

TECHNOLOGY FEATURE:

A small businessman's guide to VoIP. By Bill Seddon

For many owners of small businesses, when they hear the term Voice over Internet Protocol (VoIP), they think of Skype. If you're a trader or professional working by yourself, Skype may be an option but it is not yet a suitable telephony technology for a small business.

Even a small company with only a handful of staff needs some sort of exchange (PBX) with a switchboard, the ability to transfer calls and record/manage voicemail - services which Skype does not provide. You may disagree and have dismissed Skype and, doing so, dismissed VoIP along with it. If this scenario applies to you, then think again.

I run a UK-based business that is small, but has a global reach. Our main market is in New York and we have associates in Germany and New England. I want us to be able to communicate effectively and regularly amongst ourselves and with our clients. While e-mail is good, especially taking into account time-zone differences, it is important to be able to speak with clients and colleagues. I want our staff and clients to be able to talk constantly if needed.

Like all small businesses, cashflow is important and the cost of providing this flexibility seemed out of reach. Then, two years ago while working in the US, a client introduced me to a VoIP service and I realised this was the future for us. We have been using VoIP for all our calls for about 18 months and we've never looked back.

We have a comprehensive telephone service that provides a point of presence in London and Connecticut and we could have an apparent point of presence in just about any other country within a few hours. The phone system reverts back to regular land lines should internet access not be available, so we never need to be concerned about short-term loss of our internet service. Staff use regular telephones, not computers with headsets, and don't know if their call is routed via the internet or not. The system cost us about £500 in hardware and costs about £40/month to operate excluding call costs.

In this article I will review some of the options available to get you started. Some of this has a technical flavour, but if you employ IT staff, this is bread and butter to them.

Why VoIP?

The digitisation of a media has transformed the supply lines between producers and consumers. When that digitisation is combined with the internet, the results have been profound. Whether it's buying online, submitting tax returns, researching local amenities or many other activities, the internet has provided consumers with more direct access to

information and, in many cases, provided the means to lower costs.

But lowering costs has not been the only benefit. Even a few years ago, who could have imagined small businesses selling or bidding for goods from around the world at an auction? Who would have imagined micro companies selling to and

supporting clients around the globe with costs not significantly greater than those of large enterprises?

The same has happened with telephony but fewer people are aware of it.

VoIP is not just about lower call costs

The headline VoIP story is lower (sometimes free) call costs and is exclusively about making calls to third parties. But VoIP is more than just lower cost calls. It's about making the telephone system do more for your business internally and externally. It's about helping you generate more

business and being more productive. The cost and operational benefits of the combination of digitisation can also be realised for telecoms (though it's not widely promoted) and here are some of the benefits I see.

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Home workers/Road warriors - People who work from home (or travel out of the office) can be part of your internal telephone system wherever they are. "Let me transfer you to Linda" and the call goes to Linda's extension and rings at home or in the hotel. The call can be transferred to another VoIP phone or via VoIP to a mobile phone. Likewise the person out of the office can call via the office.

Local presence - Your call can appear to originate from anywhere in the world so providing "local" support

Local support - Provide local numbers for clients to call that are routed to you via VoIP

Record calls - Because calls are digitised, recording them whether inbound or outbound is simple. This is true of current call recording systems. However the advantage of a VoIP recorded call is that it is digital and can be filed – maybe even automatically if caller ID is provided – against a client record along with duration and any other available details. It can be recalled at will for analysis/quality monitoring. Critically, the choice of whether to record or not can be taken out of the hands of members of staff making it a valuable tool in the compliance process demanded of Independent Financial Advisers by the FSA and an addition to contemporaneous notes for accountants and solicitors.

Provide information via a menu - If your support staff answer many routine calls about the status or some event or client specific information, make it available over the phone in response to a menu so clients can get the information at anytime not just during office hours and your staff can do something more productive.

Connect two offices - Support any number of calls between offices

Create your own call centre - Your VoIP provider will allow you to make a pre-arranged number of simultaneous calls from any one VoIP number. This means you can create a call centre of arbitrary size today. That's how many Indian call centres can afford to call us!

Staff a call centre anywhere - The answering calls can be located anywhere

Call agents and queues - Setup call queuing with wait time feedback

While many of these things can be done without VoIP, it's only possible if you invest in proprietary and expensive solutions and work with a telecoms provider that has a sufficiently wide reach. With VoIP technologies, the features and benefits can be realised at almost trivial costs making them affordable for even the smallest business.

In case you do decide to research VoIP I've included at the end a glossary of some of the terms you may encounter and links for further reading.

If it's so good, why isn't VoIP promoted much?

If you've read this far you may be thinking "yeah, sure", so you should know that VoIP is not new and it's not small and here are a couple of example cases. In 2004 Bank of America began the process of replacing its phone system of 180,000 phones and 363 exchanges with ones that use VoIP technologies (from Cisco Systems). Next year BT will be piloting its new IP based telephone service in Cardiff, a service that will replace all current services by 2010.

I think the reason that no one seems to promote VoIP is that no one with a significant marketing budget has an incentive make us aware of VoIP. It's not clear that the traditional suppliers of

telephone calls and equipment can have an interest in promoting VoIP. Phone companies like BT, Deutsche Telecom, AT&T do not provide VoIP and if they did provided a credible service it would only eat further into their declining revenues from landline calls. Meanwhile suppliers of telecoms equipment make a lot of money selling proprietary hardware and software to meet telephony requirements. Anything proprietary generally has a higher price tag and you are usually locked in. Of course eBay does have a budget and has started to promote its version of VoIP and perhaps that's why we're hearing about Skype/VoIP now.

So what is VoIP?

VoIP is the generic term for software that supports point-to-point voice calls over the internet. Skype is a VoIP service without doubt. However Skype only offers calls. While important, a business usually relies on more than the ability to make a call. There is the need to be able to transfer calls, have conferences, allow callers to leave voice mail and for staff to setup message, provide a switchboard for the receptionist, etc. Skype is beginning to provide answers to this kind of concern through partnerships with hardware vendors.

But VoIP can be more than making calls which brings me to my second concern which is that Skype uses a proprietary protocol for passing call information across the internet and could lock you into Skype. This is good news for

Skype but is it good news for us? When I think of VoIP I think of the open standards protocols. Open standards for the internet are brought to us by the Internet Engineering Task Force (IETF). This is the organisation that brought us HTTP, the protocol used to request and deliver web pages, SMTP that is used to deliver email, POP3 that is used to retrieve email and many other standard and open protocols that make the internet usable by all today.

For VoIP the open standards protocols are SIP and RTP (see the glossary below for more information). To me a VoIP product is one based on these protocols. The advantage to us as consumers of using SIP/RTP based phones is that we are not locked into a vendor or group of vendors.

Phones

We use regular phones when making calls. We could use a headset attached to a computer like Skype but people are comfortable with the ergonomics of a phone. Moreover, we use wireless (DECT) phones so people can wander while they talk and that's not so easy with a

computer. There are a wide range of VoIP phones available that use SIP from ones offering basic phone features to those with multi-line capabilities. We use a device that is plugged into the network and into which you plug a regular phone. Every call made is then a VoIP call.

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VoIP exchange

For a business, the single most important component in the telephony system is the exchange. It is the exchange that provides all the services we expect of an internal phone system and this is no different when using VoIP, in fact it's the heart of an effective VoIP system. Several groups have used VoIP open standards to create SIP based exchanges (sometimes called softswitches). There are commercial offerings from companies like Cisco Systems and there are open source products. We use an open source exchange called Asterisk. In fact Asterisk is not primarily a VoIP exchange. Rather is a software based exchange for which VoIP (SIP/RTP) is just one of the types of channel it can deal with and others have created the ability for it to receive and setup calls over Skype. In addition to VoIP it can also deal with regular telephone line whether that service arrives via a single socket or a T1 line carrying 24 lines.

We use the features of the exchange to provide the normal telephony services such as conferencing, call transfers, voicemail, voicemail to email, fax to email and so on. The exchange is setup (using a web page) to route our outbound calls via the internet to our VoIP provider, VoIPTalk. VoIPTalk then routes the call to the real phone system if that is what is required or to another VoIP user. If the internet is not available then the exchange is able to fall back and use a regular phone line to ensure an uninterrupted service and the caller never

knows. Calls can be routed in sophisticated ways to, limit calls for some users or route call though one or another VoIP provider based on the called number. If the number called is a US number it may be preferable to have that call appear to originate in the US. Likewise inbound calls can be routed to specific departments or members of staff based in the number used by the caller. A business can setup new numbers and have them ready to use in minutes. Usually there is no charge for an inbound number so it's feasible to give each member of staff their own number.

The key to the flexibility is that the exchange is programmable. The ability to selectively route calls is just one example. Before you start think that this sound complicated, you should know that we don't write the programs. Instead we are able to access a library of programs created by others. Voicemail is one of the programs. There are programs for call recording, call logging, call centre management, call queues, agents and so on. However the option exists for your business to create its own program or adapt existing program to offer and improved service. If you want to route a call to the person who normally deals with particular client you can have the exchange compare the caller ID with numbers stored in your client management application, select the extension of the appropriate person and route the call.

Call quality

Call quality is largely something you purchase. There are three areas where small investments can improve call quality:

a) Call bandwidth - Skype calls sound OK because they use relatively large bandwidth and, generally, go computer to computer. While Skype typically uses 128Kbit/sec for a call, open standards VoIP uses 64K bits/second by default. This is because VoIP wants you to be able to work with the telephone system whenever you need to and the phone system uses a maximum bandwidth of 64K. Those who have ever used ISDN may know that each channel ISDN provides offers 64K and there is a reason.

b) Use a good encoder - Skype uses a proprietary protocol for converting voice into a stream of bits that can be passed over the internet. In the trade the software used to converting voice to digital and vice-versa is known as a "codec" which is an abbreviation of encoder/decoder. Part of the solution to any sound quality issues is to use a better codec or one that uses higher bandwidth.

c) Internet bandwidth - Any VoIP call is going to be susceptible to the performance of the internet connection. Most of us have an ADSL service which provides fast download of information from the internet but not so fast upload of information to the internet. Our service, from Telewest, provides 10MB/second when downloading (fantastic) but only 384K bits/second uploading (pretty minimal). However the upload speed is really important in a VoIP context because it's your voice that is being "uploaded" over the narrow bandwidth available.

Theoretically 384Kb/sec can carry three simultaneous Skype calls but, of course, the full 384Kb/sec is rarely available because it is being used to request pages, send email and other things. So we could probably have two simultaneous Skype calls (provided no one uploads a file and providing Skype isn't using our bandwidth to route calls). However we can have up to six, seven or even eight simultaneous VoIP calls using open standards because it makes better use of the bandwidth. Maybe my hearing is not as good as it used to be, but I don't really hear the difference. If you can hear a difference and it matters a lot, consider buying a second (or third) internet connection, after all they only cost £20/month each and a reasonable VoIP exchange will be able to allocate calls over the different internet connections based on availability or some other parameter.

d) Network Quality of Service - If you use VoIP it's important that the traffic carrying your call on your internal network is not interrupted or squeezed out by other traffic. From the perspective of an internal network even a relatively bandwidth-hungry VoIP service like Skype uses only 1% of the bandwidth of the most basic internal network. Because a VoIP call uses very little bandwidth, you would think that carrying a call will be no problem and in general it isn't. However our hearing and speech recognition is very sensitive to the timing of received sound. So if you are making a VoIP call and the backup system starts to copy a 10GB file across the network consuming all the bandwidth you are likely to notice. There are two solutions to this. The software solution is to use a Quality of Service (QoS) protocol on your network.

Though few of us have a reason to use it most operating systems, including Windows and Linux, support QoS. QoS relies upon the network cards on the LAN understanding the QoS standard (IEEE 802.1p) and if they do, the use of QoS ensures that sufficient bandwidth is set aside for "real-time" services such as VoIP. The hardware solution is to use a separate network for VoIP and other traffic. It turns out that standard CAT5 network cabling contains four pairs of wires but networking only uses two of the pairs. What we have done is dedicate two of the pairs to data and two of the pairs to voice. You can buy adapters that make any network cable able to use all four pairs and able to carry two discrete networks. Each adapter costs £2 and each cable requires two (one on each end) so the hardware cost of adding a separate VoIP network is just £4/desk.

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Conclusion

My recommendation is that you consider whether your business should use VoIP. Think about it in a wider context than cheaper calls, think about how it could help improve your business or improve profits. A telephone systems is not a fashion statement so there is no point changing for change's sake. However if you can see how improved telephone services can improve your business or the services you provide to clients make sure you include VoIP in your research and take the fear, uncertainty and

doubt that you may get from the those selling telephony systems with a pinch of salt. Setup a simple VoIP phone system using Asterisk to try it out. If you have a spare PC it is free to try. If you don't feel technically competent there are plenty of companies around who will be delighted to guide you through the steps of selecting, installing, configuring and using VoIP. If you have concerns about call quality, think about creating a separate network, getting extra internet connections and implementing QoS.

Clossary of terms

VoIP – Voice over Internet Protocol – the generic term for voice calls made over the internet

PBX – Public branch exchange – the device that hooks your internal telephone system to the wider telephone network and provides call transfers between phones

FXO – Traditional telephones are known in the trade as FXO devices. They generate tones and require power. The wall sockets are FXS devices and provide power and access to the telephone company

FXS – See FXO

SIP – Session Initiation Protocol – This is the open standards "language" used to setup VoIP calls between two parties

RTP – Real-time transport protocol – The protocol that ferries the voice call over the internet once a call has been setup by SIP

QoS – Quality of Service – a standard that allows a system administrator to control the prioritisation of traffic over a network. This is useful in a VoIP context as it can be used to tell devices on the internal network that voice traffic is to be prioritised over other traffic such as files being copied. This helps to ensure that calls sound OK. Ideally your ISP will support QoS so that VoIP calls are prioritised.

About the author

Bill Seddon is Managing Director of Lyquidity Solutions. He has worked in the software industry for over 20 years and headed up large development teams both in the UK and USA.

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