framework has already transformed mobility, but there's more to come. Today's dual-mode telephones can choose between WiFi and cellular channels, but don't typically maintain either a conversation (or a state-dependent data connection like an SSL session) if the user's movements demand a change of communications channel.

In other words, users have become highly mobile in a geographic sense, but their devices are not mobile across different networks.

Emerging technologies for mobile networks will allow carriers to support a smooth handoff between different networks, so a conversation can continue uninterrupted as the phone switches from 3G to WiFi network access.

Mobility in Practise: Un-tethering the User from the Desk

- **Healthcare —** Wireless IP Telephony and Unified Communications formed the basis of a system implementation at one of Australia's major cancer research and treatment centres. An initial launch of 40 wireless handsets has given doctors and nurses much greater flexibility, giving them full mobility within their facilities using WiFi IP phones. The system will also support a longer-term move to filmless radiology, and offsite users. Doctors can now share data during teleconferences with colleagues in regional or remote locations. Unified communications can simplify other mobility applications in the healthcare sector, such as keeping in touch with providers of home care, and visiting nurses or doctors (both to patients in-home and to facilities such as nursing homes and aged care hostels).
- **Warehousing —** Organisations that need to track inventory and keep in touch with warehouse staff "on the floor" are combining the two with unified communications systems, WiFi networks, IP Telephony, and handheld computers. The handheld computers can run VoIP clients, or the users can be equipped with WiFi phones, with full mobile access to Enterprise Resource Planning (ERP) systems and communications networks.
- **Universities —** Universities are strong early adopters of IP Telephony and Unified Communications in Australia. Many university applications are based on the desire to provide WiFi-based access to students and staff to any application, database, or IP Telephony function. University adoption of IP Telephony has in large part been driven by the availability of services through AARNet, whose VoIP network is accessible to all AARNet member institutions. In addition to on-campus mobility, Australian universities are adopting unified communications technologies for delivering distance education (so-called "lecture-to-camera" applications), as well as using Web conferencing and videoconferencing applications among students, between students and lecturers, and across multiple institutions.
- **Sales Staff —** Unified communications systems provide access to ERP and CRM (Customer Relationship Management) systems from sales staff laptops and PDAs while in the field. Early applications in this space focussed on data lookup such as checking stock levels while taking orders. However, more advanced applications are also beginning to appear. For example, the unified communications environment can be used as the path to send system messages (such as customer order processing status) back to sales staff, with the message delivered according to the user's communications and device profile at login.
- **Serviced Offices —** IP Telephony is beginning to see an upswing in adoption in companies operating service offices, and at the same time, the earliest adopters in this sector are moving to highly advanced systems. For example, companies seeking to establish their international presence can now use service office unified communications systems to treat their office as a single "virtual office" on a worldwide basis. Tenants in any of the owner's office around the world can access the same IP Telephony capabilities wherever they are.
- **Virtual Office and Hot-Desking —** Any type of company where people travel or tele-work can use IP Telephony and unified communications to create a "virtual desk" for all staff, with access to all corporate applications, data, and communications capabilities through a single broadband connection.