



Philips VoIP phone. Photo courtesy of Philips Electronics.

The evolution of voice

The emergence of VoIP is firmly on the radar screens of residential and business users and the amount of subscribers is on the up. The positives seem to far outweigh the negatives of this technology. Is it really as good as it seems or too good to be true? Helen Jameson investigates.

Until fairly recently, VoIP (Voice over Internet Protocol) was something I never thought I would use. However, today, I can honestly say that I am a convert – as are millions of other VoIP users all over the world. For the end-user, VoIP is a dream. It slashes phone bills, it is very easy to install and requires extremely low cost equipment. As long as you have a computer, a high-speed Internet connection and a headset, you're away. We can now conduct conference calls, ex-

change files and even see the person we have contacted via a webcam...and in some cases, we can do this free of charge. It's all too good to be true isn't it? The emergence of VoIP service providers such as Skype, VoIP Buster, VoIP Talk and many, many other based in countries all over the world has had a huge impact on the way we make calls to our families, friends and is changing the way we communicate in business. In this article, I would like to look at the tech-



nology itself and how it works, how it is used in business and at home, what the regulatory situation is and also what impact this is having on 'traditional' telcos. VoIP has its feet firmly under the table, so what will the future hold when it comes to keeping in touch?

What is VoIP

Voice over Internet Protocol is essentially the routing of voice conversations over the Internet or via any IP-based network. It's ability to facilitate tasks that are a great deal more difficult to achieve over a traditional network makes it very attractive. VoIP converts your voice into a digital signal which then travels over the Internet to the person you are contacting. Calls can be made over your computer, a VoIP phone or even a traditional phone. Wireless hotspots can also allow VoIP calls. The equipment required to make a VoIP call can vary. In some cases, the service may require a special phone or may only work over a computer. Some service providers offer free calls to other service subscribers but in other cases, you will have to pay.

The advantages of VoIP are numerous:

- Ability to transmit more than one telephone call down the same broadband connection. Very easy to add another line at home or in the office;
- Incoming calls may be routed to a VoIP phone regardless of your location;
- Free phone numbers;
- VoIP is location independent; and
- VoIP phones may be integrated with other services available over the internet such as file exchange and teleconferencing.

The disadvantages are as follows:

- Risk of network failure due to power outages;
- No access to emergency calls; and
- No business or residential listings.

For homes and businesses alike the most attractive part of VoIP has to be the fact that it is low-cost. VoIP has a different cost base in comparison with other 'traditional' systems. Its foundation is network efficiency. With circuit-switched calls, the ports in both the originating and receiving switches are tied up for the duration of the entire call but VoIP utilises virtual switches and therefore make more efficient use of the bandwidth available by filling it up with voice and data channels resulting in bandwidth consolidation.

VoIP also takes advantage of the same infrastructure that drives the Internet. The hardware and protocols required to operate the systems are available off-the-shelf and are interchangeable.

VoIP is also very scalable. It is easy to expand a VoIP network and the costs involved in doing so are also significantly lower. More conventional networks are restricted by their circuit switches but VoIP uses what are known as 'soft' switches which may be used at a regional level thus allowing multiple markets to access the network with even only limited equipment.

In business, VoIP is widely used by companies wishing to eliminate their call charges between regional offices by using their data network to carry inter-office calls. VoIP can also be used to reduce the costs of calls outside their company by carrying to the nearest point before handing them over to the PSTN (Public Switched Telephone Network) thus giving them an alternative.

The fact that VoIP is based on software rather than hardware also falls in its favour. One network is far easier to manage than two. It is easier to alter, to configure, to manage and to maintain. This results in a reduction of staffing and administration that would normally be vital in maintaining a conventional network.

VoIP in the Asian context

The VoIP market in Asia is very strong and continues to grow. By 2009, total revenue is expected to leap from US\$4.2 billion in 2005

to 12.9 billion (Source: www.Infonetics.com). Businesses are migrating to IP for the flexibility and cost-reduction that it brings. Japan, South Korea, Hong Kong and Singapore are IP hot spots. The Asian market is growing at a rapid pace and due to the fact that there is no legacy infrastructure in place, the take-up of IP has been very quick in comparison to other continents. Perhaps unsurprisingly, it is expected to adopt IP quicker than any other region.

A Chinese VoIP success story

The Chinese Government wished to deploy VoIP across its 30 provinces and 16 large cities to link over 500 of its State Information Centre offices. This body is responsible for the delivery of information technology to the People's Republic of China. The offices were often geographically dispersed and operated on an advanced IP data network over an ATM backbone. It's decision to use VoIP was in line with their long-term objective to connect all the government information centres using VoIP as part of an e-government initiative. Using VoIP would help the Chinese government to cut costs on long distance calls by having employees use the intranet instead of China's long distance telephone company. It would also increase the security of their conversations due to the use of a voice VPN.

They approached Quintum, a US-based VoIP solutions provider to meet their VoIP challenges.

The requirements stipulated by the State Information Centre were:

- Excellent voice quality;
- High reliability – including an effective form of back-up for the system in the event of any problems;
- Ability to hop-on / hop-off the network from the PSTN; and
- Optimum voice compression to ensure that the VoIP services could be delivered even to locations with limited bandwidth.

Quintum provided its Tenor VoIP MultiPath switches plus support for both analogue and digital connections. Tenor's patented SelectNet intelligent switching capability which ensures that voice

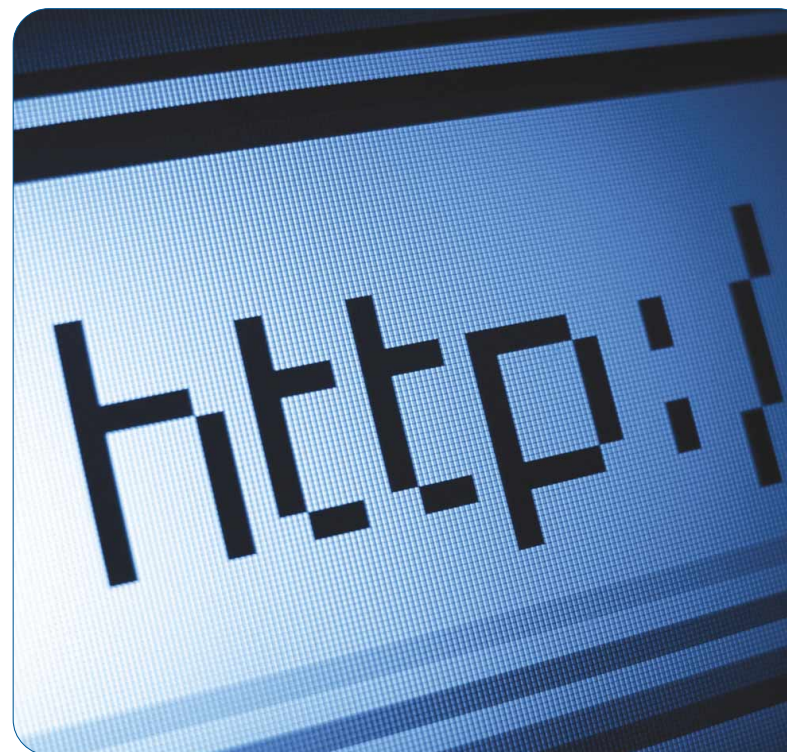


Photo courtesy of Morguefile.com



Quintum expands R&D operations to India

Quintum Technologies, an INC. 500 company, recently announced that they have expanded their operations into India, where the new organization will focus on software development and system test of the Tenor analogue and digital VoIP switches and gateways. Quintum is a leading provider of VoIP communications equipment offering VoIP solutions to business customers and service providers worldwide. Quintum's CEO, Cheng Chen, credits this expansion to the company's rapid growth and its need to cost-effectively develop and test software code to meet new market opportunities.

"As the need to bring more sophisticated products to market in a timely manner, we were able to establish a dedicated facility that leveraged the expertise of our software engineers who were trained at Quintum's corporate headquarters in New Jersey but who wanted to return to India. This also affords us a 'round the clock' R&D and System Test capability."

"Quintum has a substantial international business and establishing operations in India not only provides the opportunity to efficiently enhance our products, but also allows us to better serve our customers," said Chen.

Quintum's Tenor line of VoIP MultiPath switches and gateways are designed to deploy easily and transparently in enterprise networks and support VoIP communications with traditional PBXs or next generation IP-PBXs. The new Survivable Tenor product protects branch offices from network failure thus assuring business continuity. Its ability to easily integrate with legacy equipment makes Tenor the most versatile and cost-effective VoIP access solution on the market.

communications will not be adversely affected by problems in the IP network. In the event of problems, Tenor switches can automatically re-route calls over the PSTN allowing even active calls to continue without interruption. The Tenor switches connect to both the IP network and the PSTN. The analogue switches in each regional office support either analogue phones and fax machines or analogue PBX (Private Branch Exchange) systems and connect to the local PSTN via analogue lines. The digital switch at SIC's Beijing Headquarters connects to the local PSTN via E1 primary rate ISDN lines.

SIC purchased 49 Tenor 4-port analogue VoIP MultiPath switches and one central 30 port digital Tenor VoIP Multipath switch. A second digital Tenor was later installed to provide redundancy at the central site. Additional A400 and A800 8-port analogue switches were also purchased for expansion of the system. A standalone Tenor Gatekeeper unit will be added later to support anticipated traffic growth.

SIC's implementation of the Tenor VoIP solutions resulted in a highly effective and flexible communications solution. The architecture met the agency's requirements both for functionality and performance. The solution enabled inter-office calling and meant that agents in any VoIP-enabled SIC location could place calls to any other VoIP-enabled location over the IP network.

The solution included use of Quintum's intelligent multi-tier gatekeeper architecture to distribute gatekeeping duties between a master and a gatekeeper and secondary gatekeepers at the SIC headquarters and a master gatekeeper at the provincial information centres. The distributed nature of the architecture meant that the load was shared between the gatekeepers and therefore increased efficiency and reliability.

A major consideration contained within SIC's initial brief was the fact that hop-on/hop-off capabilities would be required for those SIC agents travelling throughout China. They would often be required to make calls to any of the regional offices or the headquarters in Beijing over the VoIP network. Just as the Tenor can route calls from local users to either the PSTN or the IP network, calls coming in to the Tenor from the local PSTN can also be routed either to a local office or the IP network based on the number dialled so agents could then call into the nearest regional office via the PSTN and hop onto the SIC VoIP network to call any other office.

Another primary concern of SIC was the importance of maintaining the reliability of high quality voice communications in the event of the IP network encountering problems. Quintum used Tenor's SelectNet technology that constantly checks the quality of the IP connection over the PSTN. When a call is placed over the IP network between two tenors, the Tenors constantly monitor the status of their IP connection based on parameters such as packet loss,

delay, latency and jitter. If the SelectNet algorithm senses that a connection is inadequate the originating Tenor launches a back-up call over the PSTN. Once the PSTN connection is established the call is switched in real-time from the IP network to the PSTN – transparently. This gives the user complete protection whilst making their call.

What about bandwidth? Bandwidth in some areas of China can be as low as 64Kbps so SIC needed its system to be bandwidth-efficient. Quintum's PacketSaver packet multiplexing technology greatly reduces the amount of bandwidth required to support multiple calls flowing between any two SIC offices. It routinely achieves bandwidth savings of as much as 50 percent resulting in per-call requirement of as little as 6Kbps. This is achieved by aggregating samples from multiple VoIP conversations and packing them into a larger IP packet with a single IP header, thus reducing the 'overhead' generated by adding a bulky IP header into every individual voice sample.

Regulation

The issue of regulation is a burning one as far as VoIP is concerned. The telecom industry is a tightly regulated one all over the world yet at the other end of the scale, the Internet is not. This presents a conflict of interests in the case of VoIP which encompasses both elements – voice and Internet. The resulting argument that continues to rage is between the incumbents and the service providers – the incumbents say that VoIP should be regulated, the service providers say it shouldn't.

The primary concern expressed by those calling for regulation of VoIP is that users are not aware of the fact that VoIP does not allow them to make emergency calls. Other problems highlighted include the fact that the caller ID will not work with VoIP so locating the call is practically impossible plus the fact that VoIP phones do not have specific geographic addresses due to the dynamic routing they follow. The re-routing of calls and the answering of calls by someone other than the intended recipient is also a problem and can cause problems in an emergency situation.

The UK's telecommunications regulatory body, OFCOM, has recently announced a code for VoIP service providers which ensures that consumers have access to important information about the capabilities of their service. VoIP is widely used in the UK and it is predicted that there will be as many as three million users by the end of 2007. By June 2007, all UK VoIP service providers were required to state whether or not their service includes access to emergency services. They must also state the extent to which the service depends on the user's home power supply. In addition, service provid-



ers must advise customers whether directory assistance, listings or itemisation of calls is available and also whether consumers will be able to keep their telephone number if they choose to switch providers at a later date. If a consumer does decide to take up a VoIP service, they must acknowledge that they know the shortfalls of the VoIP service or a label or announcement must be prominently displayed reminding the caller that access to emergency services is unavailable.

The clash between the VoIP service providers and the telecommunication companies is very evident. The service providers see voice as becoming a software application and see absolutely no benefits in the regulation of VoIP. They believe that the regulator's role should be to ensure that VoIP can be easily interconnected with the PSTN, that virtual numbers and nomadic use is allowed and to stop the network operators from blocking VoIP services.

Telcos strongly disagree and believe that VoIP should be rigorously regulated like they are. They see VoIP as a disruptive force and point out that there are Quality of Service issues as well as issues regarding how interoperable VoIP can be and pointing out that there are myths that surround the VoIP network. These include the arguments that it is not actually such a money saver as was first thought – in fact it can be an extremely costly business and require a huge amount of investment to deploy and also that it is not just 'plug and play'. It is a proprietary technology and not as open as we think it is. The battle is sure to continue to range as VoIP becomes more mature but there is a real belief that the migration will continue and there perhaps needs to be consideration of a 'new model' that will accommodate these new services and evolve with the changes that are obviously happening and will continue to happen as time goes by.

Future of VoIP in business

STONEVOICE, the Unified Communications Application Developer and Cisco Technology Developer Partner, recently announced the future launch of SkyStone, the ultimate Software IP Skype® Gateway designed to become the converging point between the PBX Business World and the Skype Consumer World.

"Very recently, Skype announced that more than one third of the 180 million registered Skype users take advantage of the Skype client and services for business purposes. On the other hand, more and more, the business world is driven by the consumer market, because of its important volume influencing the decision making process of big players in the technology sector. We are moving in that direction and are offering the missing link to this converging trend with SkyStone" said Christian Bongiovanni, CEO of STONEVOICE.

"IP based PBX is increasing rapidly it's market share. What the market was missing until today was an element that would create a solid bridge between the voice worlds of IP Telephony and Voice over Internet. Taking advantage of our extensive experience in designing and delivering applications for Cisco Unified Communications, we have created SkyStone. SMB's are looking for such a tool and the large enterprises can't wait to deliver more services to their customers in different ways, using consumer tools" said Davide Perfetti, Business Development Director of STONEVOICE. In fact, STONEVOICE SkyStone is filling this technology gap guaranteeing the access to new services for the enterprise for its internal use. Skype-in and Skype-out become new features in the IP PBX improving the company image and reducing considerably the costs and time for implementation. Furthermore, it allows services to the company clients through consumer technology, reaching a tremendous market consensus and flexibility acknowledge. One example of this new trend is to implement the Skype click-to-call functionality on the company's web site, allowing the end customers to contact the support through Skype free calls, in the simplest and quickest way. SkyStone, the software IP based Skype gateway, can interconnect any IP telephony solution or traditional PBX to the "Skype world". This represents the best answer to the above-mentioned needs and

immediately allows all the enterprise employees to take full advantage of the Skype services without having to handle a double handset infrastructure or double telephone numbers. Honouring the STONEVOICE tradition, SkyStone is completely software, inheriting all the advantages of it: no stock handling, no shipment delays, plug and play and offering an embedded try & buy free of charge. Furthermore, it is IP based and therefore seamlessly integrated with any IP PBX (through standard protocols, such as SIP and H323) and with Legacy PBX's through the recommended widely spread media gateways.

It is predicted that VoIP will change the way we communicate and that prediction certainly appears to be coming true. The future could hold a variety of scenarios. Some predict that vendor consolidation will continue and changes and development in handset technology will be substantial. The possibility of integrating VoIP into software such as Microsoft Outlook has also been suggested and new enterprise features such as videoconferencing are predicted to take off in a bit way. In China, by the end of 2007, it is forecast that a massive 200,000 people per day will be beginning to use Skype (source: MobileCrunch). There are a plethora of issues surrounding VoIP at the moment, some to do with security, some with regulation, as we have seen, interoperability – it is a new technology and is raising unique problems that will need to be resolved over time. It is also a technology that is growing day by day. Telecommunications consultants, Analysys, predict that cellular VoIP revenues will surpass fixed line VoIP by 2012 and will hit \$25.9 billion in the US and Europe.

The evolution of VoIP will be interesting to watch. Despite the questions surrounding VoIP, the attractiveness of low-cost calls and flexibility will probably override the concerns. ■

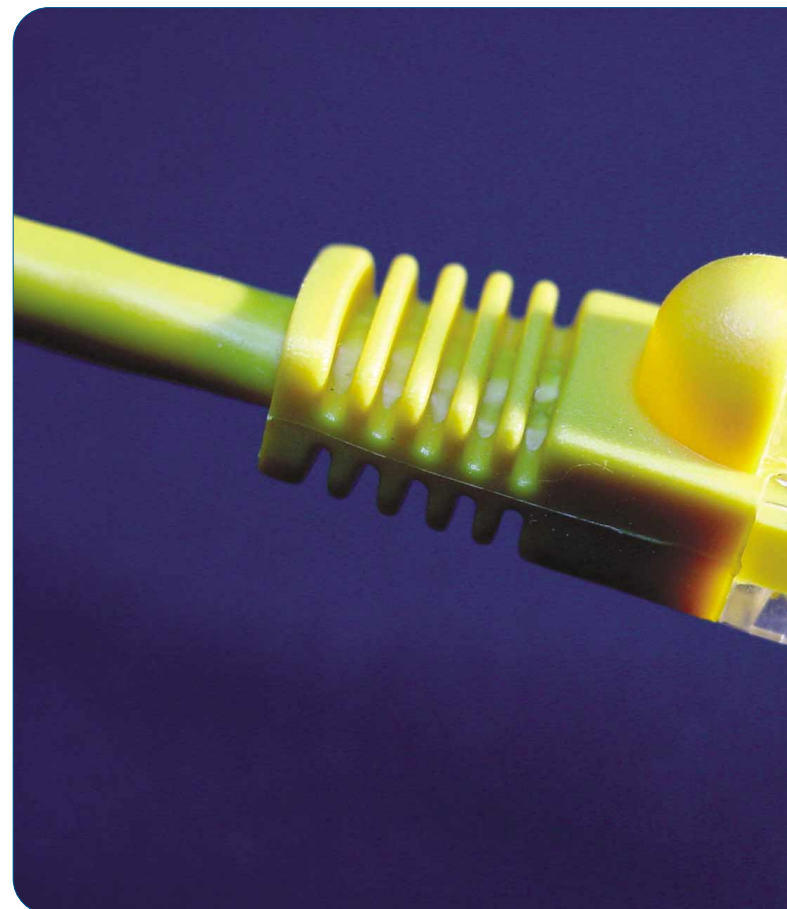


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