

# Voice over IP for small and medium-sized enterprises

May, 2007

## Executive summary

The telephony market is undergoing a sea change often compared to the transition from the classic dial phone to its pushbutton successor. Internet telephony is a large and growing trend that is rapidly gaining momentum as more and more businesses and private users begin using Voice over Internet Protocol (VoIP) to make phone calls. The majority of market researchers believe that VoIP is more than just a complement to conventional telephony; it is poised to replace it.

For small and medium-sized enterprises, too, VoIP is developing an increasingly strong appeal. Not only is the technology field-proven and mature, VoIP systems and end-user devices are now being manufactured on a large scale and are competitively priced. Carriers and service providers are offering a wide choice of affordable VoIP packages, and it is safe to assume that even Europe's erstwhile monopolist carriers, now facing mounting competitive pressure, will build increasingly on IP telephony services. After all, in daily use, VoIP no longer differs from conventional telephony and the new technology does not pose a challenge for employees.

In this white paper, Siemens Enterprise Communications, a pioneer in internet telephony, describes how small and medium-sized enterprises can use VoIP, and explores the advantages offered by the technology.

## VoIP will supplant conventional telephony

During 2007, according to *Enterprise Market Update*, the number of IP-based private branch exchanges (PBXs) supplied to enterprises will exceed the number of conventional PBXs. In the years ahead, hybrid or convergent systems – systems that support both traditional and IP telephony and enable an easy, risk-free transition between the two – will command the greatest share of the market.

Until now, most of the pioneers spearheading the advance of VoIP technology have been major companies, many of which have already made or are making the transition with the aid of hybrid systems. According to a Telekomforum study published in September 2006, close to two-thirds of large enterprises are already using VoIP for company-wide telephony.

The ready availability of inexpensive DSL connections is also encouraging VoIP take-up among private users: New breeds of service provider like Skype and new carriers like Freenet, Sippgate and 1&1 today offer IP telephony for non-business users and have contributed enormously to the popularity of this innovative technology.

In spite of the solid and technologically mature VoIP offerings available from vendors, only around one-third of small and medium-sized enterprises actually use VoIP technology. However, this situation will change radically in the years ahead: Increasingly, carriers and service providers are putting together packages aimed squarely at the needs of SMEs, and a growing number of SMEs are taking advantage of VoIP without entering into a dependency relationship with a single carrier or provider.

### Protocol-driven change

Voice over IP's new-found appeal among small and medium-sized enterprises is due to a simple communication protocol. The Session Initiation Protocol (SIP), developed with substantial Siemens involvement, today is an open standard that makes implementing VoIP far easier now than at any time in the past. SIP was developed specifically for the Internet and is modeled heavily on the Hypertext Transfer Protocol (HTTP). This makes SIP exceptionally easy to implement and to incorporate into applications and equipment. Thanks to SIP, small and medium-sized enterprises can now choose from a range of inexpensive IP PBXs as well as a growing number of VoIP service providers.

"SIP has fundamentally changed the rules of play in the VoIP market," *Computerwoche* reported in October 2006, quoting Shomik Banerjee, Frost & Sullivan's analyst for enterprise communications: "SIP has become the *de facto* standard. Vendors have no choice but to support the protocol."

### New multimedia services based on SIP

The cost advantages to be gained from implementing SIP are not the sole reason for the protocol's popularity. SIP actually harbors far greater potential. As an open, standardized protocol, it promotes interoperability between PBXs and end-user devices from different vendors. The protocol's fundamental simplicity also eases equipment integration in mobile communication solutions. In the future, this will make it possible for mobile employees to be reached on a single phone number within company-wide communication systems, just like stationary employees. At the end of the day, SIP is not a protocol designed specifically for telephony; rather, it supports a large number of multimedia services on IP-based networks like the Internet.

These services include:

- video telephony and video conferencing
- web conferencing
- direct dialing from within web pages
- instant messaging with buddy lists
- unified messaging with presence management

### **Broadband is making VoIP attractive**

The other factor driving VoIP's surging popularity is the ready availability of inexpensive broadband internet access. Today's DSL services, with their high transmission rates, are easily able to support multiple voice calls in good quality, even when carrying concurrent data traffic.

In 2005, just 22.5 percent of households in Germany had broadband. There are now some 11 million broadband connections in Germany, and the country now ranks fourth worldwide (source: DSL Forum 06.2006). This trend will gain even greater momentum as DSL becomes available in unbundled packages without ISDN.

### **Divorcing dialup and internet access**

One barrier to greater VoIP take-up was eliminated in October 2006, when Germany's Federal Network Agency required Deutsche Telekom to provide competitors on request with so-called IP bit-stream access – unbundled broadband access based on the Internet Protocol. Unbundling enables service providers to offer customers broadband internet access without the need to rent a dialup line from Telekom. Previously, small business and freelancers had showed little interest in VoIP because, in their view, there was little merit in running voice calls over a DSL connection if they had to have a regular phone connection as well.

## **VoIP: Flexible and economical**

The first thing home users associate with VoIP is lower call charges. The same is true for small and medium-sized enterprises, but there are numerous other arguments in favor of businesses adopting the technology. Using IP end-to-end to transmit voice and data can greatly improve an enterprise's internal communication and accelerate business processes. IP also enables a slew of new applications that can boost employee productivity.

### **Inexpensive subscriber and PBX connections**

The availability of inexpensive PBX connections that support SIP trunking will give substantial impetus to the adoption of internet telephony by SMEs. SIP trunking today can support almost all of the features typically provided by ISDN telephony, most notably direct dial-in (DDI), which allows specific phone numbers to be assigned to extensions and departments. As with ISDN PBXs, these connections have a PBX number and a range of extension numbers – say (089) 12345 for the PBX, plus a block of two- or three-digit numbers for the extensions. This allows callers to dial straight through to users' extensions without having to go through a switchboard. Also, users' internal phone numbers and external DDI numbers are identical.

A VoIP-capable PBX connection behaves outwardly just like a primary multiplex or ISDN PBX connection. It connects the internal PBX to the public phone network via SIP and closes the gap between VoIP and conventional telephony. If a call is placed to an external subscriber who does not use VoIP, the internet telephony service provider (ITSP) – QSC, Toplink or Broadnet, for example – handles the conversion. This generally occurs as close to the call destination as possible in order to keep long-distance calls on the less costly IP network for as long as possible.

An internet subscriber line also offers small businesses and freelancers greater flexibility than a conventional phone line. Inexpensive packages are available in a choice of bandwidths, and upgrading to the next-highest speed involves little effort and, for the most part, no new hardware.

#### **What kind of connection do businesses need?**

A voice call on an IP network needs about 80 kbit/s of bandwidth to achieve similar voice quality to a call on a fixed line, so even the slowest DSL connections available today are easily capable of supporting VoIP. However, it is important to note that inexpensive DSL lines are asymmetric (hence the term ADSL). The maximum bandwidth available for telephony is determined by the upstream bandwidth, and this is often ten times less than the downstream bandwidth. Likewise to be taken into account is the fact that the bandwidth is not exclusively available for telephony and has to be shared with other traffic like e-mail and internet downloads. Even so, an inexpensive ADSL line is usually sufficient for small businesses and freelancers. By contrast, larger companies with several employees need a symmetric connection to their ITSP to ensure reliable, high-quality voice calls.

More important than the theoretically available bandwidth is the usable bandwidth at the company's disposal. The greater the distance to the service provider's node, the lower the available bandwidth. And like public roads, the data highway can be congested at times, reducing the available bandwidth. When using VoIP professionally, businesses therefore need to obtain a service level agreement (SLA) from their service provider that guarantees the availability of a specific minimum bandwidth and ensures that communication is possible at all times.

#### **Internal VoIP communication: Achieving less with more**

Once digitized and converted into packets, voice is no different from IT system data running across networks in IP packets. This means that voice and data can easily be carried on the same network. A prerequisite for VoIP is that a data network is in place – almost always the case in businesses. IP phones are connected to network ports in the same way as the business's personal computers.

In combined voice and data networks, network equipment is configured to give voice traffic priority over data traffic (much like emergency vehicles in urban rush-hour traffic) to ensure that the voice quality is suitably high at all times. If the network switches are capable of supplying end-user devices with power over Ethernet, phones do not need an external power source. So-called soft clients – telephony software running on personal computers equipped with a headset or handset – can be used instead of phones.

In a pure IP environment, the PBX is actually nothing more than another central server that provides telephony services. Some platforms like Siemens' HiPath 5000 are supplied as software (a softswitch) that can be installed on standard server or PC hardware. For businesses that do not wish to set up another server, the telephony software can run on optimized, dedicated hardware like the smaller HiPath 2000 system.

**Lower operating costs**

Combining voice and data communication on an IP-based network can substantially reduce operating costs, because it eliminates the need to maintain a separate network for telephony. Savings can also be achieved in the area of cabling, especially now that wireless LANs (WLANs) can be used in addition to wired LANs for data communication and real-time applications like telephony.

Businesses no longer need costly dedicated lines for voice communication between different branches and locations and can cancel contracts with providers. Instead, internal voice calls can be run over the inexpensive IP backbone already connecting the data networks at different company sites. Calls to location A can be forwarded to location B automatically and invisibly for the caller. At the same time, geographically dispersed departments can be centralized, and employees at different company offices can be work together in virtual, cross-location teams at a far lower cost that would be the case with conventional telephony.

In addition, employees who have a long commute and are not in the office every day can be reached at home on their office number. Incoming and outgoing calls to and from a home office are automatically carried on a DSL circuit connected to the central VoIP PBX. This can also provide an innovative way to set up attractive working arrangements for employees on parental leave and offer loyalty-building perks to key workers. The company and the employee both benefit, and there is an environmental bonus, too.

Compared to traditional telephone systems, an IP environment offers greater flexibility and scope for expansion. Additional phones can simply be attached to a free port on a network switch, and the DDI number and voice mailbox can be configured and activated centrally.

**Convergence enables new applications**

Besides the cost savings, integrating phones and IT systems on a single network also offers a wide range of new possibilities and applications. With this kind of setup, mobile and home office workers have anytime, anywhere access to their company's communication services and can always be reached on the same number; separate office and home office numbers become a thing of the past. And through centrally installed and maintained applications like unified messaging, every employee, mobile or stationary, can have a single multimedia mailbox for receiving voice messages, e-mails, faxes and SMS text messages. With presence-based services, employees can notify their contacts where and how they can best be reached.

## Migrating to internet telephony

Businesses whose PBX and phone system leases are due to expire are in an ideal position to make the transition to voice over IP. Switching is exceptionally easy, because the outgoing system can simply be replaced with a real-time IP system and IP phones. Many IP systems, including almost all of Siemens' HiPath family, support multiple ISDN lines in addition to subscriber lines and PBX connections for internet telephony, allowing companies to retain a connection to the public ISDN network. This is always necessary when businesses need to use fax machines or electronic cash systems that can only operate over an ISDN network. In addition, ISDN connections can serve as a backup, ensuring that access to the public phone network is available in case IP-based communication or the connection to the ITSP should fail.

### **New technology, same phone number**

Those who are concerned that switching to VoIP would mean giving up the phone numbers that their customers use need have no fear. Almost all ITSPs are able to assign users numbers from local voice networks in addition to SIP numbers and generally can have existing phone numbers and DDI blocks transferred.

### **The outsourcing alternative**

As an alternative to operating its own PBX, a business can opt instead to purchase VoIP as a hosted service. With this model, an operator like Siemens provides a medium-sized business with a full telephony and applications package, and operates it inexpensively and efficiently on the business's behalf. This is as convenient as purchasing power from a utility company.

The business need not expend any effort on implementation, maintenance, updates or changes to the system. Instead, it enjoys professional, round-the-clock system administration and monitoring and can skip developing the necessary in-house expertise. A hosted service also saves on infrastructure acquisition costs; instead of committing its capital, the business agrees on a set price per port and transmitted packet with the hosting provider. If a company has multiple sites, they can be supplied with telephony services centrally by the same provider.

## The right platform for every business

As a pioneer in voice and data network convergence and in voice over IP, Siemens has a comprehensive portfolio of IP telephony platforms, end-user devices, applications and services. What they all share in common is exceptional flexibility, support for easy migration from existing solutions, and extensive scalability. This portfolio enables businesses of all sizes to tap into the benefits of convergent, IP-based networks with solutions tailored to their specific needs and requirements.

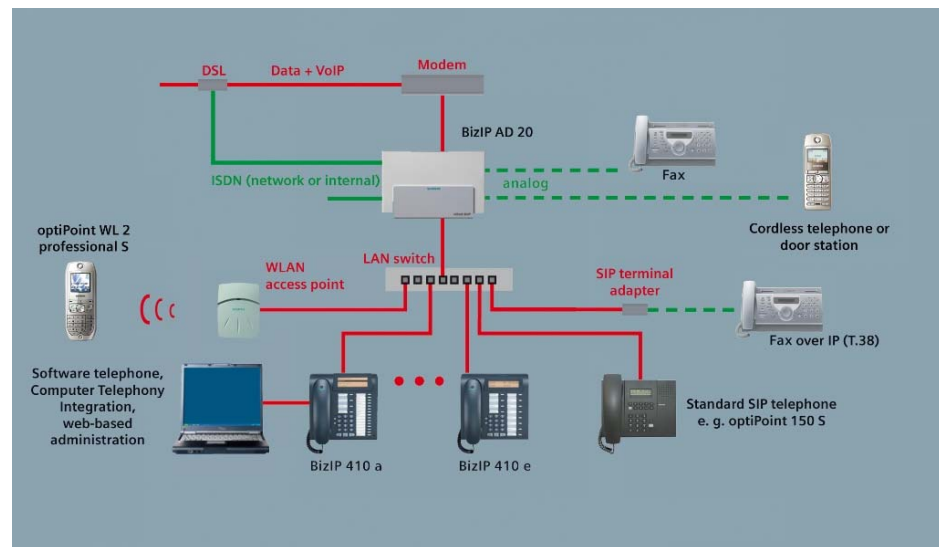
Siemens offers three platforms for small and medium-sized enterprises, each of which is especially easy to configure and manage:

- HiPath BizIP, a self-configuring IP telephony solution for up to 16 users
- HiPath 2000, an IP platform for voice and data communication with a wireless LAN for up to 30 users
- HiPath 3000/5000, a highly scalable convergence platform that supports as many as 1,000 users at up to 32 locations, designed for medium-sized enterprises that are expanding and need flexibility

All Siemens real-time IP systems support SIP end-user devices as well as subscriber line and PBX connections for SIP-based internet telephony. These systems enable businesses to use the latest generation of carrier interfaces and enjoy the advantages of internet telephony.

## BizIP: Telephony without a PBX

Siemens' HiPath BizIP is a solution based on peer-to-peer technology designed to enable freelancers and small businesses without special IT expertise to use IP telephony simply and flexibly. With HiPath BizIP, users can connect as many as 16 BizIP 410 phones directly to the company LAN. The end-user devices run software that allows them to locate and configure themselves automatically; they are instantly operational, and have built-in voice mail. An intuitive installation wizard is also available for quick and easy configuration.



### A rich set of advanced features

Communication with public voice and broadband data networks is controlled by an intelligent access device, the BizIP AD 20, which is similar to a compact router and gateway with an integrated firewall. The BizIP AD 20 is equipped with standard 10/100 Mbit/s Ethernet ports for the broadband internet connection and the internal LAN, two ISDN S<sub>0</sub> ports, and two analog phone ports for connecting analog and cordless phones, fax machines or entry phones.

Two phones are available:

**BizIP 410 e** – with a two-line display, a speaker, a headset jack, and 12 programmable LED function keys.

**BizIP 410 a** – a feature-rich phone for users who need advanced capabilities. It has a four-line backlit display, a hands-free speaker phone, and 19 programmable LED function keys, to which a further 16 function keys can be added using the optiPoint key module.

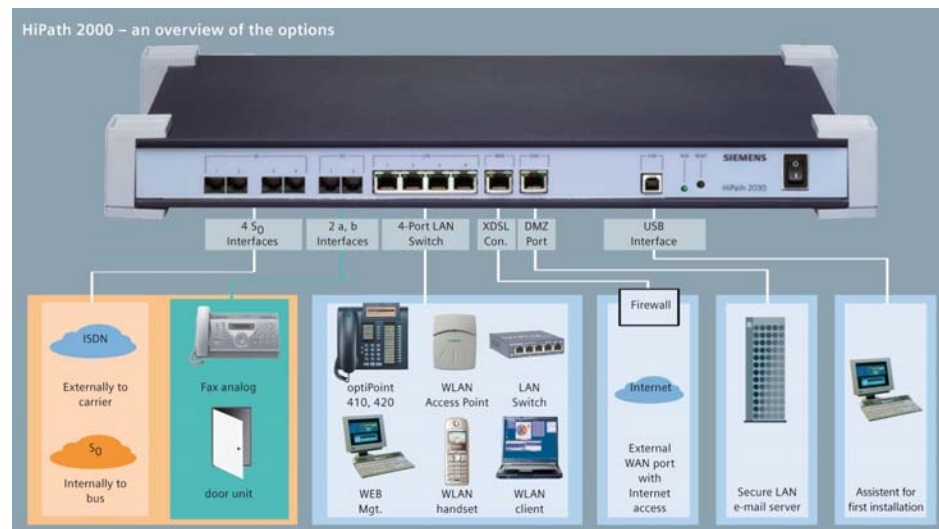
Wireless access devices can also be connected to create a wireless LAN infrastructure that allows wireless voice and data communication using WL2 handsets and laptops.

BizIP's "plug-n-phone" approach is ideal for smaller businesses and freelancers who need a quick and easy IP telephony solution with advanced phone capabilities.

## HiPath 2000: IP communication for small companies

HiPath 2000 is a modern communication system that combines voice and data transmission in a single solution. The real-time IP system with a Linux-based software architecture is designed for small businesses with up to 30 employees in a wide range of industries. Its ability to integrate mobile workers and telecommuters into the company's communication infrastructure makes it an outstanding platform for streamlining business processes.

HiPath 2000 is a robust and reliable system for voice over IP communication running on a high-performance IP infrastructure. Its built-in gateway connects the LAN/WAN with ISDN, and the routing capabilities set up connections to the Internet for data traffic and internet telephony. With its support for open standards, HiPath 2000 is especially flexible when it comes to integrating business applications. Built on IP technology, HiPath 2000 features high-quality phones with displays and dialog keys for unparalleled ease of use, and can be enhanced with PC clients and wireless LAN end-user devices to provide an advanced working environment. In addition, the real-time IP system can support analog devices where necessary. It offers a comprehensive range of sophisticated telephony features combined with computer telephony integration (CTI) and built-in voice mail support for professional business communication.



HiPath 2000 provides a wide variety of connections to enable communication with the public network and between users. The connection to the ISDN network operates parallel to the internet telephony connections to alternative internet service and telephony providers (ISPs/ISTPs). Conventional analog phones, fax machines and entry phones can also be connected to the system using the analog ports and additional analog adapters. On the LAN interface, IP devices of all kinds are connected via the external switch; power-over-Ethernet switches can be used to supply the devices with power. If WLAN base stations are incorporated, the system can support wireless voice and data clients, such as WLAN phones or laptop computers running optiClient 130 software.

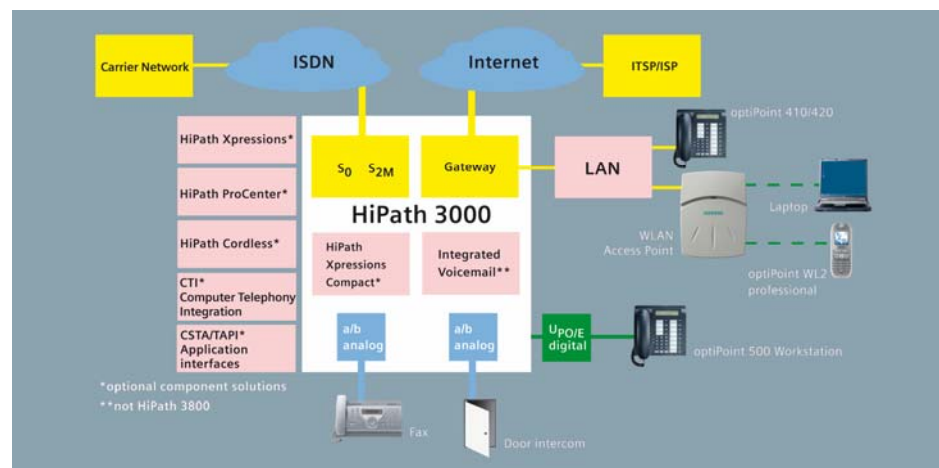
IP phones with a built-in mini switch offer added convenience, allowing "one wire to the desk" and seamless integration of PCs into the existing LAN infrastructure. Voice and data access to the Internet is protected by a firewall. An e-mail server can be set up on the DMZ port, screened off from the company's internal network infrastructure, to deliver incoming e-mail to users. Initial system setup is carried out via the USB port.

## HiPath 3000 / HiPath 5000: Exceptionally scalable for dispersed environments

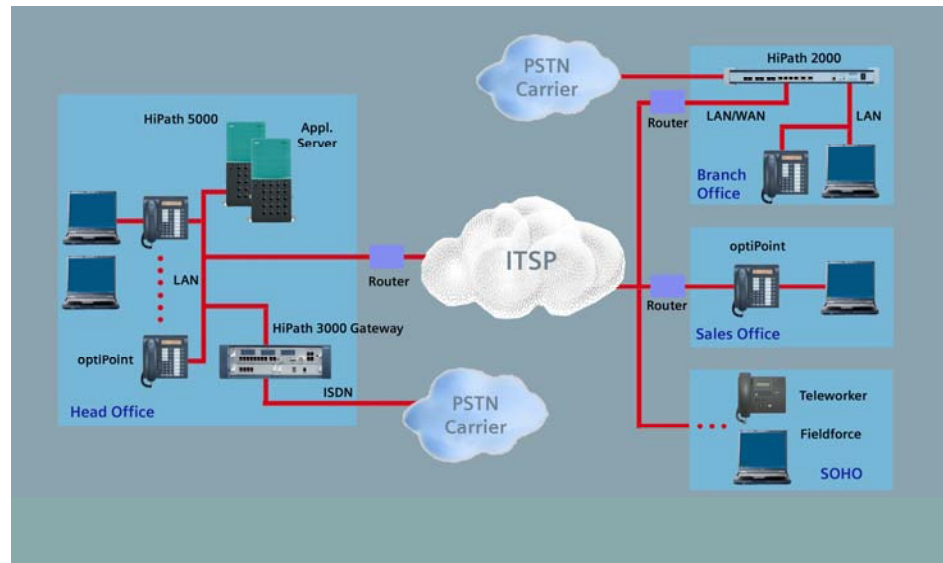
With the HiPath 3000 family of products, Siemens offers larger and expanding midsized companies a highly scalable real-time IP platform capable of integrating multiple locations, telecommuters, and mobile workers in a company-wide network. The three models in the HiPath 3000 family support between 96 and 500 IP end-user devices, offering customers the scope to choose cost-optimized solutions for company head offices and different sizes of branch offices.

HiPath 3000's flexibility is especially evident in mixed environments where voice over IP is to be deployed but conventional analog and digital end-user devices – phones, fax machines and modems, for instance – are still required. IP and TDM phones and PC soft clients can be combined as needed. HiPath 3000 can operate in a packet-switched or circuit-switched environment or in a combination of the two: Innovative IP applications, including real-time communication over the IP network, and versatile mobility solutions, can be combined with the fault tolerance and versatile features of classic telephony.

In businesses with just one location, a HiPath 3000 system provides a platform for all the company's communication.



HiPath 3000 really begins to reveal its strengths when used in combination with a HiPath 5000 Real-time Services Manager, a softswitch consisting of a central IP networking server that can reliably support voice communication for businesses with between 10 and 1,000 users at up to 32 separate locations. This is a software product that ships on CD and can be installed on any standard Windows 2000/2003 server.



The HiPath 5000 systems operates as a central platform supporting enterprise-wide applications and unified administration of a company's distributed communication network, and HiPath 3000 systems are used as gateways in the company's head office and branch offices to connect to the phone network. A HiPath 5000 system also offers a highly affordable migration path for growing companies that already have one or more HiPath 3000 systems and want to protect their investment.

## End-user devices for office and mobile workers

Even the most advanced infrastructure will only perform to its full potential if employees find it easy and intuitive to use. This is why Siemens offers an exceptionally comprehensive range of telephony clients and workpoints:

**OpenStage** – The new stylish, high-tech family of phones with innovative controls and large graphical displays. The phones feature capacitive controls with a TouchSlider for smooth volume adjustment, an advanced TouchGuide for supremely easy navigation, and user-programmable sensor keys for special functions. They also have mode keys with blue and white LEDs for accessing functions and applications that also indicate the current status during communication.

### **optiPoint 410 – IP telephony with outstanding voice quality**

Flexible IP phones with excellent voice quality and a unified user interface for easy access to phone features. Phones can be updated easily by downloading the latest software.

### **optiPoint 420 – Convenient and secure IP telephony**

IP phones with self-labeling display keys, ideal in desk-sharing office environments. When users log on, their key setup and labels are loaded automatically and their voice mail status is indicated on an assigned function key.

### **optiClient 130 – Telephony with a desktop or notebook computer**

A personal computer equipped with a headset or handset turns into a communication center for voice, data, e-mail and internet access. Installed as a soft client on a desktop or notebook PC attached to a wired or wireless LAN, optiClient 130 provides office and mobile workers with a comprehensive set of telephony functions through an easy-to-use interface.

### **optiPocket – Handheld with telephony capabilities**

This packs all of the functions of optiClient 130 into a pocket-sized PDA.

**optiPoint WL2 professional** – A WLAN phone with comprehensive voice capabilities and a menu-driven interface, complete with phone book and LDAP directory access. It offers up to four hours of talk time and 80 hours standby.

## Innovative applications for greater productivity

Merging IT and telephony on a single IP-based network offers businesses numerous advantages. Not all of them are immediately evident, so many decision-makers tend to focus primarily on the financial factors, such as the low capital expenditure, ease of management, and lower call costs. But one of the key benefits of an integrated network lies in the new possibilities that it affords. By merging real-time services like telephony and classic data applications, businesses can implement innovative applications that integrate voice communication with business processes to deliver productivity gains for all employees.

### **Unified messaging: A universal mailbox**

HiPath Xpressions provides employees with a multimedia mailbox for all types of messages – voice mail, faxes, e-mail and SMS texts – that they can access and manage easily on a computer or phone. Users can check their messages using different devices – a mobile phone, laptop computer, or fixed-line phone – no matter where they are. They can also prioritize incoming messages by setting parameters, a feature that allows mobile users, for instance, to restrict incoming messages to important or urgent items that they can respond to quickly between meetings. Users without a notebook computer can access e-mails and even faxes by phone.

Fixed mobile convergence – communication on any channel – fixed, mobile and company networks

A solution for small and medium-sized enterprises that use fixed-line office phones, mobile phones, and external fixed-line phones. FMC provides a One Number Service that unifies voice communication on office phones, mobile phones and home office phones. Mobile employees with mobile phones and telecommuters working from home offices are integrated into the company's office communication system. They can always be reached on their office extension number, and their outbound calls run through the company's system.

### **HiPath Wireless: Voice and data communications on WLANs**

HiPath 2000 also uses IP technology to support mobile communication. WLAN access points are added at different points on the LAN to provide full voice and data coverage for WLAN phones, complete with roaming and handover.

### **CTI: Placing voice calls from computer applications**

The screen dialer HiPath SimplyPhone works with Microsoft Outlook and Lotus Notes to enable users to make and receive calls quickly and easily with "click and dial." Calls can be made straight out of directories in the e-mail client. When used with HiPath Xpressions, HiPath SimplyPhone creates a highly productive system combining a mailbox and call handling in real time.

[www.siemens.com/enterprise](http://www.siemens.com/enterprise)

All rights reserved. All trademarks used  
are owned by Siemens Enterprise Communications  
or their respective owners.

© Siemens Enterprise  
Communications GmbH & Co. KG 2006

**Siemens Enterprise  
Communications GmbH & Co. KG**

Hofmannstrasse 51  
81359 Munich  
Germany