2017 Buyer’s Guide: IP PBX Telephony & Unified Communications

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Introduction

It is 2017 and things have moved on from a few years ago. Back in 2012, when this site was launched, everything was about voice and emerging video and how we could move forward to produce or develop special techniques in order to deliver fantastic business goals by utilizing voice and video over the internet. Back in 2012 cloud based virtual telephone systems were actually reasonably primitive. However, seven years later, and the world has changed. What is more in 2017; the business is no longer just about voice, it is about collaboration, data manipulation and unified communications. In this eBook we will address why the demography has changed and it has changed. We will also address the question why you should consider moving to a cloud based telephony system as present business requirements and future obligations demand change.

After all it might be that the on-premises telephone system is out of date, or that the network is less than perfect, or even the telecom provider can no longer support it. There is often the concern that there are just too many cloud telephony providers to choose from, and we agree, so we have built a comparison tool to make life easy, just input your requirements and we can narrow the field.

http://www.virtualhostedpbx.net/comparison/

Regardless, the issue is that all businesses must moving forward, look ahead, try to fit themselves within the cloud environment, and become the next generation of innovative producers in their field.
Chapter One - Internet Telephony & Unified Communications in 2017

It’s no longer just about voice – unified communications matter

In less than half a decade the world of personal and business communications has evolved beyond any expectations. Only a few years ago internet telephony was viewed with suspicion due to the unreliability of the internet and the telephony services that rode upon it. In 2010 Skype was the darling of the traveler and those needing to keep in touch with family and friends that lived abroad. However, even only five years ago internet service could be unpredictable and video quality – should you even attempt it – dire. So what happened?

Well, internet broadband service providers from both fixed and mobile telephone operators have improved beyond all expectations. Whereas before we could struggle to get sufficient bandwidth at an affordable price that was also reliable as both fixed and mobile telecom providers’ favored voice over data, now data bandwidth is plentiful and cheap. Furthermore, previously the bandwidth providers would have to provision their data links very carefully as they could easily be swamped. Therefore, the service providers shared bandwidth between customers. Residential and even business contracts had what the service providers called a contention ratio, which could be typically 45:1 for residential and 10:1 for business. Obviously if you are sharing your 1mbps line with 45 other users' then performance is going to be unreliable. However, suddenly with the explosion of growth in the smart phone market and the tremendous uptake of mobile data the operators had to upgrade their networks and services to accommodate this demand. As a result broadband internet has become ubiquitous, cheap and very reliable.

What this means for internet telephony is that ironically in order to fulfill the data demands of their customers they also provided a solid platform for IP (data) telephony. Previously, the major constraint when using internet telephony services was reliability, which manifested itself through poor voice quality, dropped calls and one way connections where one party could hear the other but not vice versa. However with the huge advancements and availability in broadband data that is rarely a problem as broadband data plans can be in tens of Gigabits per second for fixed fiber links and gigabits for mobile. This of course means that the major constraint to internet telephony has been removed and what we are seeing is a quantum shift away from fixed line (traditional land line) telephones to mobile and internet telephony. This is a huge change as before a land line telephone was considered a utility service and once, not so long ago, perhaps the late 2000’s was a top requirement of credit services in order to check credit worthiness. Now a day’s telecom operators are winding down their fixed line operations and moving to fiber-to-the-home in order to deliver the required data broadband to the premises that their customer's both residential and business demand. This has had a major impact on internet telephony voice quality, reliability and acceptability. Now it is rare to have customers complain about poor voice quality, dropped calls or unavailable service.
Another major advance was the adoption of cloud computing, which back in 2010 still was held with deep suspicion by most businesses. However, with many of the security and political constraints mitigated if not removed, businesses felt confident to shift many of their core IT services to the cloud. This enabled the business to avail themselves of the vast economic benefits of cloud computer services, especially in outsourcing their servers, storage and even applications. Within a couple of years Software as a Service (SaaS) was becoming the norm. Furthermore, as the savings in outsourcing tradition IT became apparent it wasn't long before companies started to look towards making savings on their expensive communications systems. As a result IP/PBX hosted cloud-based services suddenly became extremely attractive, especially for small to medium size companies.

However, ironically, though this is great news for the IP/PBX cloud telephone service providers it has not just been the telecom service providers that have taken the hit. This is because, along with the ubiquitous Wi-Fi, internet access and unlimited bandwidth a host of over-the-top services riding upon this limitless bandwidth appeared on the scene. Hence traditional call rates are falling, but so are IP telephony calls, as more millennial take to email, social media, chat and online texting as their preferred method of communication.

Various inbound channels
If we consider a study of the industry by Liveops Cloud then we can see that while the relative numbers of inbound communication per channel, voice, email, social media, text, online chat etc, did not change much before 2011, from 2012 they saw a big jump in email correspondence which jumped from 10.4% to 15.4%. Indeed the email figures of 16.2% in 2014 and 17.2% in 2015 suggest that this channel is still being favored by customers. The study would suggest that more customers choose to communicate online, rather than through the traditional phone call option, this view is backed up by the rise in social media communications which jumped from 1.4% to 2.8% in 2015.

These figures might not support a quantum leap away from traditional voice communications but it should alert businesses to the fact that the demographics are changing and more millennia's are choosing online communication as a preferred channel of communication. Certainly, in retail this is noticeable as online chat and live text show a marked rise in the conversion of the process of query to sales. Another, potential improvement that retail businesses and others are looking into is the updating of the much maligned IVR menu systems that many companies inflict upon their callers. Many IVR systems are an exercise in patience that leads many to utter frustration and many callers abort the call long before they eventually arrive at the destination they require. Instead, new advances in algorithms and artificial intelligence have greatly improved the automated attendant/receptionist function. Indeed in some cases businesses are doing away with the voice IVR and replacing it with a bot, a software robot – a video representation of a receptionist that has the intelligence to answer calls, redirect the caller to the correct extension and even answer commonly asked questions.

Unified Communication
Consequently, despite their growth and proliferation the cloud based IP/PBX service providers have had to shift from voice only and try to accommodate all the other types of internet communications. Today in 2017 most of the large cloud based service providers provide what is termed Unified Communications, and this is a service that as its name suggests unifies all the diverse communication
channels that a business may have to support. For example, they may need to support in their contact centers not just voice, but email, text, on-line chat, video and SMS. Furthermore, companies need to be able to integrate all these channels into one manageable system, so no customer calls go amiss. Also, companies often now have to verify the customer’s identity, which previously could have been done by the caller ID and a question, but now they require far more stringent methods. To complicate matters further in the case of email, the customer is often not online during period the service representative is dealing with their issue, so this adds additional time and stress, but also lowers the first contact resolution rate, which many contact centers use as a key performance indicator. Another, aspect of cloud based IP/PBX service providers is that some now are going beyond just communications as a standalone service and they are integrating their UCaaS with the customers other cloud applications, such as CRM, ERP, Financial and HR applications. This is a tremendous step forward as previously these applications were silos that were in accessible to the company’s employees. Now, with cloud integration sales, technical support and contact center agents can readily access records online which means they can see the callers prior history and if there should be an outstanding issue take up the call where a previous agent left off.

**Advanced Services**

The advancements in services provided by the cloud IP/PBX service providers may seem a little bit more that perhaps your business requires, and it is common for companies to worry that they don't have the need or the skills to benefit from unified communications. Fortunately, many of the larger IP/PBX cloud providers now offer not just contact center tools and functions but also unified communication suites of features that enable the business to manage and process all forms of customer communications from dashboards for supervisors and heads-up-displays for agents and employees.

**Remote working**

However, the best feature of cloud based IP/PBX services is that there is really no concept of an office anymore, the companies employees can work from home, a client site, be on the road or anywhere that there is internet connectivity. What is more they can receive and send calls, and their presence, availability etc, be detected in real time through the company IP/PBX as it resides in the cloud. This is a fantastic tool for businesses of all sizes from the one man home based freelancer, the entrepreneur or salesperson that are constantly on the road or on client sites to the small medium business (SMB) who have a plethora of branch shops or offices, either locally or nationally. To the cloud based IP/PBX they are all just another telephone extension, whether that is in San Diego or New York. The real saving here is that all the calls between branches offices, employee’s mobiles or home landlines count as free internal calls (extension to extension). Similarly, if real estate is at a premium why take the contact center service representatives into work? They can work from home on their mobile, landline or on a PC with a headset. The potential for cloud based IP telephony is vast and it is improving with new features every month.

**Outbound Services**

Some of the larger service providers even provide a dialer service. The functionality here is that marketing and sales can target potential customers using a list of numbers extracted from the CRM application of from Outlook and then automatically dial each number in turn. This is extremely useful in marketing campaigns, as the choice can be made to call, email, chat or text via SMS or any of the online text apps such as WhatsApp or even post to social media sites such as Facebook.
Therefore in only a few years the IP telephony world has gone from Skype to Unified Communications, and is now well beyond just the humble telephone call, so much so that I will discuss many of the points further in the following articles.
Chapter Two - Unified Communications, why you need them

It’s now a multi-channel world of communications
There has been a shift over the last year from voice only services to multi-channel support. Some of the major players in cloud IP/PBX, such as RingCentral, 8x8, etc are adding to their features portfolio to include new methods of communications, such as text, email and social media. The reason for this is simply down to changing demographics, more people, especially generation Y are using their preferred method of communication such as text over voice and they expect businesses to cater to their requirements. Therefore multi-channel support has become an essential addition to the business communication portfolio.

Potential growth in 2017
In 2017 we expect the requirements for multi-channel support to grow as more consumers shift from the traditional telephone to use the channels that they are most comfortable with. Voice however is still by far the most popular method of communication with calls to live agents at 66% of all inbound communications for businesses. However an interesting additional element of the voice segment of the market is that a further 12% of consumers contact businesses through voice calls to self-service portals. Indeed, some industries, such as airlines are finding that there is a definite shift away from live agents to self-service. However, currently voice calls to live agents is still the norm across business as a whole.

So what are these multi-channels?
A good question, is how important is it for buyers of cloud based PBX services to ensure that their service can support multi-channel, if voice still accounts for 66% live calls and 12% self-service calls.
What has become noticeable over the last few years is the change in the way people are communicating. Older channels are not being replaced, for example postal mail and fax are still around, and instead these channels are being augmented by new methods of communications which require businesses to adapt too. 2017 will see further growth in these channels as will subsequent years as more customers become familiar with them and migrate over. Voice traffic is likely to fall, perhaps as a victim of cannibalism from the self service channel as it gains in popularity however it is unlikely to be anything more drastic than a few percentage points for this year at least. The growth in the newer channels is where the interest is, as these can have a real effect on how businesses handle multi-channel support and support them they will have to as the demographics are changing. This will make it a requirement for businesses to ensure that they can offer multiple methods of communication and not just voice. This approach is often termed omni-channel and is been pushed by retail companies for some time, however other businesses are now feeling the need to adapt as their customers demand it.

Omni-Channels
So what are these new channels, and how do we support them through a telephone service? The first point is that business communications have moved considerably away from the traditional channels of postal mail, fax and telephone. Now companies must embrace new technologies that
ride upon the internet, such as email, text, online chat and video, social media and many others. Today these channels are well established and their acceptance with a new generation of consumers will ensure that they are here to stay. However, surveys show that these alternative channels are still only a small fraction of the communications inbound into a business. For example, email which is hugely popular within business is less so with the public and it only commands circa 13% of all business communication inbound to a contact center. This is actually quite good, because email fell away for many years as consumers found it a very ineffective way to communicate with businesses. However as popular as email is within business it is only marginally ahead of voice self-service. Self service is a fast growing channel albeit it current stands at a lowly 12%. However, consumers love the ease and efficiency of self service channels and will use them in preference even to a live company representative in many cases. An example of this is bank ATMs, airline check-ins, supermarket check-outs and online bookings and retail. People are becoming far more familiar with self-service technologies and the software behind them. Indeed it is becoming quite strange that the queues for self service machines can actually be longer than those staffed by live agents.

Other notable channels are web chat (3.2%), social media (2.6%), postal mail (1.8%), fax (1.3%) and SMS (0.6%).

**Email**

If we take a look at each of these channels in turn we can hopefully see how important or not these methods of communication will become. Email for example is on the rebound as it was virtually wiped out and all but abandoned as a suitable form for customer contact a few years ago. The reason for this was primarily the hopeless efforts that many companies made in processing emails and the time taken to respond. As a result many consumers stopped emailing and reverted to other channels which proved more effective. However lately email is making something of a comeback and is steadily growing as businesses finally start showing some diligence in managing this important channel. What was so strange with emails virtual demise was that companies actively pushed this channel to customers as it was seen as an efficient way to handle many customer issues more effectively (from an agents time) than telephone calls. It took many years for email to reemerge as a credible alternative communication channel and now it has other competitors such as web chat, social media and text amongst others.

Email however does well if it is managed properly through a unified communications service integrated with the company’s telephone system. Email can often be more effective for complaints and quotations were perhaps a paper trail in required. However email does have its limitations as the correspondents are off-line therefore authentication of identity can often be an issue. There is also in many cases a requirement for 2-way communication, where the correspondents need answers or to ask further questions or seek clarification and this can take many transactions over several days so for many types of communications email is not ideal by any means.

**Web Chat**

Web chat or IM sessions have been around for many years now and are very common on retail ecommerce sites and with retail companies in general. The advantages of web chat or IM texts are that an agent can in theory process and handle several concurrent chat sessions. This level of
Concurrency is highly efficient and provides an opportunity for improved customer experience. The speed and potential for quick resolutions is also a boon for retail companies as web chats have a good record for turning queries into sales. By improving the sales conversion rates while minimizing the costs of the contact center, web chats and IM texts are gaining acceptance with business. Consumers however have been less enthusiastic tending to use web chats as a 'point of crisis' channel, for example if an online transaction has gone wrong, or an account closed in error. At roughly 4% of company communications web chats are established but at only 4% small companies often have to have contact center voice agents double up and answer the chats as they are too infrequent to staff as an independent channel. Middle sized companies do tend to dedicate a team to chat but growth in the coming year (2017) will revolve more around automated web bots that manage many chats concurrently without the need for a live agent.

**Social Media**

Social media channels such as Facebook and Twitter are a pretty unique form of communication as often these channels were built for solely marketing purposes. Social media can therefore often be considered a de-facto channel as customers actually correspond with the company through the social media channels that were and are not built for that purpose. However, it must be noted that social media channel is driven by the customers demand and not by the company and is ignored at your peril. Social media has the potential for both positive and negative customer experience; however the potential for extreme negative responses is enough for managers to lose sleep over. As a result some customers will take advantage of the social media platforms high profile and post negative comments in order to get a quick response and resolution. The problem however with social media however is that it is typically managed by sales and marketing and not the contact center so agents rarely interact directly with the customer. As social media moves away from just a marketing tool towards a key channel in the customer contact portfolio, then it would make more sense to integrate it with the contact center communication systems. Several enterprise editions of cloud based PBX services like RingCentral and 8x8 have social media integrated within their Unified Communication functions.

However, social media really is a de facto channel and as a result social media only accounts for 2-3% of communication traffic, but it is very high profile traffic.

**SMS**

SMS is rather sadly in steep decline and this is also the case in the business contact center. Currently SMS accounts only for around 0.6% of communication traffic and that is practically all outbound (from the business to the customer). SMS did however have many successful applications in customer contact for example, SMS was perfect for brief account statements, and balance enquires, mobile top-up notifications, notification of funds received or dispatched, as well as a plethora of other applications. SMS was a very democratic form of communication as it worked on any mobile phone and in the 2000s many contact centers relied heavily on sending bulk SMS notices to inform customers of important events. SMS was also extremely efficient, in that it was almost guaranteed that the customer would read the message within minutes of it being sent.
Today SMS is hardly used even in outbound communications as cheaper (free) IM and secure texting has become more popular with Generation Y, however SMS was not without its faults. As we have seen SMS was typically used for outbound notification and messages to customers, and one of the perks was the almost instant receipt of the message and the assurance that it would be read or at least opened. Unfortunately, SMS was not so good for customer to company communications as there was rarely if ever anyone reading the incoming SMS, except maybe to dedicated number. However, the customers expected the same immediate response to their SMS and in many cases they would be disappointed. Additionally SMS had huge security issues, which is surprising it was ever used for SMS banking, as the message was encrypted over the air but was in clear text within the SMSC (telecom SMS center) for most cases this would not be a problem but it was a potential security and privacy issue.

To conclude our review of some of the modern communication channels that come with the UC features provided by many leading cloud PBX service providers, we need to quickly mention some other less notable channels that make up omni-channel communications. In addition to those we have examined there are several others, such as visual IVR, Virtual agents or bots, web and mobile self service, FAQ portals, online technical support and libraries, How-to videos and tutorials and many others, which make up the rich omni-channel landscape on customer contact in 2017.

**Software robots (bots) and clever algorithms**

Web Agents (software robots)

The issue with virtual agents, which are otherwise known as virtual assistants, such as Amazon’s Alexa or Apple’s iPhone Siri and Google’s box is that these are software applications that engage customers in conversations in order to provide them with an answer to their queries. They may be personalized to reflect the company’s branding, and often act as the first point of contact between the website visitor and the business. Virtual agent functionality ‘understands’ the context of what the customer is asking, with the result being more akin to that of an empathetic human who also has had access to what the customer has been trying to do. For example, if asked “When can I expect my delivery?,” the context and the required answer will be different depending on whether the customer has placed an order and is enquiring about its status, or has only a hypothetical interest in turnaround times in case they decide to place an order. When the virtual agent application has low confidence that it has returned the correct result, it is able to escalate the customers query seamlessly to a live chat agent, who then has access to the self-service session history, enabling a greater chance of a successful resolution without repetition. Further detail is available within the ‘Web Chat’ section of this report. Of these three methods of web self-service, by far the most prevalent is that of the FAQ, which is used by 72% of businesses that offer telephony self-service as well. The free text search of the document library is rather less well supported and only 32%. Virtual agents are still employed only by a very small proportion of respondents, usually those within large enterprises.
Chapter Three - Creating an Auto-Attendant your customers will love

The IVR, why companies love them and customers’ hate them

It should come as no surprise that customers hate having to use a business IVR. Navigating through countless menus is not their idea of fun. However for businesses, large and small, an IVR is an essential component of their telephone system. For the small business an IVR is so important it is along with the closely related auto-attendant/receptionist the reason that they have shifted to a virtual telephone service. On the other-hand larger businesses feel that they have to have an IVR menu as it is the only way to redirect customers’ calls to the correct extension barring having a live receptionist answering inbound calls. Even then for large companies handling the amount of inbound calls would be an onerous task, requiring a team of people without some form of automation, and the much maligned IVR does that task just fine.

Do customers’ hate the trusty IVR menu system?

Well as with most systems that interact with the public there are some contradictions. It appears that customers do like self-service, but they just don’t like the IVR as much as they like other forms of self service. For instance Forrester Forsights survey of customers found that 66% of customers believed self-service to be more convenient, this rose to 82% for Generation Y consumers. However even though the majority of consumers prefer self-service doesn’t seem to carry over to the IVR. Indeed in the same survey 83% of consumers said that an IVR provides the consumer with no benefit at all and is only a cost saving benefit for the company. The dissatisfaction, is compounded by what consumers’ feel as the widespread use of business IVR’s that are designed to contain consumers and as the vast majority of communications with a business is still through the telephone and the IVR is the first point of contact, this is an area of concern. Indeed it is believed that up to 82% of customers are likely to stop spending money with businesses if they have poor customer experience.

It is not difficult to understand why customers dislike IVRs as they often aggravate callers by providing a menu maze that is near impossible to navigate and even should you succeed and are on hold the IVR inundates the unfortunate caller with promotions or security questions. In short callers believe that the IVR is more an obstacle that stands between them and the service they require. The bottom line being, customer calling the business do not hate IVRs for what they are, they hate them for what they do or rather don’t do.

How can we improve the IVR experience?

One of the surprising aspects of the airline passenger survey of adults in the US was that the majority were more likely to have a positive experience using an IVR if the system greeted them by name. This personal greeting appears to have a substantial positive effect on the caller, and they in turn rate the IVR as more effective if it greets them by their name. Why this is surprising is that only a few years ago this practice of the personal greeting fell out of favor as customers reported it to be a bit creepy and so the practice was dropped. Now however there appears to be a case for bringing the personal touch back into the IVR greeting. The airline passenger survey believed that this sea
change in consumer experience was down to them becoming more accustomed to being recognized and greeted by name when visiting websites and when carrying out other internet transactions.

**Keep it simple**

However, no matter how much satisfaction the customer might feel being greeted by name is not going to last long if they are confronted with a menu system that is difficult to use. Therefore we have to make the IVR easier to use by keeping the menu levels and complexity to a minimum.

One of the greatest failings of any IVR system is when designers try to do too much. For example it is not uncommon to find 5 or 6 levels of sub-menus that the consumer has to navigate. This is time consuming and frustrating for the consumer even though the menu might be a work of technical genius of logic. The strange thing about IVR menus is that they hone in on what the customer wants by gradually narrowing the options at each sub-menu. However that is not how humans interact naturally. It does not take a human receptionist or even a software bot 5 or six questions to put you into the correct queue. Therefore, why can the IVR not just ask, "How can I help you?"

**Ditch the Menus**

This would be easy and quick and the whole point of an IVR is voice recognition or so it should be but instead they are anything but as they typically use selecting a number from a list using the keys on the phone. This is not rocket science everyday applications from smartphone personal assistants to televisions and car infotainment systems interface with the consumer by voice commands. So why stick with unfriendly, time consuming and difficult to navigate menus. Therefore, let us get rid of the menus and design IVRs that communicate naturally with humans in a way that they understand.

**Stop asking for PINs, Passwords**

Another bugbear of IVR according to consumers is the way that they prompt them for credentials when all they are trying to do is get through to someone to get a price quotation or a timetable. There should be no need for security credentials at the IVR. Voice recognition software can provide the necessary biometric function for security conscious companies such as financial services and health care.

**Plan the IVR scripts to boost the brand**

There is a rule developed by UCLA called the 7-38-55 rule of verbal communication. It appears that only 7% of comprehension comes from the actual words spoke. 38% of comprehension comes from the delivery or the way the words are spoken, and 55% comes from facial expressions and other body language cues. Unfortunately, the IVR cannot benefit from the facial cues but it can make better use of the way that the words are spoken, which is 5 times more important than the words themselves. Unfortunately, some companies misconstrue this rule and concentrate more on the voice persona than the message. Tech startups are prime examples with IVR messages and instructions that are an exercise in geek jargon – even though they are delivered with a high quality persona. Despite the 7-38-55 rule if the consumer doesn’t understand the word or term used it really doesn’t matter how the words are spoken. So keep the messages simple and jargon free.
Chapter Four - Your employees are mobile shouldn't you be too

How to optimize your telephone system for the modern 2017 workforce

Businesses are no longer restricted to their physical premises and today with over 80% of US adults owning a smart phone and with almost 100% penetration in the mobile market people are contactable where ever they go. Cloud based phone systems can utilize this by using techniques such as find me – follow me to treat the users mobile phone as simply another extension on the business telephone system. The way this works is the employee can simply configure his extension with the numbers of several phones in a hierarchal list. So for example they may have their office desk phone as the number one preferred devise to ring. However they can also list their mobile so if they are away from their desk the system will ring their mobile. Similarly they can do the same with their home landline. In this way the system will always be able to find them. Furthermore the system can be configured to ring the phones in sequence or simultaneously.

This feature of cloud PBX phone services is huge advantageous to business as it allows employees to roam away from their desk, to be on the road, or at client sits and never miss a call. By migrating to a hosted cloud based telephone service companies can make the most of remote workers and BYOD (Bring Your Own Device) whereby employees can work from their own smartphones or mobiles. By utilizing the mobile apps that typically come with the hosted service at no extra cost employees can also make outbound calls on their mobile phones through the company phone system, so that the business is charged for the call and not them. Similarly, the outbound calls will show the business number as the caller ID and not the employees private number.

What businesses need to comprehend is that in 2017 this type of anywhere, anytime connectivity is expected. Clients, suppliers and partners no longer accept an extension ringing out at the very least they will expect to be passed to voicemail. However with find me – follow me, which is supported by many hosted cloud telephone service providers, this should no longer be an issue.

It is estimated that approximately three-quarters of the US workforce will be mobile or remote workers by 2020 and cloud based telephone services will be the glue holding this all together.

Cloud based services provide a common platform for the companies communications and operations, wherever they may be. Furthermore, it’s not just about voice anymore and cloud telephone services can mix voice communications with multimedia and collaboration tools as this is becoming an essential part of how new businesses will operate in 2017 and beyond.

Hosted cloud services provide businesses with unprecedented business opportunity and operational efficiency and give the employees the freedom of movement and flexibility previously unavailable to them using a tradition PBX system.
Chapter Five – Small Business and virtual PBX, is it a good fit?

How a Virtual PBX can benefit a Small Medium Business (SMB)

When we consider the benefits of virtual telephone services for entrepreneurs and home-office workers it is easy to assess the benefits from both a quantitative and qualitative perspective. For the single employee company or a company with only a few mobile employees without a bricks and mortar office, then a virtual telephone system provides business-class telephony services. These services reflect positively on the company, by providing a professional call answering service, where no customer call ever goes unanswered and a call redirect service that allows employees to operate transparently from their mobile phones. This service is such a perfect match to the requirements of the startup and entrepreneur the subsequent follow-on benefits such as projecting a professional image, improved customer and vendor communication, increased business efficiency, and large company-class customer relations are clear for all to see.

However, what about the SMB, they have outgrown the virtual telephone service, which is incoming call focused, they need outgoing call handling features, so their upgrade path is the virtual PBX model. The benefits for the SMB though are not so readily materialized as virtual PBXs tend to be marketed on price and feature-sets. The problem here is that the feature rich PBX will be capable of far more functionality that the SMB can ever envisage utilizing, making it appear to be a poor fit. This can leave the decision-makers feeling that they are paying for something they aren’t using.

However, it is important to move away from judging the PBX on its plethora of features and take a broader view of the benefits a virtual PBX brings to a SMB:

- **Initial capital costs and operational expenses** – a virtual PBX hosted by a cloud service provider will be cheaper to implement and maintain that an on-premises IP PBX or traditional PSTN PBX
- **Mobility** – virtual PBX give employees mobility as calls can be forwarded transparently to any extension and that includes an IP Softphone, a mobile or a home telephone.
- **Find me/follow me** – one of the great features of a virtual PBX is that not only can it redirect to any type of telephone extension it can do so sequentially or ring all extensions simultaneously.
- **Local Presence** – one of the neat features of virtual phone systems is that they can provide real telephone numbers of other cities, regions or even countries. This means you can advertise local numbers for customers in New York, Paris, London or Milan even though you have no local presence.
- **Credibility** – having customer’s call answered by a auto-attendant with IVR support gives the impression of a large company giving immediate credibility to even the smallest business
- **Scalability** – one major failing of traditional and on-premises solutions is the lack of capacity both to support extensions but more importantly voice-mail boxes and email. Cloud based PBX can have unlimited voice-mail capacity so you will never face the embarrassment of a full mailbox.
- Ease of administration – having a virtual PBX means you can administer and maintain the system from anywhere with an internet connection
- CRM and Application integration – virtual PBX providers based in the cloud can readily connect and integrate with other cloud based applications such as Salesforce, SugarCRM or many other business, financial and customer relations applications
- Total Cost of Ownership – Financial planning is easy as there is no capital outlay, only monthly subscriptions per extensions (users). Therefore, there are no additional charges for software or hardware upgrades, as with a traditional on-premises PBX. Furthermore, maintenance and support are no longer the company's responsibility.
- Financial budgeting - A virtual PBX makes financial planning and monthly budgeting easier and by using the many free call minute plans available from most service providers the monthly call charges will be predictable, regardless of the volume of monthly calls per extension.

As we can see, there are many benefits in having a virtual PBX service for a SMB. The benefits are not just a plethora of features you may never have heard of before or ever be likely to use. In fact, most of the features are bundled together in one big service offering, as it is easier to delivery that way, rather than split them into groups of features, and then parcel them up in smaller service plans. Instead, the common service model is to differentiate services on price, using free minutes either per extension or on monthly subscription per extension. Either way a virtual PBX will undoubtedly realize both monetary and operational benefit to the SMB.
Chapter Six – Redefining and boosting the company brand

How to make your SMB appear as a Fortune 500

In a previous article, we considered how an entrepreneur of small business could operate from their personal mobile phones. We considered the products on the market that facilitated this and the features that each provided. However, sometimes a small business is looking for a means to grow credibility in the eyes of their prospective customers. They will want to appear larger than they are; to be well established having a local or regional presence.

Yet many SMBs fail to understand that the first point of contact, usually the prospective customer's first telephone call can destroy than image immediately. There is nothing gives a customer a poorer user experience than waiting as the telephone rings for ages before someone finally answers or worse never answered at all.

With today's technology that should never happen, even a small business can afford to invest in a virtual telephone system to manage incoming calls so that no call goes unanswered. Virtual phone systems such as Grasshopper or RingCentral Professional can answer an incoming call on the 2nd or 3rd ring and welcome the caller with a customized greeting and furnish them with a menu of options in the form of a list extensions or departments. For example, 'Press 2 for Sales, 3 for Accounts, etc'.

These virtual inbound call management systems are well within the budgets of even small SMBs or startups because the alternative costs in lost business through unanswered calls is both expensive in lost opportunity and reputation and is easily avoidable. A virtual telephone system will not make your business appear as a Fortune 500 but it will at least make it appear as a business.

In order to take the next leap forward in order to convey to the customer an image of a much larger, well establish organization will require a bit more work and investment. This is where cloud hosted IP PBX system's can be of assistance as they have all the features that were once only available to large enterprises with deep pockets. Nowadays, cloud based software and services make it possible for SMBs to take advantage of the economies of scale and provide their customers with an improved user experience.

There are key features and tools that large companies use to make communication with their customer's as painless for the customer as possible:

- Toll free and Local Numbers – These are self-explanatory as a customer is far more likely to call a free or local number than a potentially expensive national number. By providing the customer's the options of toll free or even a local number will increase the likelihood of calls considerably. Furthermore most virtual IP/PBX providers supply Toll Free, Local and International numbers, which you can use to establish a presence in that area – even if it is just in the customer's mind.
- An auto-attendant\receptionist – The importance of a professional auto-attendant to manage incoming calls cannot be overstated. It is vital that you get the greeting
professionally recorded, and worded. After all this will be the first contact the customer may have with the company so make sure the greeting is welcoming and the menu well presented to the customer. The menu similarly should be not just welcoming but not too daunting or confusing with too many layers of sub-menus for them to navigate.

- Click-to-Dial – By placing Click-to-Dial or Click-to-Chat icons on the company website or on advertising collateral encourages customers to call as it is a free VoIP call, and therefore the company's physical location is irrelevant.

- Multiple Communication Channels – by offering customers' the option of either calling, chatting via messenger, emailing or submitting an online support or sale query enhances the customer's image of the company. By presenting the customer with a choice of communication channels, you are inviting them to contact you through whatever means is convenient to them and by doing so indicating your willingness to engage with your customers.

- Call queuing – How you handle call-queuing is another important area where you can unintentionally frustrate customers. PBX's with advanced call queuing features can alleviate a lot of the pain points if configured correctly.

- Music-on-hold – the choice of the music you select to be played when a customer is on hold is important as it also conveys an image of the company to the caller. So it is best to go check what other large companies in your field play to their callers as they have typically invested in research to determine the optimal type of music to affect mood and create the correct ambience.

- Call Center – If you have a call center then proper call center features sets are imperative such as Call Park, so that you can safely park a call while you chat with another agent – rather than cup your hand over the microphone. Other required features that will reflect well with the customers user experience is skill based routing so that you deliver them first time to an agent with the appropriate skills to assist them.

- Call Conferencing – If you are doing B2B then having a capable voice and video call conferencing service is vital in providing a good impression.

The most impressive IP PBX's on the market provide you with all the tools you require to build a convincing presence and business profile. Therefore, to let you see how, let's look at some of them and see what features and tool they have that we can use to build your professional image in a convincing way.
Chapter Seven – Virtual PBX and the large business, can it scale?

How can virtual phone systems help large businesses?

Large businesses have typically shied away from using virtual telephone systems preferring instead to use traditional in-house PBX systems. The reasons for this are varied but virtual systems just did not provide the tremendous advantages to them as large companies as it did small and medium businesses. Large businesses would already have feature rich systems that could manage call queuing and many of the specialized features required to support contact centers and large salerooms. However, lately there has been a shift towards virtualization due to rising confidence in the internet and the cloud service provider’s capabilities. Similarly, advances in technology have seen vast improvements in internet bandwidth via xDSL and this has circumvented the problem with call quality and capacity. Both of were major concerns for large companies, as dropped call, distorted voice and failure to establish a call did little to enhance the company’s reputation in the eye of their customers.

However, with these improvements in the core technologies performance and confidence has risen and we are now seeing large company’s looking at virtual telephone systems. So what are the direct benefits that they can now get out of a virtual system?

- Mobility and BYOD (Bring Your Own Device): By supporting inbound call forwarding and outbound calling using the virtual company’s number employees can use their personal devices to make and receive calls using the business number
- Converged communications: Voice, video and email can be integrated into one service providing voice and video call conferencing and transcript voice-mail to email.
- Follow-the-Sun routing: By using a virtual number for a contact center in bound calls can be redirected to the closest operational contact center dependent on the time of day
- Collaboration and home-working: By utilizing the IP collaboration tools available with virtual telephone systems contact center workers no longer need to commute hours a day to work. Instead, they can work from home and communicate in real time by messenger, voice or through onscreen displays, which shows each worker’s status. This means the business can save on renting contact center premises.
- Automated Call Distribution: provides a system for your customers to call into and be connected to the correct people quickly and reliably.
- Virtual Regional Presence: Virtual telephone systems allow the business to have virtual telephone number for any city or country. This means the business can have virtual toll-free numbers that their customers in other regions and countries can call, even if the business has no presence there; this is a major benefit for both the customer and the business.
- Lower Cost of Ownership: By saving on monthly leasing fees for a traditional PBX and on the ongoing maintenance and support a large business can if it is careful about planning the virtual system make considerable savings. The point they have to remember hear is that if
they want an extension on every desk then the monthly virtual telephone fees are going to soon outweigh the PBX costs.

- **Business Continuity and Disaster Recovery:** This is one of the biggest advantages for large businesses. The major benefit with business continuity practices ensures that the risks involved (and costs) of providing redundancy and fail-over hot sites is passed to the service provider. Similarly, with disaster recovery, it is the responsibility of the service provider to ensure there are disaster recovery options and hot sites available. This can be a major saving for any large business.

- **Cheaper call tariffs:** This is probably the most obvious but largest saving as the costs of international calls especially can be greatly reduced.

To conclude, it is now advantageous for large companies to consider virtual telephone services. Whereas before the technology and services were not mature. Now improvements have removed some of the disadvantageous and they deliver real benefits in price and operational savings.
Chapter Eight - Cloud Hosted Versus On-Premise PBX

Cloud hosted Vs. On-premises PBX – which is best?
Over the past decade as internet communications and high speed broadband communications have become almost ubiquitous at least in major metropolitan areas there has been a steady move towards cloud-based services. This has also been the case with IP PBX where cloud hosted IP PBX’s have grown exponentially over the decade as companies not only abandon the PSTN but also their on-premises IP PBXs. The common reasons given for this shift in dynamics is that it is down to convenience and costs for SMBs but the reasons are not quite so clear why mid-sized businesses and enterprises are making this shift into the cloud. After all telephony is a major business communication tools and perhaps it is not as vital as it was prior to the advent of the internet (email, chat, etc) and mobile telephony, it still is an essential business function.

So what are the advantages of a cloud hosted IP PBX?
The most obvious advantage is that the service provider is responsible for the server hardware and application, and this entails maintenance and support. Similarly, they should have 99.999% availability, as this is the measure of service reliability, through having several redundant geographically diverse data centers and ISPs. Obviously, for the SMB selecting a host-based solution, whether it is for a SaaS (software as a service) CRM or a telephony IP PBX service makes sense. In fact this is a logical solution as having to run their own application and telephony servers may not be beyond their technical knowledge but obtaining five nine reliability of the service will almost certainly be beyond their budgets. However, for the larger businesses that have their own IT departments and computer rooms/data centers then the decision is less clear-cut.

Another advantage of a hosted cloud PBX is that the system will be seamlessly upgraded both for the applications and the OS (operating systems) and this is a source of headache for most SMBs who might not accept the risk of installing application upgrades on their PBX systems. Another advantage is that on a hosted cloud system you don’t have to concern yourself with system and configuration backups it’s all managed in the cloud. Again, this all makes sense for the SMB but is less clear for the larger business and enterprise, which will already be supporting and have business practices and procedures for all of these issues and events.

A further cloud based advantage cloud is construed to be web based administration and reporting portals. This would be essential for the SMB that does not support their own web site servers but for medium business and enterprises, this is hardly a technical issue, as they would simply have to host a web portal running a backend API or secure web service to their
PBX server. Indeed, they are probably running several similar remote access web portals for a variety of applications.

Cloud applications do have inherent advantages due to the very nature of the cloud data centers architecture. For example, application servers can scale, in effect they stretch and shrink as resources are required or dropped and this is called elasticity. However, this level of scalability in an IP PBX system in a single tenant PBX application is unlikely to be an issue.

What are the disadvantageous of an on-premises PBX server?
If we cannot resolve the issue looking at the problem from the perspective of cloud advantages perhaps the problem lies with an inherent problem in the on-premise model. The most obvious drawback to having an on-premise server is the daily maintenance and support of the server and application. In this regard we have to consider the costs of housing the server in an appropriate cooled computer room and supplying it with a reliable source of power. For an SMB this may be beyond their budgets but for larger organization hosting their own applications and email servers, one more server isn't going to make much difference to the OpEx (operational expense). Therefore, we can disregard the inconvenience of maintenance and support. Similarly, application upgrades and configuration backups are just going to fall in line with existing procedures, so moving them to the cloud gives no real advantage.

In fact the more we look at the issue the more advantageous it appears to be for large businesses and enterprises to keep their PBX in the local computer room/ data center.

What are the advantages of an on-premises IP PBX server?
The advantages of keeping the IP PBX server on-premises are considerable. Being hosted local means that IT can use existing or obtain PSTN trunk lines (E1 or T1 depending on the continent) and have an automatic fail-over system that provides the five nine availability that the cloud service was boasting. However, providing the fail-over service in-house means there will be instant failover with no loss of service or lost calls.

Having the choice between using VoIP lines, and PSTN trunk channels gives IT the flexibility to provision PSTN channels to the contact center, sales and VIPs and then provision VoIP for everyone else. This is a far more flexible and pragmatic approach to provisioning and assigning extensions and call plans.

Secure lines and C-suite extension could also be a security issue passing across the internet and may well be better served using POTS lines and re-routes when required thereby leveraging the inherent security and quality of the PSTN.

Finally, for large businesses it makes no economic sense to host in the cloud, as their total cost of ownership will be lower hosting on premises. This is because even though the first years will be expensive due to the cost of the hardware – but Virtual Machines will mitigate that – subsequent years will be almost zero as there will be fewer monthly service charges.
from the cloud service provider. Therefore, over a five-year cycle the TCO will be markedly lower, especially if utilizing virtualization on a shared application server.

Conclusion

For SMB’s with no IT, computer rooms or in-house VoIP expertise then the choice of going with a cloud hosted IP PBX is a logical one, both from an operational and financial perspective. However, for businesses with existing IT presence, computer rooms hosting mission critical servers then there really is no advantage to hosting in the cloud. Indeed, there are several advantages to hosting on-premises. These are PSTN/POTS automatic failover, built in business continuity and lower total cost of ownership.

What are the potential savings using a hosted cloud-based IP/PBX?

There are very compelling reasons as to why you should go for a hosted cloud IP/PBX, for example,

1. No CAPEX (capital expenditure) on servers and software. Similarly there is no operational OPEX (Operational Expenditure) on maintenance. However there will be outlay on perhaps upgrading or configuring the network to ensure there is segregation of voice and operational data traffic. This might mean running a separate LAN or configuring VLANs.

2. Predictable pricing – as most if not all hosted cloud service providers charge on a per seat (extension/user) basis it is easier to budget for the entire system. So long as you plan diligently and only give users the service plans that they require it will be much cheaper over a three year period. However you must make sure you allocate the correct service plan per user. Some users, such as sales and executives will be heavy telephone users so make sure they have unlimited call plans and give light telephone users the basic plans. The problem you can face when trying to be democratic is that some users will use much more than their allotted minutes which will result in hefty overuse bills while others may only use a fraction of theirs. Some service providers will allow averaging across the total number of users, but some do not, so be aware.

3. No support costs – again because the system is operated and supplied as a service to you there is no need for any in-house technical skills required. This is a big saving for medium to large companies as they do not have to hire technicians to maintain and administer the system.

4. Lower cost of ownership

5. Lower cost of calls – most calls that are on network, for example between employees will be free even if they are remote or travelling. If your business has several branches then bridging extensions can also result in free calls. Additionally as the cloud providers have the advantage of negotiating rates at large scale they can
typically get very low long distance and international rates at considerable discounts, which they pass on to the customer.

What are some of the hidden costs?

It may sound too good to be true, and generally it is very affordable, but there are some hidden costs you should be aware of. For example service plans per extension may have for the sake of argument 1,500 free minutes per month. Now what you need to understand is that IP telephony differs from traditional calls because you are charged for calls to make (outbound of the network) and calls you receive. Therefore it is very easy to go over your allotted bundle of free minutes. In this case of over usage, some service providers charge quite extortionate rates so the bills can suddenly escalate. This is why due diligence is required when allocating service plans to extensions (users) because they might not make any external calls but if they receive a lot, say they are doing technical support, then that extension is being charged for every inbound call per minute. Therefore it is very easy to go over the allocated limit and find yourself paying quite heavily for the privilege.

Another cost that many people do not realize is that you are typically buying a service, so no hardware is required. However that is not quite true as you will often have to buy IP phones that are configured and ready to use out of the box in order to utilize the service. These phones can be very expensive, even the most basic phones can be several hundred dollars.

On a similar note, many of the services advertised are available to each user however if you are on a basic one line phone how can you possibly use most of the features. For example if you have a desk phone with one line you cannot use speed dial or if the phone has no video display you will not be able to do video conferencing despite the fact that the capability is there and you are paying for it but your low cost phone isn’t capable of performing the function.
Chapter Nine - 10 Secure Messenger Applications for Smartphones

A review of 10 popular and secure messenger applications being used in 2017 and how these apps differ from others notably for their privacy and encryption features.

Messenger applications have come a long way since the ubiquitous adoption of the smartphone and are no longer just glorified SMS text services. Indeed most of the top messenger applications support voice, video and file-sharing of photographs and other multimedia content as well as the humble text chats. Perhaps because of these multimedia attributes messenger apps have become the communication medium of choice for the public and many small businesses. However, as the proliferation of messenger apps and smartphones edges out voice calls as the preferred method of communication especially with the younger generation the performance and capability demands on these applications has risen. It is no longer enough to just have a free and easy to use application with an abundance of cute emojis. Success requires customer adoption because in the messenger market success depends on a large user base.

Success breeds success
It is one of the issues with messenger applications is that to be successful you have to have an existing large user base if not it is difficult to get new users. This is a bit like the chicken and the egg syndrome for application developers after all users are only going to download and install the app if their friends are already using the application if not there is little point. The result of this is that the successful messenger apps are hugely successful with WhatsApp, Line and Wechat being regional powerhouses with hundreds of thousands of subscribers.

However, it is no longer just about basic functionality such as chatting, consumers of these applications now are expecting support for all sorts of media and interestingly they are focusing more on essentials such as security and privacy.

Security & Privacy
There was and still is to some extend a commonly held belief that consumers of mobile and web applications were not concerned with security let alone privacy. Indeed many industry analysts believed the concepts of privacy in the internet age was archaic and many held the view that privacy if it was not dead was at least an irrelevance. Fortunately, a lot has happened in the last few years to go some way to disprove the notion that consumers neither cared about security and privacy let alone were willing to pay for it. This transformation in the public’s perception has come about gradually due largely to a reaction to the insidious encroachment of application developers and software providers appropriating consumer’s personal information. This is of course the business model of the free internet and mobile economy, whereby application developers provide free of charge their product in return for the consumer’s data such as their usage history, metadata and geo-location data which can be sold on to advertising houses or data aggregators. The most famous of these companies are Google and Facebook. However, it appears the public is perhaps tiring of this invasion of their privacy and the collection of geolocation data is a particular bugbear. As a result consumers are now putting emphasis on security and privacy features such as encryption, secure
data storage and reliable data deletion. Consequently in our reviews we will consider the top messenger applications that provide not just large subscriber bases, multi-media support and features but also security and privacy functions.

**WhatsApp**

WhatsApp is hugely popular messenger app for Android and iOS. What is surprising is that it was built upon a business model that shunned advertising and personal data harvesting instead offering subscribers’ free usage for the first year – this was necessary to build a subscriber base – and then a subscription fee for every subsequent year. By producing a messenger app that was simple to use, supported voice, video messages and emojis as well as importantly being advert free WhatsApp did not just disprove the common bias that consumers would not pay for personal privacy it completely debunked the concept. WhatsApp also provides end to end encryption between subscribers thereby protecting against eavesdropping of messages across the internet. Unfortunately, this method of end-to-end encryption has not found favour amongst the governments of several countries that frown upon the fact that their citizens wish to keep their conversations private and WhatsApp is sometimes blocked without notice.

WhatsApp claims to have over a billion subscribers around the globe however its revolutionary business concepts has since been scrapped as it was acquired by Facebook who have reverted to a free service but at the expense of personal data sharing between WhatsApp and Facebook. Subscribers can still opt out of sharing their contacts and personal information with Facebook but they don’t make it easy. However, for all that WhatsApp is still the leader for usability, features, security and privacy – just remember to opt out of sharing your personal data.

**Line**

Line is a hugely popular messaging app in Asia and has now introduced end-to-end encryption by default which ensures users data privacy.

One of the most popular instant messenger apps in Asia is the Japanese instant messenger application Line with over 600 million subscribers worldwide. Line supports both Android and iOS and there is also a PC app available but you have to have a mobile phone number to register. Line instant messenger is particularly good for business use in Asia due to both its extensive subscriber base but also its capability to support large conference calls and user group chats and calls. Line supports video, file-sharing and calls to landlines and mobiles as well as free in-network calls to other Line subscribers. Line’s popularity is also due to it wide range of features, multi-media support and large-scale stickers (emoji). Line also has many popular media channels where subscribers can follow popular groups, celebrities and TV shows.

However despite its popularity in Asia there were niggling concerns regards its overall security and concerns with privacy especially in Thailand – one of Lines’ biggest install base with 40 million active subscribers. Indeed, not only was it rumored that Line allowed access to the Government in Thailand it was also discovered that Line used on open Wi-Fi networks could be captured and rebuilt using a
PC or laptop. As of summer 2016 Line has addressed these concerns and now uses end-to-end encryption by default on all communications ensuring call privacy and security.

Blackberry Messenger

The grandfather of all secure messaging apps is still going strong due to its reliable encryption, high security reputation and government certification.

Back in the 2000’s Blackberry dominated the smartphone market due to its corporate email support and robust security. Indeed so highly was Blackberry held it was the recommended smartphone for the president of the United States of America? The Blackberry range of phones were also iconic for their full qwerty keyboards large screens and closed-system which only permitted recognized developers to access the phone features – Apple’s iPhone would later take this even further. However one outstanding feature of the Blackberry, which made it so popular with non-business users, was its encrypted messenger service.

Blackberry sank into decline soon after the emergence of the iPhone and Android mobile devices but fortunately the Blackberry Messenger Service has survived and it is ported to work on Android and iOS. The features that made Blackberry messenger so popular was that instead of using the mobile number as the identifier Messenger used a hardcoded handset identifier called a PIN. Subscribers then communicated with one another using the PIN as an identifier. Using a PIN meant that subscribers could safely exchange contacts without revealing any phone numbers or email addresses. Also, as the messenger was encrypted throughout the Blackberry network this made the communications very private and secure. In addition to its original features the Blackberry Messenger has continued to evolve and now supports settings to allow two-way permissions for communications, and a very convenient group retraction feature for messages.

Of course as with WhatsApp the Blackberry Messenger’s encryption came in for a lot of criticism from many countries but Blackberry’s once massive popularity meant governments were loath to ban the service. Today the Blackberry messenger Service is still a robust, secure service worthy of serious business consideration where security and privacy are important criteria.

SnapChat

SnapChat as its name suggests is actually a messenger service geared towards sharing photos (snaps) with the interesting feature that these shared images cannot be stored or copied and delete themselves after a few seconds. This cool feature made SnapChat extremely popular with youngsters and the selfie community as photos could be shared with friends to view but not to store thereby removing the hazards of any incriminating evidence.

SnapChat’s innovation with regards these self-deleting photos were actually in contrast to its rather stark and minimalistic application and features. However as its popularity grew better features have been added such as improved security and privacy settings. These were necessary as the default SnapChat settings were not sufficient to provide any privacy.
To ensure basic security and privacy with Snapchat that extends beyond the cool self-deleting texts and photos it is necessary to restrict communications to friends only because like Facebook Snapchat operates over a large open community and you don’t want to be receiving unsolicited photos from people you don’t know. Similarly you only want friends to view your stories content.

Another security weakness with Snapchat is that screen saving the photo is difficult but not impossible and can easily we captured using another phone to photograph the screen. Similarly although Snapchat claims to never store any photos on their servers there are plenty of third party applications that work with Snapchat that do. Therefore you can never be sure that the person you are sending the self-deleting photo to is not going to store the image either intentionally or not. In 2014 around 200,000 snapchat images were posted online on 4Chan and third party apps storing supposedly deleted images on their servers were the obvious suspects. More recently a playboy model found herself in deep trouble with the police after posting online body-shaming snaps of a woman that used the same gym as her. The snaps were taken without permission and it was therefore illegal to distribute them in this manner. The playboy model though because the snaps would self-delete that it would be safe to take snaps in inappropriate places like a gym changing room. Unfortunately for her the images were stored and redistributed.

SnapChat is extremely popular but is very limited as a secure messenger service and is best suited to trivial communications were strong confidentiality and privacy are not strict prerequisites. A more robust and security aware application that is an alternative to SnapChat is Wickr Me.

**Wickr Me**

Wickr Me is available on iOS and Android and supports end-to-end encryption, and self-destructing texts, photos, images, voice and videos. Wickr Me is a good alternative to the limited SnapChat and it takes security and user privacy very seriously even going to far as having a shredder feature that allows subscribers to permanently delete any attachments or data of any kind to prevent recovery. In addition Wickr Me also has configurable setting for self-destruct times and deletes all message metadata as well and this includes time message was sent and importantly any geo-location information.

The only slight drawback with Wickr Me is that it is a proprietary application and encryption protocol so we really don’t know just how secure the encryption is as the company is relatively new and therefore untested. However Wicker Me has received very good security audits to date and offer a security bounty for any bugs found in its code.

Like SnapChat a weak point will always exist with the recipient using screen savers to capture the time-sensitive image or message. Wickr claim that screensaver capture is possible of iOS devices though not on Android so beware and be careful you only send to those you can trust.

Privacy is another Wickr Me strong point as they do not collect any geo-location details or metadata of any type from the subscribers other than the details they supply during registration. However Wickr does collect device and aggregate usage data but does not share this with third parties.
ChatSecure is an open-source and free messaging application available for iOS that uses end-to-end encryption. The encryption used is the OFR (off the record) protocol. There were earlier issues with OTR and Chatsecure but from version 3.0 these have been rectified. Chatsecure now used OTR over TLS with pinnable security certificates to mitigate earlier vulnerabilities with the underlying protocols that made it susceptible to man in the middle attacks. In addition Chatsecure now uses verifiable end-to-end encryption with perfect forwarding secrecy and can also be used in conjunction with the TOR network to bypass firewalls and other security impediments. However using the TOR anonymizing network can bring upon unwelcome attention so is best avoided unless strictly necessary.

As a messaging service Chatsecure can send text messages as well as files, videos, photographs and voice (audio), but the feature lists are not as well developed as say Wickr. However it does support group chats but this is currently unencrypted at this time.

Currently Chat secure is only available for iOS and the Android fork is no longer available which may be a serious setback. However if your business runs on iPhones this is perhaps not an issue. If it is then you might want to consider Silentphone which is available for iOS and Android.

**SilentPhone**

The company behind the SilentPhone messaging app is Silent Circle the makers of the encrypted Blackphone which has low level security clearance so it comes with a good pedigree. However the Silentphone is not free and comes at $9.99 per month. What you get for that subscription fee is unlimited secure voice and messaging between silent circle network subscribers. There is also a 100MB file transfer capability, video and call conferencing for up to 6 people, which is encrypted and full file/data burning facility to ensure file deletion at both ends. This is an important addition to many other features common to other secure messengers’, in that silent phone deletes the files from recipients as well as the senders. Another key point with Silentphone is that the users keep the encryption keys, as this is peer-to-peer encryption so silent Circle plays no parts in the encryption process. What that also means is that Silent Circle could not decrypt any user data for law enforcement even if it is ordered too.

SilentPhone maybe the ultimate in encrypted secure messengers but is comes at a price but is available for Android, iOS and SilentOS

**Threema**

Another Switzerland based company to produce a secure messenger application is Threema, which is available for iOS, Android and Microsoft. Threema’s intention is to provide a secure messenger
Threema provides all the standard features we expect from a modern messenger application such as file, text, video and voice messaging. There is also group control and the ability to silently agree or disagree to receive texts. Also there is a neat authentication method using QR codes to verify the participant at each end of the communication. Files and messages can be securely stored using a PIN or fingerprint as protection. Additionally, Threema works on tablets and even smartwatches and can securely chat anonymously as no phone number is required.

There are two versions of Threema, the basic version and a business version called Threema Work, which also comes in three license offerings, basic, business and enterprise.

Telegram

Telegram is a free secure messenger with no adverts or subscription fees and is available for Android, iOS as well as PC, Mac and Linux. What makes Telegram different from the other messenger services is that it is a cloud based solution. What this means is that you can access the service from any device as files and data are stored in the cloud. Telegram’s cloud is built on a multi-data center model with encryption to enable fast access to consumer data from anywhere in the world.

Another interesting point about Telegram is that though it was started in 2013 it is growing rapidly and has adopted the same privacy stance as WhatsApp did originally. Telegram, is dedicated to protecting subscriber security and privacy and protecting them from third parties and marketers. Of course Telegram is also going to be subject to law enforcement warrants but they will not allow third party snooping on your data by those without legal warrants. This is normal but perhaps for a secure app storing your data in the cloud and in easy reach of the authorities might not seem like such a great idea but for most businesses this shouldn’t be an issue. However Telegram does address those concern using secret chats that are end-to-end encrypted and leave no trace on Telegram servers as all encryption is done on the end devices participating in the communication. Also these secret chats support message deletion, self-destruct and cannot be forwarded by the recipients.

As for features Telegram excels at communicating large media files, text, and video. Telegram also supports groups, super groups and channels. Groups are idea for sharing and collaborating with small groups such as family and friends. Super groups however can support up to 5000 participants so are very powerful communication tools. Super groups work using a shared history and so files deleted on one device will be removed from the entire group. Channels on the other hand are used for public broadcasts. Another interesting feature is that you can create bot users and Telegram provides the development tools to construct the bots.
Finally Telegram is not open source but it does make its source code available for inspection for security audits and this also applies to their protocols and APIs. This provides a measure of reliability and trust in their product.

**Signal**

Open Whisper System’s private messaging application Signal is available for iOS and Android devices. Like Telegram Signal is free to use, advert free and your privacy is protected. Signal proved a secure platform for private messaging whereby you can send text, pictures and video free of charge and privately. Signal uses end-to-end encryption and cannot see anything that passes between the communicating parties and no one else can either as only you have the encryption keys. Signal also provides a private calling service which ensures voice call privacy without any long distance charges. Just like with the private messaging app private voice is private no-one not even Private Whisper can eavesdrop on your calls.

Interestingly WhatsApp and Google’s new Allo messaging app both use the same robust encryption as Signal as it is developed by Silent Whisper Systems. However they differ in the way they implement the protocols. For example WhatsApp does not have the encryption keys so cannot decrypt data for any government that may order them to do so. However WhatsApp does see the data flow through their servers it’s encrypted but WhatsApp can extract the metadata which it can store and submit to legal requests from governments, such as like the recent request from the Brazilian government.

Google’s Allo on the other hand disables end-to-end encryption by default, unsurprisingly and this makes it a poor choice for a security messenger. Unlike WhatsApp and Google Signal does not store encryption keys or metadata. The way that Silent Whisper can do this is because it is open source and supported by grants and donations rather than selling advertising such as Google.

Signal is the better more secure choice because simply put if the government demand that Silent Whisper hand over your user data or metadata they have nothing to hand over. The problem is though that the Signal user base compared to WhatsApp and Line is miniscule which is a problem. So if you want a free, secure and private messaging and calling application Signal would be a great choice but you’re going to have to persuade your colleagues, friends and family to download the app as well.
Chapter Ten - How to run your business from your mobile phone

An entrepreneur’s guide to the virtual telephone

Today smartphones are ubiquitous; they are becoming vital business tools not just for mobile communications but also for running business mobile apps. Executives and entrepreneurs alike run their businesses using nothing more than their smartphones and this has revolutionized the way they do business. By using mainly, mobile apps or more likely, for SMB and larger organizations cloud apps employees can work from anywhere and at any time. This mix of work/play time creates they say a more harmonious balance between the home and the office.

Such has been the uptake of mobile devices by the public that most now prefer to use their own devices within the workplace and this phenomenon is called Bring Your Own Device (BYOD). In this business case, employees request to use their personal smartphones, tablets, and laptops to do their work. There are some security issues, such as data leakage from the company into the cloud, and these need to be addressed but in most cases, BYOD results in improved efficiency and morale.

For the business to have employees work from their own devices has its own obvious advantages, lower costs, higher efficiency, less expenses on software and maintenance, all these and more contribute towards the benefits derived from BYOD. However, one use of mobile phones in the business is not advantageous and that is ironically when employees use them to make and worse receive business calls.

The problem with employees using their own devices to receive customer calls is the loss of the control the company has on the customer relationship. In fact, the relationship will develop between the customer and the employee for better or worse and that is never a good thing in any business.

Therefore, the goals of many startup, SMBs, and even medium enterprises are to find a way to utilize the employee’s smartphone without them operating out with the business telephone system. The preferred method would be to have a second number, which could somehow create the effect of two phone lines on one phone. The way they can accomplish this is through a virtual telephone system, and there are several vendors offering possible solutions.

Google Voice

Google voice is an online VoIP PBX that works from either a new or an existing mobile number and it can transfer calls to one or more additional phone lines. The idea behind Google Voice is that it will work as a central phone number, for in our case a business, but then transparently redirect the incoming call to one or several phones (extensions). Google Voice rings all the extensions simultaneously until the user answers or it sends the call to voicemail. For outbound calls if the user has opted for a Google Voice number then that number will show as the caller ID on outbound calls. This is okay for a startup getting a new business number as you could use the Google Voice number as the central customer contact number or you could port your existing business number to be the Google Voice number. On all other calls not using the Google App, I.E. the employee’s personal calls would then be handled (inbound and outbound) using the mobile’s own number.
**Grasshopper**

Grasshopper is a virtual telephone system that uses an overlay on the public telephone system the PSTN. The way Grasshopper works is by transferring incoming calls to a business number via an auto-attendant to a selection of other phones. This works much like Google Voice, however with Grasshopper you have an auto-attendant to offer the caller a choice of extension, which can be configured to represent departments and other employees so it works like a company switchboard redirecting calls to other employee's phones. This feature makes handling incoming business calls very efficient as Grasshopper never lets a call go unanswered and if they cannot get an answer on a specific extension, Grasshopper will pass the call to voicemail.

The only drawback with Grasshopper is that it is for incoming call management only, it does not supply a dial tone so any outbound calls will need to use the Grasshopper’s mobile app. That is a minor inconvenience, when you consider all the advantages you get with Grasshopper. Features such as call hold, transfer, conferencing, call announce and voice-mail transcription to email or SMS.

Grasshopper starts at $12 per month

**RingCentral**

RingCentral has two main business products it’s cloud based PBX services called Office aimed at SMB and larger organizations and it virtual telephone service3e Professional which is targeted as entrepreneurs and SMB. RingCentral is very similar to Grasshopper in the way it works and the features that it supports. The primary differentiator between Grasshopper and RingCentral is that RingCentral is cloud hosted VoIP.

RingCentral starts are $20 per month

**Line2**

Line2 is another possible solution to the second mobile phone number issue. Line2 allows for a second number that lets users send and receive calls on a compatible device. Line2 features include call waiting, call transfer, voice & video conferencing, visual voice mail and a desktop client for a PC or Mac. There is an optional auto-attendant.

Line2 Pro starts at 14.99 per month

**OneSuite Business**

You can get a second number for a mobile by installing the OneSuite Business app on either an iOS or Android device. OneSuite comes with all the standard features such as call history, call waiting, call conferencing and call transfer. OneSuite Business can be used as a personal service, or it can be set up to support multiple subaccounts. Configuring sub-accounts allows multiple employees and departments to be supported in much the same way as Grasshopper uses extensions.
Skype for Business

A basic Skype account is free and while it allows outbound calls to regular phone numbers all inbound calls must go through the Skype app. However, any Skype user can have those incoming calls diverted to a landline or mobile number but at a fee per minute.

In addition, Skype Business has many extra features as it supports voice and video as well as being tightly integrated into the Microsoft Office product. Being part of Outlook, Word and Excel for example makes it a great tool for collaboration in business. Furthermore, its video conferencing tools make it ideal for meetings, presentations and interviews. Additionally Skype Business has a desktop sharing tool, which makes it great for remote training and distance learning.

Skype Business starts at $2.99 per month.

One final recommendation is that Skype can work really well with Grasshopper, as Skype is primarily an outbound service and Grasshopper an incoming call service they complement each other beautifully.
Chapter Eleven- Top 10 things to consider when choosing a new IP/PBX Telephone System

When considering upgrading or shifting to a new IP PBX telephone system it is wise to do some researches before you dump the old telephone system, especially if you are new to IP Telephony. The problem is that businesses require robust reliable services and a telephone service that provides PBX style features. However some of the voice over IP (VoIP) services offered is only suitable for residential use and not for business.

Unfortunately, there lies the problem, as VoIP covers a multitude of technologies and applications both in the consumer and business marketplaces. Skype for example is probably most consumers’ idea of VoIP; they see it as a consumer service for free long distant calls to other Skype enabled PC’s. Unfortunately, Skype has always been synonymous with good consumer quality voice, but not something you would want to rely on for business. Consequently, that consumer level perspective has for a long time tarnished the reputation of business class solutions such as RingCentral who provide cloud based VoIP PBX systems, that are feature rich, reliable and provide business quality voice. Therefore, the first thing we must establish when considering a new business class telephone system, is to differentiate between the residential and the true business IP/PBX products – many vendors will have you believe that there is considerable overlap, there is not.

So let's first look at the options available to us.

1. Hosting Options – there are two options when considering a cloud based IP PBX solution. 1) cloud-hosted VoIP and 2) On-premises hosted VoIP. Fortunately, this is an easy choice as cloud-based solutions such as RingCentral host the IP PBX on your behalf on their cloud-based servers. You, the customer provide nothing but the Internet connection so there is no upfront CapEx costs to concern the accountants. What you are paying for is VaaS (Voice as a Service) which means you pay a monthly subscription based on the levels of service provided. For the vast majority of SMBs cloud-hosted solutions is the preferential choice as it removes all the burdens of implementations, support and maintenance and provides the better total cost of ownership – or at least it does in most situations. The case where on-premises hosted IP PBX is favorable is when the business has very technical IT support people on hand who prefer to have systems under their direct control. The drawback to on-premises is that the customer is responsible for buying the on-premises server and for all support and maintenance of the server hardware. However although this is an on-premises solution, the server is hosted on site – it is actually a hybrid solution as the software is still hosted partially in the cloud, so don't expect total control of the system. Whatever, on-premises can result in faster fault resolution and support as the technical team are on-site and lower software rentals making total cost of ownership favorable, so long as you don't have any server hardware problems.
2. There is also a plethora of user endpoints (VoIP devices) to choose from and these can make all the difference between a consumer and business quality system. For example, there are Softphones, which are software applications that run on a computer, laptop or tablet, and they utilize the host devices soundcard, microphone and speakers. These are perfectly suitable for consumer class services. However he obvious failing here is that it becomes the weak link of a professional system as most business PC's are not blessed with high definition soundcards and speakers. At the other end of the spectrum are the dedicated desk IP phones that can typically support high definition voice. However these devices are not only expensive, they must be deployed properly within the network. For instance they cannot just be connected to the LAN per se, they should have their own dedicated LAN network or at the very least a dedicated Voice VLAN in able to leverage the inbuilt quality. The good news is that you are not restricted to one or the other, and you can easily mix and match softphones and IP desk phones.

3. The next thing you must consider is the network infrastructure. The problem here is that most companies have no idea whatsoever what is going on in the network. IT concerns themselves with servers, applications, and the occasional network duties but rarely do they have an understanding of the traffic traversing the wires. If you are going to deploy VoIP within the business, then that has to change. In order for VoIP to work there must be visibility and a clear understanding of network volumes and patterns across the LAN. Typically, most SMB businesses do not have the volumes of traffic to cause major problems on Gigabit LAN connections but that is not the case with the internet WAN link. By moving voice traffic from dedicated P1/E1 telephone links to the Internet IP WAN link can cause congestion, poor voice quality, dropped calls or even the ability to make a call due to lack of available bandwidth. It is therefore essential to consider the upgrade and redundancy of the business Internet WAN link in order to support the number of concurrent calls that your plan envisages. If possible, deploy a WAN link strictly for VoIP only, so it does not have to compete with YouTube or other capacity grabbing applications. As a rough baseline, each call requires 90kbps, although this is dependent on the codex used, some vendors claim 30Kbps is sufficient. However, by experience, for a SMB of 5-7 concurrent calls a minimum of 5Mbps down and 2Mbps up is required – but the more you have the better.

4. Understand the difference between Cloud and traditional PBX. Before you dump the old PBX, understand the difference between Cloud-based and traditional PBX.

5. Understand pricing for cloud VoIP. Telco charges are based on per line. In the VoIP world, specifically for cloud-hosted VoIP like service from RingCentral, the numbers of calls are priced as "per endpoint" Extension.

6. Line limits are non-existent. There are no line restrictions therefore as long as the hosted provider is not having issues, callers will never get a busy signal and all calls will be answered.

7. VoIP lives and dies by the WAN. PRI costs are done away with but so is their reliability, the downside to cloud hosted VoIP is that when your WAN connection goes down, your phones also go down.
8. SIP-based desk phones are near universally supported now. Don't get pushed into buying into vendor specific hardware or software. RingCentral, 8x8, FreedomVoice among others, all support SIP based VoIP which has become the open standard for VoIP services and hardware.

9. Don't skimp on cabling. If your cabling infrastructure is still Cat3-grade from your existing PBX, you need to invest in Cat5e or better for new data lines (if you don't already have data in place). Don't try to make savings here, or try to use Wi-Fi, it will provide inferior quality.

10. Fax is a problem – If you cannot use VoIP fax services, which are just like shared network print queues, then you will have to use ATA adaptors on each of the analogue lines on your FAX machines, there is no way around this.
Chapter Twelve - Top 7 Security issues you need to know about VoIP Telephone Systems

Security issues you need to be aware of
The top concerns that prospective businesses have when considering implementing or migrating to a VoIP telephony system is that of reliability and quality of the voice calls. This is understandable because I think we have all in the past have had less than stellar experiences with consumer class VoIP solutions where calls drop for no reason and the voice quality is poor. Fortunately, business class VoIP solutions can usually dispel any fears that prospective clients may have.

However, hot on the heels of reliability and quality comes the major concerns that many businesses harbor with regards security. Unfortunately, security in VoIP is not nearly so well addressed and is to this day a serious issue that needs consideration and remediation.

As with any internet application, security should be a real concern and it is therefore important that IT understand the security vulnerabilities and the inherent risk that they manifest. IT should fully appreciate the threats and be capable of mitigating the risks before committing the business to a VoIP telephony solution.

So what are the major security threats to VoIP?

1. Denial of Service
2. Voice Call Fraud
3. Phreaking
4. Eavesdropping
5. Man-in-The-Middle Attack
6. Call Tampering and Hijacking
7. Malware, Worms and Viruses

Denial of Service attacks are one of the most common and disruptive form of malicious attack. This is primarily because it takes very little skill and can be launched successfully using many free online tools. Hackers and other unscrupulous competitors can bring a company's VoIP system to a halt using a simple DoS attack. The denial of service comes about when an attacker floods the main internet connection, the link or pipe to the service provider, with useless data. By flooding the businesses internet connection the attack will consume all the available bandwidth preventing any new calls from being initiated and causing severe quality issues with existing active calls.

Furthermore, the attacker may use more sophisticated attack techniques, which target the VoIP server, using SIP session initiation messages to consume available SIP resources. The attacker may also attack not just the Voice but also the data networks by targeting the internet router or firewall.
using sync attacks that consume resources and prevent initiation of new TCP sessions. These simple techniques can have a devastating effect on availability, reliability and the quality of the voice service.

**VoIP Call Fraud**

Voice call fraud typically involves an attacker penetrating the network and gaining permission and access to make unauthorized and free calls. There are two main types of call fraud:

1. **Phreaking** - Phreaking is the process of illegitimately gaining access to a business’s VoIP service provider information, including account numbers, access codes and so on, and illegitimately adding phone extensions to make phone calls, or making calls on existing business VoIP lines and racking up a huge service provider bill.

2. **Eavesdropping** - Eavesdropping is another common threat and this is when a hacker taps into a VoIP phone call and listens in to get the names of employees, their passwords, phone numbers, and other information. Eavesdropping is done thorough sniffing traffic crossing the wire or via eavesdropping wireless traffic. The hacker can then use the information captured to gain access to voice mail, calling plan details, administrative portals and billing information. Hackers will eavesdrop on business VoIP calls in order to facilitate identity theft, VoIP service theft, and corporate sabotage.

**Man-in-the-Middle Attacks**

These are sophisticated attacks, where a hacker uses software tools to fool the client into believing it is a server and vice versa. By sitting transparently between the genuine client and the genuine server, the man-in-the-middle can intercept all the traffic flowing between them, manipulate the data, and replay the messages. Man-in-the-Middle attacks are very effective in capturing sensitive information and are particularly vulnerable over wireless connections where evil twin access points can be installed to capture unwary clients. Man-in-the-Middle attacks are much harder over wired switched networks as sniffing the traffic on a dedicated LAN of VLAN is far harder and requires direct access to switches and their configuration.

**VoIP Call Tampering and Hijacking**

VoIP call tampering is technique whereby a hacker maliciously sends a stream of data packets with the intension of causing interruption to the VoIP communication stream. This attack will result in poor call quality, dropped calls, and delays in voice signaling. A third party can then intercept the VoIP call signals and then change the encryption key of the digital signature of the call, to their own public key. This can cause serious issues with authentication and privacy. This is also some-times called Phishing over VoIP.

**Malware, Worms and Viruses**

As with all network based hosts VoIP clients are prone to the effects of malware, worms and viruses. Malware and worms can consume network bandwidth and viruses can create their typical havoc with PC software, and softphones are specific targets. Malware and viruses can destroy data on hosts, steal sensitive information and provide Trojan backdoors to critical hosts. VoIP hosts and servers are just as vulnerable to malicious software as any other network client, and should be treated as such.
VoIP Countermeasures

Just like any other network application the best countermeasures and remediation techniques for the majority of malicious software, eavesdropping, hijacking and hacking attacks on the network is encryption. Most business VoIP solution offer encryption as an option so you should be sure to enable it on all VoIP clients and servers. In addition to encryption, there is the requirement of authentication.

Authentication Protocols

Authentication protocols such as PAP, CHAP, Kerberos and Radius provide various levels of authentication and identity management with Pap being the weakest, CHAP and Kerberos definite improvements and Radius the most secure but expensive and complex to implement. Identity management however is critical in today’s networks. Therefore as a matter of best practice, the VoIP system must leverage any authentication system, access management or existing identity protocols already implemented, for example MS Active Directory.

With regards malware, worms and viruses then typical antivirus, antimalware software should be installed and actively monitored to ensure hosts are updated.

For larger networks, which are hosting VoIP, IT may consider installing Intrusion Detection/Protection Systems (IDS/IPS) that can perform wire speed deep packet inspection. These devices can look deep inside data packets to spot malicious packets by looking for known signatures.

However, for more specific VoIP countermeasures and quality of service controls, IT should be considering Session Border Controllers (SBC). Session border controllers are devices used in VoIP networks to control media streams and protocol signals that can start, conduct, and stop VoIP voice calls. SBCs also provide control mechanisms for quality of service (QoS) to ensure that all VoIP calls have the best voice quality possible.

Call Fraud is best mitigated using white lists of countries employees are authorized to call. By restricting access to international calling, most call fraud can be avoided. By utilizing these VoIP security tools and security protocols that are readily available today, IT can secure the VoIP systems and provide reliable, available and confidential VoIP service for the organization.
Getting the most out of your internet connection
When it comes to optimizing, the internet link for VoIP there is one way to ensure you have an easier life if you have the budget and that is by provisioning a dedicated VoIP internet link to your hosted IP/PBX provider. This can be arranged through your service provider and the local telecom company. The Telco can arrange fixed line T1/E1 links or better virtual lease lines over point-to-point MPLS private wires. If your budget doesn't stretch to that or the services are just not available in your area then buying another ADSL link to the internet is a good cheap alternative, which you can use solely for VoIP. This way you will have all the bandwidth available for calls without any contention issues. If you are using a Unified Communications solution whereby you have video conferencing and other such video services then you really should have a dedicated link anyway. However, should your budget not stretch to adding a dedicated internet link what are the other options available?

If you cannot provision a dedicated internet link for the VoIP and Video services, which would free them from bandwidth contention and traffic congestion over your internet link, then the alternative is to create a virtual link. What you will need to do is to implement Quality of Service (QoS) and if you can Traffic Policing and Shaping.

QoS is available on just about all modern routers likely to be found in Small Office Home Office (SoHo) environments. It can easily be configured via the browser based configuration portal on the router. It is normally accessed via an address such as 192.168.1.1 or 192.168.1.254 or something similar – check the back of the router or on the manufacturer's website for details.

The QoS feature will be normally switched off, so you need only enable it by ticking a checkbox. The next thing you have to do is then select the priority that you wish to assign different classes of traffic. All IP traffic by default will be at best effort or low priority. What you have to do is select VoIP and assign it to the highest priority available. It doesn't really matter what – these routers classes vary along the lines of low-medium-high - so long as it is assigned a priority higher than any other traffic on the router.

Now that you have assigned VoIP the highest priority you can, try it out and guess what … most likely nothing has changed there is no discernable change in quality. Don't worry that is perfectly normal. You see what happens is QoS is actually a priority queuing system it controls the depth and order that packets queue when at the interface output queue awaiting to be fed out onto the wire. So, if there is no congestion at the queue then QoS has no effect whatsoever. QoS only kicks in if there is congestion.

This is why really it is better to address quality issues by provisioning bandwidth. If you have sufficient bandwidth you have no need for QoS as it will be rarely if ever required. However, on the small SoHo router it is easy to configure so you should enable it anyway as it probably will be required if your bandwidth is on the low side.
With regards larger businesses with medium sized routers perhaps by Cisco then there are far more optimization tricks you can play with. QoS is implemented in Cisco either via the web based GUI or by the IOS command line. Here we want to do the same as on the SoHo router and prioritize VoIP traffic by giving it a priority of 5 (Priority queue) and video as 4 (next highest). However, as the Cisco router is far more configurable than the small SoHo routers we can also look at configuring Traffic policing and shaping by configuring policy maps and assigning bandwidth per class of traffic.

Traffic policing and shaping uses policy maps, which are used to match traffic by certain criteria, such as the interface it arrived on, by protocol, its ports numbers or priority. We can identify and mark traffic and assign them to a certain class. We can then set permitted bandwidth limits for each class. What this does is virtual creates separate tunnels for each class. By assigning VoIP for example 30% of the available bandwidth and WWW traffic 20% and leave the remaining 50% for all the other protocols and applications we can ensure that even under the most congested traffic situations that we will have that bandwidth reserved for VoIP.

QoS and Traffic Policing and shaping are useful tools if your network is regularly facing congestion. However, bandwidth is rarely today expensive to upgrade and it should be your first choice. Only if bandwidth for whatever reason cannot be upgraded to remove the congestions should you consider QoS as a solution – it is not it is a short-term firefighting technique.
Chapter Fourteen - Ten IP Voice Terms & Techniques you must know

When buying a virtual PBX you need to know the Jargon.

What is SIP?
SIP or to give it its full name Session Initialization Protocol is an IETF standard protocol used for establishing VoIP sessions over the internet. SIP is the set of messages, which are themselves heavily inspired by HTTP are in text readable format. The messages establish, modify and terminate sessions belonging to one of more media streams. Typical SIP enabled applications such as video conferencing, instant messaging, file transfers and presence notification are the basic tools required to build VoIP and chat applications found in soft-phone and unified communication platforms.

SIP uses text-based messages that are considered either requests or responses between a SIP agent and a SIP server. SIP only concerns itself with the message communication it relies on underlying transport and session protocols to deliver the message on TCP or UDP ports 5060, and/or 5061.

SIP as we have seen focuses on setting up the sessions for voice and video calls. Once it has accomplished the task the actual data streams between the SIP end-points are transported over another protocol called Real-time Transport Protocol (RTP). SIP supports encrypted transfer if required using TLS. Encryption however is accomplished on a hop-by-hop bases so really requires all hops in the path to be trusted which is okay for a LAN but not over the internet.

SIP uses the concept of user agents, servers and proxies. Although two SIP devices can communicate with each other sometimes it is easier to use a proxy. The job of the SIP proxy is to translate the numbers entered into the keypad of the phone into a SIP address and ultimately an IP address. SIP proxies are therefore very useful for offloading and performing lookup and registration and call setup between the devices.

SIP is a very simple protocol, which because of its simple command structure and it is text readable, which makes it easy to troubleshoot yet still be powerful enough to build complex PBX systems.

What is a SIP Address?
SIP works by using a simple address format similar to HTTP and email. In its simplest format a SIP address on a LAN would be the devices IP address. This is because the simple notation, sip: 192.168.16.167 as an example is all that is required to identify the recipient of the call. Even over the internet, this simplified format would work, though a more user friendly way would be to use the domain name rather than the public IP address and allow DNS to resolve the name for you. For example, sip: recipientsname@theirdomain-name.com would connect both devices which have public and reachable IP addresses – firewall rules allowing.

However, in practice this isn’t feasible as the vast majority of devices using IPv4 use private IP addresses that are not reachable over the internet. The solution therefore is to use a service provider who will provide a routing service and act as a proxy client. The first stage is that the user registers with the service provider and creates a username password combination, which will be used to identify and authenticate the SIP device and session. The SIP address will then look like
username@service-provider.com, and by using this SIP address others will be able to reach you on the internet.

Service provider routing services are normally free, so registering and obtaining a generic SIP address is easy. If however you have your own domain name and a matching email address, that have a corresponding MX record that matches your networks public IP address, it is better to try to match them so that your SIP address would match your email address. This is easy to do as DNS will resolve the domain name and so long as you have a unique SIP address within your LAN you will be reachable from anywhere outside the network.

**What is a Voice App?**

A Voice application is a piece of software which when loaded on your multimedia enabled PC, Smartphone or Tablet allows you to make VoIP calls over a network connection. The motivation for using a Voice app on a mobile telephone is simply with regards cost. It is far cheaper to make a call over a WLAN/Wi-Fi connection than it is to use the service provider’s mobile data plan.

In order to make use of the voice application, you will probably have to register with a SIP service provider in order to get a SIP address and routing service. That may well be the only costs involved as most voice apps come free or with free versions. The paid versions are usually aimed at businesses with specific quality, reliability and availability demands so if that will be the predominant use then paying for the software is probably a prudent move. For most home use though the free versions will provide all the features and quality required.

There are different types of voice apps available so you need to get the one specific for the device you are using. For example, download and install the version that matches your OS version when using a PC or laptop. On a mobile device check to get the mobile version for not just the OS whether that be IOS or Android but also for the actual model of phone or tablet as they vary a lot. Some voice apps like Google have the softphone application embedded in the web browser. Also, much Softphone functionality is coming packaged into cloud based applications.

There are some drawbacks with using voice apps the main concern was to receive calls the PC needed to remain on but that is not such an issue when being deployed onto a smartphone or tablet.

**Audio Menu**

An audio menu is a popular method for directing callers to specific pre-configured extensions by reading them a menu of available extensions. It is commonly used in incoming call answering services to provide the caller with the call experience provided by a large company IP/PBX.

The audio menu will typically take the format; Press one for Sales; two for Customer Care; three for Technical Support, or four for Finance. The caller is then able to make the selection using the keypad on their phone. Because phones use dial tone multi frequency DTMF there is a different
frequency generated for each individual key. Therefore, the software can determine which key has been press, in this case 1 to 4 and take the appropriate action.

**Way it's used in VoIP**

Incoming auto-attendants for virtual hosting companies use this feature as the cornerstone of their call-answering service as they can offer a caller a professional sounding menu of option and then call forward the caller to the appropriate selection.

In call center environments audio menus are utilized to call screen and deliver callers to the correct agents to deal with their queries. Callers will be asked to select a service or wait in a queue, some audio menu systems will capture the caller ID and from that lookup a database or CRM application which will retrieve the customer's history file.

Audio menus can be more complex and be used to build intricate processes, which a customer can follow to automate a desired action. A popular use of this type of audio menu was telephone banking.

Audio menus are flexible telephone interfaces that have many uses and are commonly implemented in retail & entertainment, banking and telephony bill payment, where processes can be broken down into very specific caller led sequences of events. Audio menus are generally useful and helpful to the caller so long as the hierarchy of choices is limited to three or four layers of menu, beyond that callers can get frustrated. Additionally when designing an audio menu there should always be an option to breakout and wait in a queue to speak to a live operator.

An audio menu is sometimes referred to as interactive voice recognition or IVR. Strictly speaking, they are two different technologies but today in the VoIP industry IVR is commonly used as a catch all phrase for all types of telephony menu.

**Codec**

The name Codec comes from its function, which is the 'coding-decoding of digital signals.'

In hardware implementations Codec are hardware devices, a soundcard, that convert digital signals into analogue signals that can be fed to a speaker. Codec devices use a digital-to-analogue convertor to convert digital signals into analogue signals; they can also handle the reverse procedure using a digital-to-analogue convertor that runs off the same clock.

In software the processes is typically reversed and the goal is to 'compress and decompress' high-fidelity analogue signals into encoded digital signals of a minimum number of bits. Software codec use algorithms to effectively reduce the size of a file for storage or transmission.

In VoIP, codec are used to compress and encode analogue voice signals into a reduced digital format for transmission. At the recipient's end the digital signal is then decompressed and decoded for signal replay. A codec works by sampling a signal several thousand times a second and converting
each small sample into a compiled encoded digital signal for transmission. Once decoded at the receiver the missing parts of the analogue signal are not perceptible to the human ear. The number of times a sample is conducted generally relates to the quality of the codec for example a 64k sample a second is the same as a standard landline call so the call quality should be similar. Other codec are aimed at providing compression and sample at 32k, 16k and even 8k in order to support low bandwidth VoIP internet bandwidth. The lower the sample rate the less bandwidth will be required for transmission with some trade-off with voice quality.

Software codec employed in VoIP situations use special voice algorithms that not only sample at low rates, 8k samples per second, but they also take into account peculiarities in a two way simultaneous telephone conversation. The algorithm detects when there is silence and then they send nothing, and as a large percentage of any telephone conversation is silence this greatly increase the efficiency of the compression without losing quality. Packet based systems have the flexibility to do this whereas circuit based synchronous systems cannot they have to send packets whether they are empty or not.

Conference Bridge
Audio conferencing relies on a conference bridge to provide the software and hardware application designed to support simultaneous multiparty conferences. A conference bridge is typically a server that handles each individual audio stream for each party on the conference call. This feature was typical of a legacy PBX that handled each voice call circuit that attended the call. However today with VoIP the same features can now be readily obtained using VoIP and an IP/PBX conference bridge. The conference bridge in this case can be a server, router or software application. IP/PBX have brought audio and video conferencing to the SMB as there is no longer the requirement for very expensive conference bridges instead even small businesses can now operate audio conferencing on standard IP/PBX servers.

Hosted or on-Premises
Conference bridges are a highly desirable feature of an IP/PBX service. This service can be hosted, virtual or on-premises depending on the situation and the business requirements and capabilities of the business. For small companies (SoHo) then virtual conference bridge services are available with virtual IP/PBX services supporting conference bridging for audio and video. SoHo type services such as Skype also can now support small multiparty conference calls.

How does it work?
A typical conference bridge regardless whether it is hardware or software handles multiple traffic streams from each party on the call. These traffic streams are bi-directional and it is the conference bridges job to 'bridge' all these simultaneous call streams together to give the impression of one simultaneous call. In a business scenario if all the delegates on the call are in the same building VoIP handles each data stream within the PBX software to bridge the calls into one conference. If however the call delegates are from outside the business then calls may come in on VoIP or on landlines through the PBX's PSTN links. It is then the job of PBX hardware and software to bridge together the delegate's calls into one seamless conference.
Audio and video conference bridges are now very popular as they are well within the budget of even SMB. Conference bridges provide a means to increase efficiency, and enable cost savings through reduced lost time and travel expenditure.

Digital Subscriber Line (DSL)
DSL is a medium for transferring data over plain old telephone system (POTS) copper lines. These are the standard, local loop, copper twin cables, which are used to deliver a standard telephone connection to the home. The advantage of DSL to the user and the Telco provider is that the technology leverages the investment in the legacy copper infrastructure this is already installed. This makes it a cheap efficient way for a Telco to provide internet service.

Previously users connected using the standard telephone lines using 56kbps modems or if they could justify the expense by an ISDN line, 128kbps, both of which use standard POTS cabling. DSL however offers much higher throughput than these legacy technologies. ADSL is the most common format and it provides higher download than upload, which matches typical internet usage.

How does it work?
DSL works by taking advantage of the unused frequency capacity of the copper wiring used to connect the POTS telephone from the central office to the home. The copper wire is barely utilized as only a fraction of its potential is used to carry the fine frequency bandwidth required to carry voice. This is because human hearing range is so narrow that only frequencies within the range 300 to 3,400 HZ need to be carried; the copper wires capabilities are in the several million hertz. This leaves a vast amount of unused frequency available that can be used simultaneously. DSL takes advantage of this by using high frequencies at the top end of the spectrum so that there is no clash with the low frequency voice.

Benefits of DSL
How much benefit that is gained from DSL is dependent on a few things such as how close you are from the Telco central office and what contention ratio the Telco uses. ADSL is a distance sensitive technology and the signal quality decreases the further away from the CO the user resides. Apart from the distance factor, ADSL has many benefits such as it is an always-on technology so can be active 24/7. It also provides far greater throughput with ADSL2 and ADSL2+ providing for very high throughput in the 20mbps range. Another significant advantage is that the provider normally provides the DSL modems or routers. Though these are not normally wireless DSL routers so you may need to replace them, but that is very easily done, failing that a small switch and a Wi-Fi access-point is all that you would require to connect a home or small office network.

Instant Messaging
Instant messaging as seen with Google Chat, Yahoo Messenger allows subscribers to communicate in real time using short chat messages. Instant messaging (IM) works due to a feature called presence, which is a notification that the subscriber is currently online and logged into the application. Subscribers build contact lists and can see which of their contacts are currently online and available to chat.
Presence information regarding a subscriber is collected when they log on to the service via a network connection and is stored in a presence availability record that can then be distributed out to other subscribers who are currently in the contact list, these are known as watchers. Presence is not just used in IM it has many uses and one very relevant one is in VoIP.

The most common use of presence in applications is to display an icon that shows the subscribers availability or willingness to communicate. The common states are online, busy, away, idle and do not disturb. These are configurable by the subscriber who wishes to change his status from 'online' and free to chat to a more granular use of presence information. Furthermore, the subscriber can be invisible by switching of the presence feature. This is often used to prevent from being disturbed, for example when busy or in a meeting, as not everyone respects the do not disturb state.

When the subscriber sends a text message it travels across the internet to the relevant IM server hosting the service. The server relays the text messages to the other subscriber and it pops up on his screen in a transcript dialogue box. A complete record of the chat session is available for review and subscribers can also send files to one another. In the case of send a file the IM server initiates a direct connection between sender and receiver to make the process quicker and more efficient.

The added benefit of IM is it is cheap and a highly efficient way to communicate. IM chat messages are tiny so IM can be an efficient and cost effective way to work on even the smallest of bandwidths as well as on expensive mobile data plans.

IVR
Interactive Voice Recognition or IVR, as it is commonly known, is the technology that a caller will interactive with when they telephone a large business or enterprise. The caller’s experience will be that their call will be answered by an automated system, which will greet them with a customized voice recorded greeting, and probably present them with a menu of options. These options might be:

- Press one for Sales, or speak One
- Press two for Billing, or speak Two
- Press three for Technical support, or Speak Three
- Etc

This is where voice recognition comes into play, because the initial menu offers just tone dialing, for example the caller wishing to speak to sales would just press the number one button on their phone. The phone would then send the correct tone for button ‘One’ to the system, which it would immediately recognize and connect the caller to sales.

However, IVR is much more complex than just that, it can identify the alternative, for example if instead of pressing the button number one, the caller spoke the utterance ‘one’. The system would also be able to understand the utterance the human had spoken and duly direct them to the correct option.

IVR in this its truest form requires algorithms and complex hardware to capture and then analyze the voice samples, after all it has to work with every customer, regardless of local accent or speech
impediment. This makes IVR a very complex science but one that has been pursued by telephony companies and PBX manufactures for a long time.

The future of IVR is not just to recognize single words but ultimately to distinguish distinct speakers, as this has huge ramifications in telephone banking security and call center fraud. The goal of speaker recognition may still be some way off, but IVR as voice word recognition is very advanced and not just confined to security but is becoming common-place in domestic appliances and as an aid for those less able bodied.

**Latency**

Network speed is often thought of as being the bandwidth of the link; however there are many sources of latency (delay) that can affect overall performance and throughput. Low latency networks are typically described as being networks that operate close to their predetermined bandwidth, whilst high latency networks often suffer from large delays that might not affect throughput but will show considerable delay. An example of a low latency network is short distance optical fiber network, which is very low latency and will provide very high throughput with minimal delay. On the other hand a satellite link will provide reasonable throughput but large delay – due to the distances travelled.

The reasons for latency though, or delay, can be down not just to distance – you can have severe delay on a LAN – it can come about for a variety of reasons. Some of the most common reasons for latency are network congestion. This can come about through the network being too busy, all the bandwidth is being consumed, packets are being dropped, which requires resending, and that can compound the problem. Other reasons are poor cabling, kinks or twists in cabling or poorly constructed or wired cable connectors. On optical networks, transceivers may need cleaning or just periodically reseated as that is another common reason for unexplained latency.

With regards voice networks latency is a concern, but not to the extent most people imagine. Voice typically requires one way latency between parties of 150ms, but that is a large figure and easily obtained even over the internet – remember a ping is two ways so that will equate to a round trip delay of 300ms.

If on a WAN you are experiencing unacceptable latency you should take this up with your service provider. Failing that you could check it out yourself by examining the traffic crossing the link and either filtering at the router unwanted traffic or looking into deploying a WAN optimizer.

**Jitter**

When auditing IP networks there are three KPIs (Key Performance Indicators) that are paramount to a high performance network.

1. Packet loss
2. Latency
3. Jitter

Packet loss and Latency are important but jitter is the one KPI often overlooked or misunderstood.
Jitter is the deviation in latency and is very commonly seen on the internet rather than on local area networks. For example if you ping www.google.com you may well see response times varying from 53 ms to as much as 63 ms and that is jitter the difference between the minimum and maximum latency. On a LAN for example you will rarely see the jitter as pings to a local server will be 1ms and be pretty constant.

The effect Jitter has on data networks is negligible even across the internet and this is because when traversing the internet TCP/IP is used as the transport protocol. Fortunately, TCP has built in features that mitigate jitter and latency such as reordering of packets and resending any lost packets. However, on voice and video traffic TCPs techniques are not much use as there is little point in sending a real-time voice packet if it was lost in transit. Similarly, real time video streaming does not benefit from packet reordering or resending of packets. Consequently, voice and video require low latency networks with minimal jitter.

If a network has excessive jitter then it probably will not be noticeable during normal data operation. However if you find poor video or voice quality it is something to look out for.

Consequently, when determining the quality of a network to support voice and video, the key factors to look out for is jitter of less than 30ms, anything above that can cause poor performance and poor voice or video quality. There are some ways within LANS and WANS to reduce Jitter, one is to deploy QoS (Quality of Service) another is to prioritize Voice and Video traffic though that normally is done by default. Unfortunately QoS doesn’t work over the internet as you have no control over the intermediate routers that your traffic is passing through or even the route the packets are even taking. However, one solution is to try and at least make sure the source of the jitter is not on your own uplink internet pipe to your ISP, and often the only solution is to increase the bandwidth.
### Grasshopper – Pay as You Grow/ Ramp

<table>
<thead>
<tr>
<th></th>
<th>Pay as You Go/Ramp</th>
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<tbody>
<tr>
<td><strong>Pros &amp; Cons</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pros</strong></td>
<td></td>
</tr>
<tr>
<td>• Auto-Attendant answering service</td>
<td></td>
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<tr>
<td>• Call transfer to Mobile Phone</td>
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<tr>
<td>• Send receive Fax</td>
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<td>• Unlimited extensions</td>
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<tr>
<td>• Reliability using PSTN</td>
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<tr>
<td><strong>Cons</strong></td>
<td></td>
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<tr>
<td>• No dial tone, so no real outbound service</td>
<td></td>
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<tr>
<td>• Difficult to make outbound calls using mobile app with business caller ID</td>
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</tbody>
</table>

#### Service Plan Review

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<table>
<thead>
<tr>
<th><strong>Plan Price Per User</strong></th>
<th>Pay as you Go - $12 a month 6¢ per minute</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Free minutes per line</strong></td>
<td>Ramp – 500 minutes</td>
</tr>
<tr>
<td><strong>Toll Free minutes</strong></td>
<td>Ramp – 500 minutes</td>
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<tr>
<td><strong>Pay as you go options</strong></td>
<td>Pay as you Go - $12 a month 6¢ per minute</td>
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<td><strong>Contract Terms</strong></td>
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<td><strong>Free Trial/Money Back Guarantee</strong></td>
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<td><strong>Conferencing Calling</strong></td>
<td>3-way calling</td>
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<td>Send and receive Internet Fax</td>
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<td><strong>Support Service</strong></td>
<td>US based Live</td>
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<td><strong>Support Options</strong></td>
<td>Email, phone, live-chat,</td>
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<tr>
<td><strong>Support Hours</strong></td>
<td>24x7</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td>Grasshopper is a feature rich virtual phone</td>
</tr>
</tbody>
</table>
Grasshopper virtual phone service has two entry-level products, the Pay as You Grow and the Ramp service plans. Pay as You Go, is the billed on minutes used and currently that is at 6¢ per minute, there is also a 12$ per month subscription charge. Ramp, on the other hand is 24$ per month, but you have 500 free calling minutes. Now what we have to remember here is that this is an inbound focused virtual telephone service, so these minutes are for received calls, not call you are going to me initiating. However, Grasshopper does offer a great virtual telephone service by providing a business number and answering service, which enables businesses to operate using their mobile phones. This is of course not unusual now, but the major differentiator between Grasshopper and most of their competitors is that Grasshopper utilizes the standard PSTN telephone network to transfer calls. This might explain why its call per minute charge is higher than most of its competitors but it also means that Grasshopper is very reliable and will not suffer from internet reliability issues.

Grasshopper works by providing an inbound call answering service, and by using an auto-attendant it provides the caller with a professional greeting and a menu of configurable options. The menu can be made up of departments or extensions dependent on the organization, and each can be redirected to a different phone. A handy thing is a number of real phones can be linked to the virtual extension number, which can ring in sequence or simultaneously. Therefore, you could have your mobile as the first number and the house phone as the second, this way you can ensure you will not miss an important call.

Category – SMB

Grasshopper – MAX and Grow

<table>
<thead>
<tr>
<th>Grasshopper</th>
<th>Grow/Max</th>
</tr>
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<tbody>
<tr>
<td>Pros &amp; Cons</td>
<td>Pros</td>
</tr>
<tr>
<td></td>
<td>• Auto-Attendant answering service</td>
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<td>• 2,000 or 10,000 minutes</td>
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<td>• Reliability using PSTN</td>
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<td>Cons</td>
<td>No dial tone, so no real outbound service</td>
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<tr>
<td></td>
<td>Difficult to make outbound calls using mobile app</td>
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</tbody>
</table>

Service Plan Review

(Place button or link here to short service plan review)

Plan Price Per User

Grow - $49 a month
Grasshopper is a virtual phone system with unlimited extensions, which was designed with the entrepreneur and small business in mind and therefore it can be an ideal solution for the SMB. With the Grow and Max service plans Grasshopper provides two and three local or toll free business numbers respectively, and unlimited extensions so it can theoretically scale to fit a company of any size. However, Grasshopper is an inbound service, you do not get a dial tone so cannot place outbound calls, well not conveniently anyway. Therefore, Grasshopper is perfectly suited to the small business, which perhaps has no physical office and where employees are mobile and work using their mobile phones. If that is your type of business then Grasshopper can be an ideal fit and can be used to handle even the largest workforce.

Grasshopper, works by issuing a virtual business number that the customers can call. Grasshopper will answer all incoming calls via an auto-attendant and then depending on the caller’s choice, made from a configurable menu, Grasshopper will transfer the call to a mobile phone or landline. This is all transparent to the caller, so it provides a caller with a professional user experience and provides the business with a professional image.

Grasshopper is an ideal solution for entrepreneurs and mobile workforces that tend to work from mobile phones. However, the Grasshopper service can also be used as an inbound service for small businesses that have home workers as calls can be transferred to a home phone line. Where Grasshopper is less useful is when used in an office environment where desk phones would be a preferable option, which could handle both incoming and outbound calls. One important feature
with Grasshopper is its reliability as it is based upon the telephone network and not the internet; therefore it is not susceptible to internet reliability issues.

**SMB (Small to large Business)**

**8x8**

Category: SoHo, Entrepreneur

<table>
<thead>
<tr>
<th>8x8 Business Phone Systems</th>
<th>Office Enterprise Suite Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros &amp; Cons</strong></td>
<td><strong>Pros</strong></td>
</tr>
<tr>
<td></td>
<td>• Advanced integration with CRM</td>
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<tr>
<td></td>
<td>• Advanced collaboration features</td>
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<td></td>
<td><strong>Cons</strong></td>
</tr>
<tr>
<td></td>
<td>• Lacking advanced call distribution features</td>
</tr>
<tr>
<td><strong>Service Plan Review</strong></td>
<td>(place button or link here to short service plan review)</td>
</tr>
<tr>
<td><strong>Plan Price Per User</strong></td>
<td>Price on Request</td>
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<td><strong>Free minutes per line</strong></td>
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<td>Month to Month</td>
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<td><strong>Phones Supported</strong></td>
<td>All VoIP phones, BYOD</td>
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<tr>
<td><strong>Phones Supplied</strong></td>
<td>8x8 can supply Cisco, Polycom and Yearling handsets</td>
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<tr>
<td><strong>Mobile Apps &amp; Softphones</strong></td>
<td>Android, iPhone, PC and Tablets</td>
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<tr>
<td><strong>Conferencing Calling</strong></td>
<td>Up to 50 participants</td>
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<td>Send and receive Internet Fax</td>
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<td><strong>Additional Fees</strong></td>
<td>Local taxes</td>
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<tr>
<td><strong>Cancellation Fees</strong></td>
<td>None on month-to-month, no refund on annual pre-paid service</td>
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<tr>
<td><strong>Pre-sales Consultation Service</strong></td>
<td>planning, designing and project management,</td>
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<tr>
<td><strong>Installation Consultation Service</strong></td>
<td>implementation project management, ongoing support, and consulting</td>
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<tr>
<td><strong>Support Service</strong></td>
<td>US based</td>
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<tr>
<td><strong>Support Options</strong></td>
<td>Email, phone, online forms</td>
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<td><strong>Support Hours</strong></td>
<td>24x7</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td>8x8 is a feature rich virtual IP PBX service for businesses of all sizes.</td>
</tr>
</tbody>
</table>

**Our Rating**  

★★★★★
Virtual Office Enterprise Suite

The 8x8 solution for the larger business or the enterprise is the Virtual Office Enterprise Suite, which is their flagship product that incorporates all the functionality of the business phone system, unified communications and contact center functions. As a result the Enterprise Suite is feature rich and includes all the enterprise-grade telephony features, along with mobility, chat, SMS, presence, audio, as well as web and video conferencing. Furthermore, the Virtual Office Enterprise Suite offers business analytic tools, which are meant to monitor and manage not just system performance and usage but also staff productivity and can be used to optimize the caller’s user experience in the case of a contact center. However, the most telling features are within the unified communications feature-set as this enables voice, video, chat, text, SMS and social media streams to be input into the system. This feature is very important today as customers contact points are more diverse so contact center and enterprise solution require the ability to communicate on far more than just traditional voice media. The Enterprise Suite is designed specifically for large businesses and comes with additional workforce optimization tools, which may be overkill for many smaller companies.

**SMB/SME/UCaaS**

RingCentral

**Category: SoHo/Entrepreneur**

<table>
<thead>
<tr>
<th>Ring Central</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros &amp; Cons</strong></td>
<td><strong>Pros</strong></td>
</tr>
<tr>
<td></td>
<td>• Internet Fax</td>
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<tr>
<td></td>
<td>• Dedicated fax number</td>
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<tr>
<td></td>
<td>• Dial-by name directory</td>
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<tr>
<td></td>
<td>• Phone &amp; web support</td>
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<tr>
<td></td>
<td><strong>Cons</strong></td>
</tr>
<tr>
<td></td>
<td>• No International call plans</td>
</tr>
<tr>
<td></td>
<td>• No refund on cancelling annual pre-paid service for months unused</td>
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</table>

**Service Plan Review** *(place button or link here to short service plan review)*

<table>
<thead>
<tr>
<th>Plan Price Per User</th>
<th>Pro - $12.99</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Proclus – $19.99</td>
</tr>
<tr>
<td></td>
<td>Proposer - $24.99</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Free minutes per line</th>
<th>Pro – 300</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proclus -1,000</td>
</tr>
<tr>
<td></td>
<td>Proposer – 2,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Toll Free minutes</th>
<th>Pro -300</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proclus – 1,000</td>
</tr>
<tr>
<td></td>
<td>Proposer – 1,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pay as you go options</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract Terms</td>
<td>Annual pre-paid</td>
</tr>
</tbody>
</table>
Service Plan: Professional

RingCentral Professional is a cloud based virtual telephone service designed for startups, entrepreneurs, and business people who are on the move. The Professional service plan delivers a solution for professionals that are heavily reliant on their mobile phones for business by providing an inbound call answering service. Because RingCentral Professional is an inbound service it lacks many of the features that its larger IP/PBX siblings offer but if all you require is a reliable inbound answering and call transfer service then Professional is probably what you are looking for. Just like other virtual telephone services Professional works by providing a business number for customers to call, this number can be local, toll free or you can port an existing number. The auto-attendant will always answer any inbound calls, which ensures you never miss a call and the configurable menu options allow calls to be redirected to a mobile or to any phone of your choosing. If you should be unavailable, then RingCentral will automatically divert the call through to voice-mail.

RingCentral Professional is designed to be a feature rich, virtual telephone system, but it does lack out going capabilities that you may require for a business solution. However, if your chief concern is receiving business calls, or even faxes when you are out and about working from a mobile telephone then this service works great.

Category: SMB

Service Plan: Standard
<table>
<thead>
<tr>
<th>Ring Central</th>
<th>Standard Service Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros &amp; Cons</strong></td>
<td><strong>Pros</strong></td>
</tr>
<tr>
<td></td>
<td>• Best in class range of features</td>
</tr>
<tr>
<td></td>
<td>• Easy Installation &amp; Administration</td>
</tr>
<tr>
<td></td>
<td>• Remote collaboration &amp; Desktop Sharing</td>
</tr>
<tr>
<td></td>
<td>• Online Meetings</td>
</tr>
<tr>
<td></td>
<td>• Voice Video conferencing</td>
</tr>
<tr>
<td></td>
<td><strong>Cons</strong></td>
</tr>
<tr>
<td></td>
<td>• No International call plans</td>
</tr>
<tr>
<td></td>
<td>• No refund on cancelling annual pre-paid service for months unused</td>
</tr>
</tbody>
</table>

**Service Plan Review**

(Place button or link here to short service plan review)

| Plan Price Per User | $24.99 |
| Free minutes per line | unlimited |
| Toll Free minutes | 1,000 |
| Pay as you go options | N/A |
| Contract Terms | Annual pre-paid |
| | Month to Month |
| Free Trial/Money Back Guarantee | No risk 30 day trial for up to 4 users |
| Phones Supported | All VoIP phones, BYOD |
| Phones Supplied | If required, RingCentral can supply Cisco, Polycot and Yearling handsets |
| Mobile Apps & Softphones | Android, iPhone, PC and Tablets |
| Conferencing Calling | Up to 4 participants |
| Fax | Send and receive Internet Fax |
| Standard & Advanced Features | Add link here to table of standard/advanced features |
| Installation Fees | none |
| Additional Fees | Local taxes |
| Cancellation Fees | None on month-to-month, no refund on annual pre-paid service |
| Pre-sales Consultation Service | Planning, designing and project management, |
| Installation Consultation Service | implementation project management, ongoing support, and consulting |
| Support Service | US based |
| Support Options | Email, phone, live-chat, |
| Support Hours | 24x7 - Office subscribers with 2 or more users. Otherwise 13x5 supports. |
| Summary | Ring Central Premium is a feature rich virtual IP PBX service for businesses of all sizes. |
| Our Rating | ★★★★★

RingCentral standard edition is the entry-level version of their feature rich cloud based IP/PBX Office service targeted at small to medium sized businesses. As such, the standard edition although having most of the features and functionality, of its more expensive siblings sometimes has limited
functionality, for example, call conferencing is limited to four participants. However, the standard edition does not lack much in the way of features, so long as HD voice, automatic call recording or CRM integration are not key requirements to your business.

RingCentral’s Office Standard Edition, has unlimited calling and online administration and configuration. However, Office goes beyond just a cloud based telephone service as it incorporates many business collaboration tools and features. These are available in the standard edition, through Glop, which is RingCentral’s team workspace application for collaboration. Glop is a valuable tool for task management as it provides a workspace for all team communications so that team emails, notes, files tasks and calendars are stored in a single shared workspace. In addition, RingCentral have integrated not just voice into their product but also adopted video so that there is audio/video conferencing and the ability to conduct online meetings and presentations. Therefore when considering RingCentral as an option for a cloud based PBX system you also have to take into consideration all of the additional tools for collaboration and unified communications that it brings to the table.

Category: SMB, Large Companies

Service Plan: Office Premier Edition

<table>
<thead>
<tr>
<th>Ring Central</th>
<th>Premium Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros &amp; Cons</strong></td>
<td><strong>Pros</strong></td>
</tr>
<tr>
<td></td>
<td>- Best in class range of features</td>
</tr>
<tr>
<td></td>
<td>- Easy Installation &amp; Administration</td>
</tr>
<tr>
<td></td>
<td>- Remote collaboration &amp; Desktop Sharing</td>
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<tr>
<td></td>
<td>- Online Meetings</td>
</tr>
<tr>
<td></td>
<td>- Voice Video conferencing</td>
</tr>
<tr>
<td></td>
<td><strong>Cons</strong></td>
</tr>
<tr>
<td></td>
<td>- No International call plans</td>
</tr>
<tr>
<td></td>
<td>- No refund on cancelling annual pre-paid service for months unused</td>
</tr>
</tbody>
</table>

**Service Plan Review**

Plan Price Per User: $34.99
Free minutes per line: unlimited
Toll Free minutes: 2,500
Pay as you go options: N/A
Contract Terms: Annual pre-paid
Month to Month
Free Trial/Money Back Guarantee: No risk 30 day trial for up to 4 users
Phones Supported: All VoIP phones, BYOD
Phones Supplied: If required, RingCentral can supply Cisco, Polycot and Yearling handsets
Mobile Apps & Softphones: Android, iPhone, PC and Tablets
Conferencing Calling: Up to 25 participants
Fax: Send and receive Internet Fax
Standard & Advanced Features: Add link here to table of standard/advanced
RingCentral's premier edition is their most popular service offering as it spans the range of features at affordable prices. RingCentral's Office service is one of the most feature rich of all the service providers, and the premier addition lacks very little that even large companies would require from a cloud based PBX system. Indeed RingCentral's Office, Premier Edition, lacks only voicemail-to-text as an obvious omission from their otherwise comprehensive array of features. However, when comparing Office Premier Edition to competitors, it is important to realize that this is not just a cloud IP/PBX, with unlimited calling; it is as RingCentral are now claiming a Unified Communication as a Service (UCaaS) product as it delivers not just voice, but unified communications. RingCentral delivers this through not only voice, but also by incorporating video, chat, email, and social media channels. Furthermore, it has inbuilt collaboration tools, such as Skype like features such as the capability to share your desktop, and video conferencing, both of which enable online presentations, remote training or technical support.

In summary, RingCentral Premier Edition is their flagship product, which is feature rich and competitively priced. It has all the PBX and mobility features and applications you would expect, as well as integration with most popular CRM and business applications. As a result, Premier Edition is a true UCaaS product that delivers a lot more than just voice and these additional features do not come at a premium price but as part of the service.

**Category: Small Medium Enterprise (SME)**

<table>
<thead>
<tr>
<th>Ring Central</th>
<th>Enterprise Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pros &amp; Cons</td>
<td>Pros</td>
</tr>
<tr>
<td></td>
<td>• Best in class range of features</td>
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<td></td>
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<tr>
<td></td>
<td>• Voice Video conferencing</td>
</tr>
<tr>
<td></td>
<td>Cons</td>
</tr>
<tr>
<td>Service Plan Review</td>
<td>(place button or link here to short service plan review)</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Plan Price Per User</td>
<td>$44.99</td>
</tr>
<tr>
<td>Free minutes per line</td>
<td>unlimited</td>
</tr>
<tr>
<td>Toll Free minutes</td>
<td>10,000</td>
</tr>
<tr>
<td>Pay as you go options</td>
<td>N/A</td>
</tr>
<tr>
<td>Contract Terms</td>
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</tr>
<tr>
<td></td>
<td>Month to Month</td>
</tr>
<tr>
<td>Free Trial/Money Back Guarantee</td>
<td>No risk 30 day trial for up to 4 users</td>
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<tr>
<td>Phones Supported</td>
<td>All VoIP phones, BYOD</td>
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<tr>
<td>Phones Supplied</td>
<td>If required, RingCentral can supply Cisco, Polycot and Yealink handsets</td>
</tr>
<tr>
<td>Mobile Apps &amp; Softphones</td>
<td>Android, iPhone, PC and Tablets</td>
</tr>
<tr>
<td>Conferencing Calling</td>
<td>Up to 50 participants</td>
</tr>
<tr>
<td>Fax</td>
<td>Send and receive Internet Fax</td>
</tr>
<tr>
<td>Installation Fees</td>
<td>none</td>
</tr>
<tr>
<td>Additional Fees</td>
<td>Local taxes</td>
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<td>Cancellation Fees</td>
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<tr>
<td>Pre-sales Consultation Service</td>
<td>planning, designing and project management,</td>
</tr>
<tr>
<td>Installation Consultation Service</td>
<td>implementation project management, ongoing support, and consulting</td>
</tr>
<tr>
<td>Support Service</td>
<td>US based</td>
</tr>
<tr>
<td>Support Options</td>
<td>Email, phone, live-chat</td>
</tr>
<tr>
<td>Support Hours</td>
<td>24x7 - Office subscribers with 2 or more users. Otherwise 13x5 support.</td>
</tr>
<tr>
<td>Summary</td>
<td>Ring Central Premium is a feature rich virtual IP PBX service for businesses of all sizes.</td>
</tr>
<tr>
<td>Our Rating</td>
<td>⭐⭐⭐⭐⭐</td>
</tr>
</tbody>
</table>

**Office Enterprise Edition**

RingCentral’s Office Enterprise Edition is the top of the range offering and it offers value through scale rather than added features or functionality. For example, voice and video conferencing can scale to have 50 participants, and toll free calls are free for 10,000 minutes per month, this is an improvement on the Premier editions 25 participants for conferencing and 2,500 toll free minutes, although it comes at an additional ten dollars per seat per month.

An additional benefit of the Enterprise Edition is that voicemail-to-text is now incorporated as a standard feature, which is lacking in the Standard and Premier Editions. However, for SME’s the real benefits are the unified communication as a service tools (UCaaS) that come with Office Enterprise Edition. Business collaboration and teamwork apps such as Glip and audio/video conferencing, desktop sharing and the capability to manage multi-media channel communications, such as voice,
video, email, chat and social media, which are all tightly integrated as are the interfaces for third party business applications such as Salesforce, ZenDesk and many other CRM or business applications.

RingCentral’s Office service is one of, if not the most feature rich products on the market, and the Enterprise Edition is their service offering for large or small enterprises. As with all Ring Central Office editions, the Enterprise Edition comes with unlimited calling, and online call management and administration.