

VoIP small to medium business Implementation analysis.

Whitepaper Summary:

This paper will outline the hurdles, benefits, and costs associated with:

- 1.) Implementing a new VoIP telephone system for a small to medium business. (2-500 employees.)
- 2.) Migrating an existing PSTN phone system to a fully functional, feature rich VoIP telephone system.

What is Voice over IP (VoIP)?

This term refers to the many ways that voice conversations can be routed over a digital network (or any other IP based network, such as the Internet, your home network, or the larger network at your business.)

VoIP desktop phones function similarly to any other phone and at the most basic level provide standard features such as on-hold, caller-ID, and conference calling.

What is a Public Switched Telephone Network (PSTN)?

This term refers to the standard public telephone system. This system consists of the collection of all interconnected voice-oriented public networks. (Also known as "POTS" – Plain Old Telephone System.)

PSTN offers basic functionality to the public such as on-hold, and caller-ID.

What are the different ways VoIP can be implemented in a small to medium sized business?

Application Integration

Application integration the process by which a VoIP solution may be customized to integrate with a software system such as Microsoft Outlook or a Customer Relationship Management (CRM) title. Software can be modified to integrate and utilize the abilities of voice traffic. The complexity of these modification can vary; from simple 'click to talk' features to more advanced automated response, and even text to speech engines with a database backend.

Very few methods of application integration are applicable across multiple industries. Law and Medical offices have varying uses for this technology. Though a Law firm might utilize a VoIP based dictation system to streamline their documentation capabilities a manufacturing firm would be more likely to deploy an information dissemination system for their sales team.

< Insert table outlining the various market segments and how they use VoIP >

The marked improvements in productivity that are now offered by application integration may be considered a competitive advantage. However, these may quickly become the norm for various industries, requiring the use of further technical innovation to stay competitive. This concept is further outlined in 'IT doesn't matter', 2003, published by Harvard Business Review.

Enable True Telecommuting – include graph of telecommuting growth in the US

One of the greatest promises of VoIP is true seamless and affordable telecommuting.

Users with access to a phone or high speed internet connections will appear as though they are sitting at their desk. Coupled with a laptop, and a well designed and implemented soft-infrastructure, any user can have access to all files and information they would require to perform their job and the connectivity to their colleagues to get it done.

The implementation described in the previous paragraph is accessible with legacy equipment, however the cost has been prohibitive. Usually only accessible to Fortune 500 companies with substantial telecommunications budgets.

As a result of more accessible telecommuting technologies, the number of telecommuters is set to rise to forty million in 2005 <Gartner 2005>. Though workers have obvious advantages, including refuge from sky rocketing gas prices, companies are finding that telecommuters are more productive, and they are able to leverage a larger labor pool when filling their positions. A highly

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qualified PhD in the Midwest would cost a company significantly less than the same in New York City or Los Angeles.

Ease of management / cost of management

Traditional telephone systems require highly trained technicians to install and alter custom configurations. Companies find the need to call on the services of a specialist to implement simple tasks such as moving or adding a phone. Modules such as 'voicemail' and the additional lines are a part of a perpetual cycle of upgrades and modifications that make telephony support a very profitable business. The methodology used to implement PSTN business phones systems is well understood and the industry is very mature. Hence a company can make a purchase with the confidence that if they are installing a traditional system it will function and include an excellent support infrastructure.

IDC reports the number of VoIP ports shipped in 2005 will be equal to traditional analogue deployments. Not to be taken lightly, the average lifespan of a voice system range from 5-10 years. In 5-10 years, an analogue telephony system will be the exception as opposed to the telephony standard. Qualified technicians, whom are required to work on proprietary systems, will be difficult to come by. In addition, the prospect of telephony hardware manufacturers going out of business or the technology simply being replaced by a more agile and less costly alternative, are both risks that must be taken into account in a well informed decision.

Fortunately a company can take a few preventive steps to protect themselves from outdated systems. One such step is the use of open standards technologies that are backed by a number of companies and possibly trade groups as opposed to a single entity. In the VoIP space a good example is the Session Initiation Protocol, SIP. SIP is supported by the large majority of vendors; and is considered the industry standard protocol for VoIP. Beyond analogue lines that terminate from an ISP, the traditional telephony market does not have much interoperability. For example it is not be easy to integrate an Avaya PBX with a Nortel PBX.

Hidden costs can be substantial in any technology deployment. The downtime experienced with buggy or poorly implemented technology, in addition to the cost of qualified consultants to remedy such a situation, can quickly grow beyond the cost benefit incurred by using the technology in the first place. By integrating a VoIP deployment into an existing network the burden of maintenance and upgrading can be shifted to the Information Technology group. The knowledge necessary to run a VoIP implementation generally overlaps with basic networking skill sets. There is a learning curve whose length is dependant on the specific implementation used.

Scalability

There is a very well established method for telephony infrastructure growth in the existing marketplace. Simply add more modules and more equipment, and complete replacements at certain intervals (25 employees, 50 employees, etc. etc.). Though expensive, there is massive precedent; this is the way things have been done for a long time.

VoIP deployments however tend to be more flexible. Beyond the upgrading of an existing server, or the purchase of a more powerful one the base software is generally scalable enough to handle anywhere from 2 to 250 users, in increments of 1 if necessary. The concern however shifts from the PBX to the network infrastructure.

It is critical that the network on the LAN and WAN be well designed with low latency and high bandwidth. This is relatively simple to achieve on a closed LAN, sometimes complicated by complex security installations, but challenging on the WAN side. Proper and thorough testing for latency, dropped packets and throughput is mandatory.

The VoIP sector has achieved a level of maturity and many would argue has passed the tipping point for mass adoption. Most major Internet Service Providers (ISP) have VoIP initiatives of their own and have developed their core infrastructures with the ability to handle large volumes of voice traffic.

The consensus in the technology industry is that VoIP facilitates quicker and more robust scalability, specifically when deploying across open standards technology when compared to traditional solutions. There is a substantial 'diseconomies of scale' effect when growing beyond 500 users with either technology.

Converged infrastructure

By consolidating two separate networks (one for voice and one for data) into one network for both types of traffic, VoIP proponents argue that network management costs reduce significantly. However, this is not as straightforward as it may appear.

We will address the umbrella of Converged Infrastructure by breaking it into three components wiring, monitoring, and scaling.

Wiring is a substantial cost. It is much less expensive to wire a single line to a port as opposed to two lines of different technologies. Most IP phones have the ability to act as switches so the computer at that desk can gain access to the network via the IP phone. However it is often desirable to maintain two separate IP networks so that the downtime and security needed for one does not affect the

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other. For example, a virus which generates large volumes of traffic on your data network could paralyze the voice side as well if the network architect did not utilize Quality of Service (QOS) when designing the system.

In addition if the VoIP implementation requires power to be pushed out over the network so that the phones still works in the event of a power outage, not all devices are able to support this feature.

IP over a standard data 10/100 network enables some functionality on its own, such as being able to move a user by simply unplugging their phone and putting it in a different part of the office (in most deployments). This is not the case with traditional equipment which generally requires that the PBX be re-configured.

Monitoring the network to maintain voice quality and to keep security concerns at bay is essential for stability. A voice quality test using any number of software packages in addition to constant security probes and best business practice development is necessary.

As a company and it's network begins to gain a level of complexity and size, many difficulties can arise in guaranteeing voice quality across multiple disparate networks and time zones. The best way to avoid potential issues is to get the advice of a qualified engineer prior to development of the strategy. Fortunately most installations can be remedied by adding more capable routers / firewalls / wan interfaces.

Wiring for a traditional deployment is usually straight forward, there is rarely a need to involve a firewall or other security equipment and generally remote connectivity is handled by the Service Provider.

Cost analysis

Our analysis shows that VoIP deployments are approximately equivalent in initial installation / material costs when compared to traditional telephony systems. However management and usage expenditures are dramatically lowered when using VoIP.

Though many Internet Telephony Service Providers offer very aggressive rates we have found that the current quality is inadequate for most business deployments. During testing we experienced multiple instances of dropped calls, poor call quality and disruptions to service regardless of the vendor providing service or the hardware used to connect to the vendor.

Though there were some offerings that performed better than others in our environment, we were unable to determine whether this was a result of their networks proximity or a true competitive advantage.

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Most analysts anticipate call quality of Internet based traffic to improve significantly over the course of the next two to three years. This will result in a dramatic decrease in residual telephony costs.

When deploying across a trusted network, or when a guaranteed minimum bandwidth and latency can be offered systems across the WAN are viable using today's technology. These systems are generally deployed when a company requires multiple branch offices to be interfaced with headquarters. Because both ends of this connection are owned by the customer, the cost for unlimited calls between the two nodes will not exceed the cost of the net connection on either end. This is a significant benefit over traditional installations which required dedicated lines in both locations.

Beyond monthly usage rates which in the model we have suggested would be equivalent through either a VoIP or traditional deployment the next largest cost is service and support of the system. Our research shows that VoIP deployments are less expensive to maintain and scale. The amount that the price deviates is largely decided by the complexity of the installation and the availability of trained labor.

If a company requires a more customized solution than vendors offer, the clear winner for ease of implementation and capital needed to develop the software is VoIP. Projects that would have cost easily into the hundreds of thousands of dollars with traditional PBX systems can now be delivered for tens of thousands. For example a system which queries a proprietary database for information on current status of a shipment, or the progress of a manufactured good and replays that data via a text to speech engine. Previously this would be either handled by a full time employee or a large scale installation which would require a team of highly skilled consultants to implement. With the advent of easily accessible Application Programming Interfaces (API) for most of the major VoIP PBX deployments, the project can be handled by a single developer using industry standard software development tools.

Conclusion

Though the full promise of VoIP connectivity has not yet been delivered by the technology industry, the available implementations are now more competitive than their traditional telephony counterparts. VoIP accomplishes all of the features that have become common place and offers a level of future-proofing.

In addition the maintenance and expansion options are financially more attractive with VoIP deployments. The initial installation and purchase price are comparable.

VoIP is not a tried and tested technology, there is a concern that a poorly designed system even if using a standard telephony trunk such as a T1 to

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interface with the Plain Old Telephone System, POTS, may fail or provide inadequate service. This is not a concern with traditional systems which usually guarantee reliable service. A company should consider the choice of business partner when deploying VoIP very carefully.

Our experience has shown that across the available vendor solutions the single factor that most consistently determines the success of a project is the caliber of engineer(s) implementing the VoIP solution.

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