

**Business Grade Internet Phone Service Must Be Done a Different Way**  
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Currently, Small to Midsized Businesses (SMB) use the legacy Public Switched Telephone Network (PSTN) phone company for voice and fax services. Because of long standing government sanctioned monopolies these PSTN phone companies have had no incentives to operate efficiently or competitively. This has led to high cost and low innovation. High government taxation at all levels has further added to the large expense of traditional phone services.

Several years ago voice technology was adapted to run over a data stream and today this method of carrying voice traffic is commonly used across the digital cellular networks and even between major PSTN carriers. Larger enterprise organizations are now widely using a technology known as Voice over Internet Protocol (VoIP) to carry phone voice traffic across their internal wired and wireless networks.

In the last 5 years, broadband Internet access has become ubiquitous to almost all small and large businesses. Bandwidth continues to increase while the price for bandwidth continues to drop. In several markets, Verizon has started delivering 15Mb downstream and 5Mb upstream to homes and businesses for \$80 per month. With the cable companies, telephone companies and independent data providers competing for data subscribers this trend will continue. Because of government policies restricting taxing the Internet, the high taxes of normal phone line use are not a factor on the Internet.

These three factors taken together make an obvious opportunity to offer phone service over the Internet. The first market segment to adopt this new technology was the residential phone customer. Several companies including Vonage, Broadvoice, cable companies and even some traditional PSTN providers have been providing consumers lower cost phone service over the Internet. While consumers can surely benefit from this technology, there are still several barriers to applying the same opportunity to the small and midsize business marketplace.

The first of these barriers is the sophistication expected in a business phone system. With extensions, call queues, ring groups, automated attendants, voicemail, call conferencing and dozens of other features, business phone service has traditionally required an expensive PBX system from companies like Cisco or Avaya. These systems often cost at least \$15,000 and when installed the total cost of a business PBX solution is often 3 times that amount.

This has left this expanded set of business phone capabilities out of the reach of smaller businesses and put a financial strain on the midsized businesses that can barely afford them. Beyond the cost, complexity of the implementation requires hours of consultant time and a resident IT technician to keep everything running.

There are several startup offering PC based VoIP phones systems but none of these companies has built there own Business Grade Phone Service so they rely on third party consumer based VoIP services for connectivity. The first problem you run into is that a PC is not an appropriate piece of equipment to be used as a phone system. PCs have hard disks and fans which are mechanical and are single points of failure. The larger issues are that you end up with a patchwork integration project offering only the features that both companies developed independently that happen to work together.

The biggest problem with this approach is that the consumer grade VoIP services also lack the quality, reliability, monitoring and 24x7x365 service desk operation that businesses expect for their mission critical communications. Having two vendors in the picture turns the solution into a complex science project and if things are not working finger pointing often occurs rather than problem solving. This is so much the case that many of the manufacturers of these PC based phone system disclaim or even refrain from recommending the use of VoIP phone service unless you outlay for an expensive T1 line.

In contrast, we have also seen several VoIP companies start up with what we term the hosted model. This approach tries to avoid the costly PBX at the customer site by running the call routing and switching software in a centralized Network Operation Center (NOC). This centralized approach seems a good idea until you begin to see the pitfalls of the architecture. The most obvious is that all calls get routed through the NOC even if they are meant to stay inside the building. In most businesses there is in fact more call volume between people inside the business than between the inside and the outside. This cuts available calling bandwidth by 2/3 or more. In addition, there are serious quality and reliability issues that arise with the absence of a PBX on site. This problem is so severe that most of the hosted vendors insist that you purchase an expensive T1 with their solution and also charge a significant per seat charge on the use of the hosted BPX making it the most expensive of all possible outcomes.

Star2star takes a different approach than either of these two solutions. By being both the VoIP service provider and the VoIP phone system manufacturer, our end-to-end solution provides a low cost, easy to install, feature rich on-site PBX with powerful multi-site hosted capabilities. We provide a complete complement of business phone features with a locally installed PBX that costs much less than traditional PBX platforms. This is made possible with a combination of an open source PBX known as Asterisk in a carefully tuned architecture that can support hundreds of extensions on an extremely low powered solid state computer and a multi-million dollar investment in engineering our state of the art carrier grade data center.

The second barrier keeping VoIP from the SMB marketplace is call quality and reliability. Consumer grade VoIP can save consumer money but that consumer is much more willing to endure poor phone quality such as jitter, echo and complete interruptions of service than would a business.

In business, the phone is one of the main connections to revenue. No phone means no business. Poor quality can also lead to a loss of business. But, there are barriers to high quality. Some broadband Internet connections are less reliable than the old PSTN networks. Moreover, surges in network utilization from within the organization can drive down call quality. These are serious obstacles for any "business grade" VoIP offering.

To mitigate these problems, we have architected a solution that is more robust than the PSTN by leveraging smart quality management and failover techniques that are only possible with an end-to-end solution. By being able to control the call from both ends we offer the following capability:

- We monitor the network on the customer premise and throughout the entire call path until we reach the PSTN termination point. By measuring things such as latency, number of discarded packets and network utilization we can predict and track call quality throughout our entire Star2Star call path.

- We monitor the on-site PBX called the Starbox and all of our phones (Star Phones). We monitor all of our equipment in our Network Operation Center (NOC). We are able to anticipate or at least know immediately when call quality begins to degrade or a component becomes unavailable. With this information we can immediately notify the customer or, in the case of a total system failure at the customer site, even route calls directly to the user's cell phones, an alternate phone line or voice mail.
- Our solution provides an option for the customer to compensate for lack of a self powered network. By offering an optional UPS backup system with a Power Over Ethernet switch we can power the network, Star Box and all phones in the case of a power failure for a period of time.
- We implement Quality of Service (QOS) management on the customer's network and at the customer network's edge on the Star Box. Each phone will also provide QOS management for the PC data passing through it. This QOS management will guarantee the delivery of voice data before other data. This is important because even a small delay in a voice packet creates an annoying call experience. A slight delay in other data will generally never be noticed.
- We have determined optimal settings such as buffering to fill in if a packet shows up late. We have paid a premium for a special compression CODEC that uses minimal network bandwidth and at the same time provides smooth, high quality voice communications and interpolates missing data to improve call quality.
- Where it makes sense, we limit the distance the calls travel on the public Internet and use other techniques at our disposal to improve call quality.
- We only use premium PSTN termination Services from Level-3 and our own high quality local circuits and avoid cut rate companies with dubious quality standards.
- Our solution logs and tracks all system health factors which can be reviewed later to better understand what is happening on our network during problems.
- Our solution includes a service desk which is manned 24x7x365. This service desk has a web presence and a phone presence. The service desk is implemented along the lines of the ITIL standard for service desk best practices and will include: incident management (trouble tickets), problem management (incidents that collect together under one problem), knowledge management (Web based self help to find answers to common problems) and integration with the real time systems monitoring system described above to automatically open trouble tickets when a problem is sensed, possibly take automatic action to fix problems and automatically close tickets where a problem is detected as resolved. In addition, the service desk will be programmed to automatically notify and even escalate trouble tickets that meet criteria for severity and length of trouble. Report will be generated from the system to measure effectiveness.
- We standardize on specific hardware, do a pre-install network analysis, configure systems through an automated and well tested process, use standard networking settings, QA each device and system before shipping and follow an established set of best practices to minimize customer support complications. Our goal is to have the installation succeed in less than one day 95% of the time.

Our end-to-end approach gives Star2Star a very compelling service offering to the SMB marketplace but we realize that without adding additional value we will not have realized the full potential of this paradigm shift.

The way that people work has changed. We have a growing population of people that work from their homes. Almost all of us spend part of our work time at home and/or away from any land phone. The Internet, eMail and the information systems upon which we rely have all been revolutionized in the past ten years. Why would your phone which has now become another computing device sending data over the internet not take advantage of these other changes?

This is the obvious next step and we intend to lead the way. Rather than just replicate the kind of phone service that is already out there we intend to create an entirely new paradigm for communications through innovation and by continuing to sponsor and leverage the grassroots power of the open source community. Our end-to-end architecture becomes a powerful platform to build these new applications that will transform business communications into the very fabric of this new paradigm for working and collaborating that we find ourselves. We will combine the backend databases of your organization, CRM, Video Conferencing and the collaboration tools on your computer together to create an entire new realm of capability.

We have already implemented powerful new features such as the ability to dial from your computer and have it call both your phone and the outgoing number. Another unique feature is the ability to sense your local presence and reroute calls from your cell phone to your home and/or business landline automatically. These are just some of the examples that have already come out of this new ability to innovate business telephony solutions.

What we have done is revolutionary but it is just the beginning. We intend to lead the way to the next generation of integrated voice and data applications.