

OPEN SOURCE TELEPHONY



A Frost & Sullivan White Paper

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INTRODUCTION

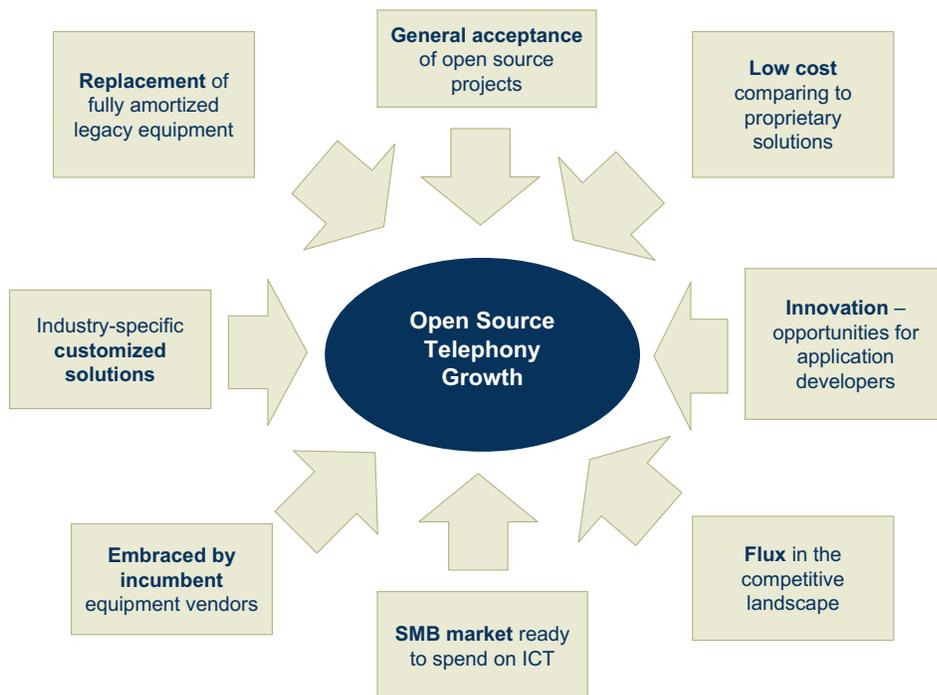
Open-source telephony is experiencing the positive impact of a combination of factors culminating in a perfect storm – the evolution of the telephony solution architecture, acceptance of other open-source projects, an uncertain economy and an unconquered SMB market segment. The opportunity for open-source solutions in general is huge and open-source telephony is becoming a significant competitor in the business telephony market.

Over the last year, one of the main factors indirectly promoting open-source telephony solutions and helping vendors in building recognition is the adoption and acceptance of other open-source projects such as Apache, Linux, JBoss, Eclipse, MySQL and others. As users get more comfortable with these projects, they also become more receptive to open-source telephony. While it has taken years for these projects to gain market trust, telephony solutions are able to take advantage of their reputation and fast-forward their own credibility-building phase.

Today, a growing number of business telephony deployments are already using open-source elements. For example, the next-generation telephony solutions that are being sold in the market are being deployed with open-source operating systems (OS). In fact, since 2004, Linux has been steadily replacing Windows as the OS in most of the new products rolled out by tier-I telephony vendors. The opportunity for open-source solutions in general is huge and this paper highlights the potential for open-source telephony to become a significant competitor in the business telephony market.

One of the characteristics of the open-source phenomena that are driving businesses to consider open-source telephony is the nature of the contributors. The open-source community of developers has tended to embrace the trends of Web 2.0, Web mashups and other advanced Web features. Web-based interfaces in these applications and in open-source telephony are providing a common development framework that ensures easy interoperability. This in turn has led to the integration of the Web-based technology into open-source telephony solutions. In this scenario assets can be allocated strictly to developing additional innovations as opposed to having to first ‘reinvent the wheel’.

The following chart brings together the key drivers for the business adoption of open-source telephony for the time period 2008 to 2014.

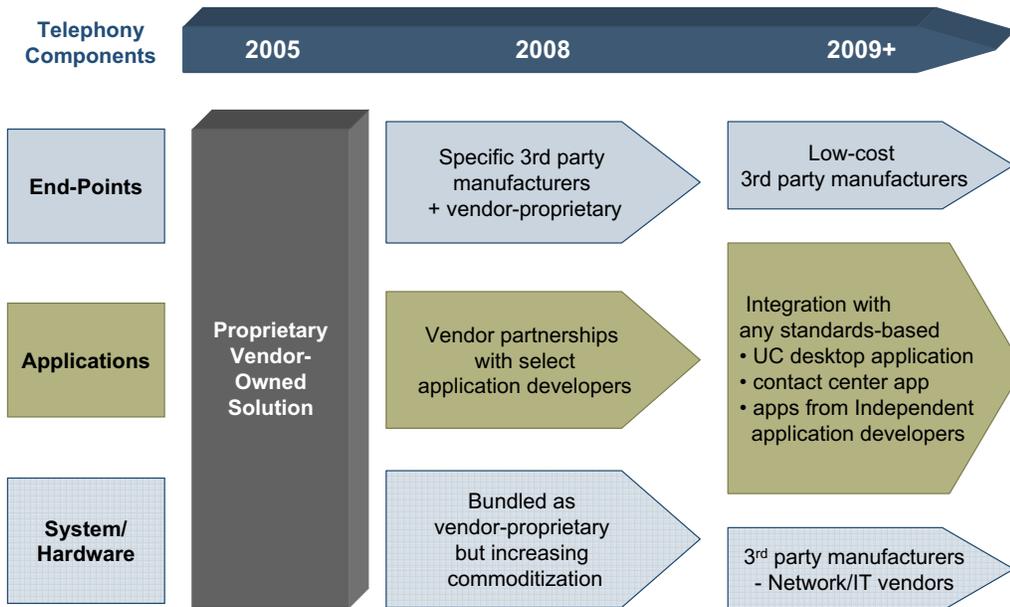


Source: Frost & Sullivan

The low cost of open-source solutions compared to proprietary solutions is of course the major driver. The difference can be between 30 and even 90 percent. The cost benefits are far greater in a call center environment and in those situations where the proportion of ‘professional services fee’ is higher.

Unbundling and usage of third-party equipment in mainstream business telephony is also one of the primary reasons for the acceptance and adoption of open-source telephony solutions. Right now, the market is already at a stage where telephony vendors are using 3rd-party components in the total solution. Many PBX vendors are enabling the integration of industry-standard servers, third-party media gateways and SIP phones.

The following chart provides a graphical representation of the evolution.



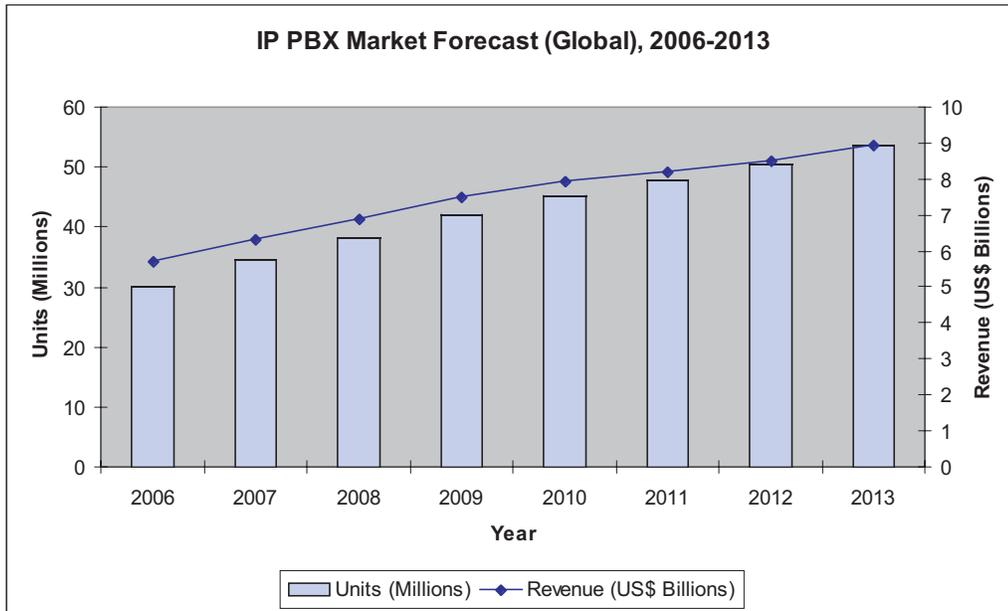
Source: Frost & Sullivan

This evolution reveals a couple of different issues. First, open-source telephony solutions embody a major trend in business telephony in general. Most open-source telephony software solutions are completely standards-based. They integrate with third-party PSTN hardware, can be deployed on industry standard servers, can be used with standards-based SIP phones and are capable of integrating with standards-based third-party applications. Accordingly, open-source telephony comes in at a time where it fits the natural progression of the communication market. Further, the standards-based nature of the components of open-source telephony allows it to interoperate with the rest of the infrastructure, providing a less risky proposition for customers. Finally, the distributed development model employed in open-source software results in rapid bug fixes, and thus a high degree of interoperability and reliability. With the core telephony platform becoming commoditized, resellers have to find a way to improve their profit margins through differentiating applications, services and support. Open-source telephony provides a way to do that.

MARKET OVERVIEW

The telephony market as a whole is in a state of consolidation and evolution. Throughout 2007, the market saw a spate of private equity buy-outs, mergers and acquisitions. In 2008, the combination of the economy and technology evolution is threatening to upset the long standing dominance of the traditional telephony vendors such as Avaya and Nortel and even IP-centric vendors such as Cisco. However, all this upheaval is not preventing the slow but steady migration of the market to IP telephony, which is based on triggers at the demand end – such as end of life of equipment or need for technologies that will save money in a tough economic situation.

The following chart shows Frost & Sullivan's global IP PBX system revenue and line shipment forecasts in the enterprise telephony market for the time period 2006 to 2013.

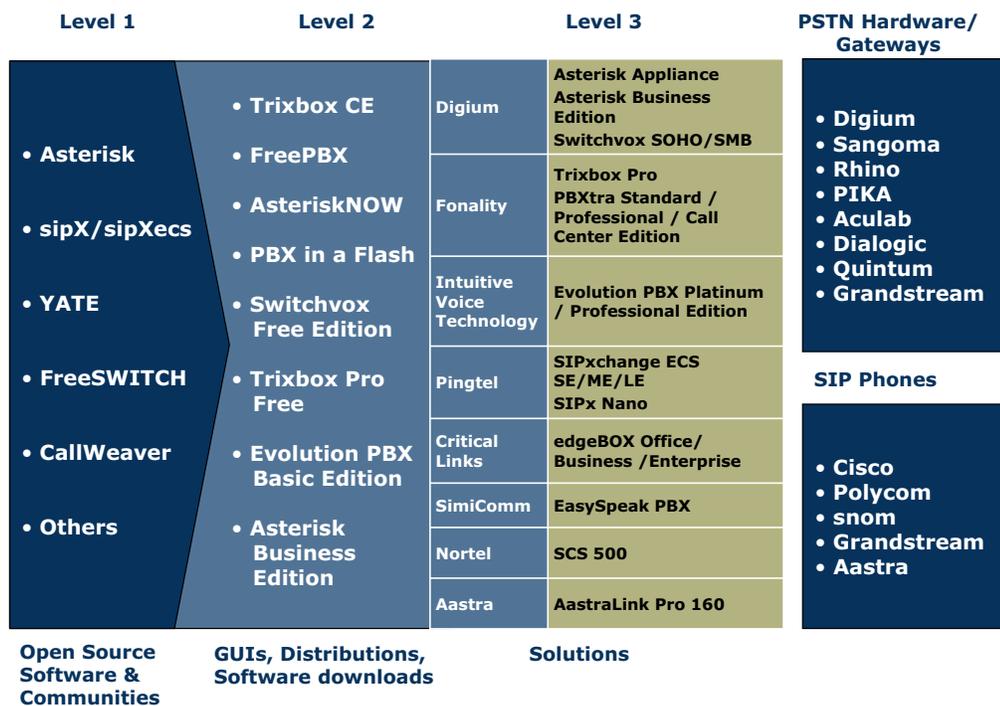


Source: Frost & Sullivan

The upheaval amongst telephony vendors is providing an opportunity for open-source telephony to enter the market; whether it is targeting traditional data resellers adding voice to their portfolio, abandoned resellers of a merged entity or dissatisfied resellers of a financially struggling company. Digium in particular is well positioned to take advantage of this upheaval with an appropriate product portfolio, unique business model, well-known brand name and the advantage of a community to perform its R&D. Open-source telephony-based solutions are very quickly proving their parity or in some cases, superiority to current-generation IP-based solutions, but without the high costs involved.

Paths to Market with Open-source Solutions

The chart below provides a Frost & Sullivan view of the open-source telephony ecosystem in the year 2008.



Source: Frost & Sullivan

It represents how the market has shaken out in the last year and what options are currently available in the market to businesses, resellers or vendors that want to leverage open-source telephony. At the first level is the core open-source telephony software supported by a community. At this level, users have full access to the source code itself and can directly manipulate this code to add new features or improve its performance.

At the second level of distributions, if partners do not have the skills or have a need to compile and build the PBX, they can choose to download pre-built and configured software packages in the form of a distribution, developed by a vendor or a community. Level 2 is a limited feature set packaging of OSs with no support. These packages can often be enhanced using open interfaces, allowing them to be combined with other software applications and customized to assemble a complete solution. Overall, these distributions are currently helping spread the adoption of open-source telephony through less technical IT resellers and telephony VARs who still want to add customization.

At the highest level is a set of complete solutions with a full feature set and support. Here, vendors have already done the job of compiling and installing and are selling plug-and-play PBX solutions. These solutions vary from software-based to turn-key PC-based and appliance-based ones. In the last year, many incumbent brand-name telephony vendors have

Frost & Sullivan

entered this market through OEM relationships or solutions of their own based on open-source software. This approach is largely gaining traction in the small and medium business market.

Level I - Open-source Telephony Software/Projects Lower Barrier to Entry

In the past, vendors wishing to enter the telephony market had to dedicate a large amount of R&D resources to the development of reliable and robust hardware and software. With telephony capabilities becoming a commodity, open-source telephony projects are helping newcomers focus on building value-added applications over the telephony platform rather than focus on building the platform itself. The success of this approach is seen in Nortel's adoption of the sipXecs code and acquisition of Pingtel and Aastra's adoption of Asterisk to create the AastraLink Pro 160. Currently, the platform with the most prominent mind share making inroads into the business telephony market is Asterisk.

Asterisk

The open-source telephony movement was largely propelled into fame by the Asterisk project. Asterisk is a software-based telephony application platform that can run on off-the-shelf hardware components. Asterisk was created by Mark Spencer in 1999 as a software-based alternative to the hardware-based TDM solutions that were then dominating the market. The project is sponsored and maintained by Digium, Inc which was founded by Spencer. When deployed as a telephony platform, it can provide VoIP and traditional PSTN connectivity, IVR, voicemail, call conferencing, call queue handling, and a large number of other call features. The software runs on Linux, BSD, MacOSX and Solaris. There are versions of Asterisk that can be compiled and run on Windows under Cygwin but Linux is the system upon which Asterisk has been developed and optimized. Asterisk is currently available under the GNU General Public License v2 and is available for download, free-of-charge.

Asterisk supports a wide range of IP telephony protocols including H.323, Session Initiation Protocol (SIP), Media Gateway Control Protocol (MGCP), Skinny Client Control Protocol (SCCP) and Nortel UNISTIM in addition to its native Inter-Asterisk eXchange2 (IAX2) protocol. Accordingly, this means that Asterisk can integrate with most incumbent proprietary IP phones in the market. Asterisk provides the option of its own protocol, IAX2, in addition to other standard protocols, to provide the benefits of transparent NAT traversal, encryption, and lower bandwidth consumption especially when compared to the SIP protocol. Asterisk also supports the Jingle protocol, which allows integration with XMPP/Jabber and connection with GoogleTalk.

For a VoIP-only deployment, Asterisk needs no additional hardware except for the server itself. However, Asterisk also connects to traditional analog and digital telephony equipment through hardware devices manufactured by Digium and a number of third-party vendors.

Digium also offers a regression-tested version of Asterisk that comes with a warranty and Digium support. Called the Asterisk Business Edition (ABE), this version of Asterisk is sold and distributed under a traditional commercial license. ABE is typically a version or two behind the open-source version. This is done in order to guarantee a highly-tested and bug-free performance with ABE. ABE comes pre-loaded with drivers for Digium hardware and can be purchased in incremental capacity of concurrent calls.

Other Popular Open-source Telephony Projects

While Asterisk began the open-source telephony revolution, there exist other open-source telephony platform projects in the market. One of these platforms is sipX/sipXecs a SIP-based telephony platform that runs on standard Linux, Windows and MAC systems and includes features found in a typical PBX. sipX is distributed under the Lesser General Public License (LGPL) and available for download, free-of-charge. sipX doesn't support analog FXO/FXS cards, i.e. PCI cards that connect the server directly to an analog line. Thus, the only way to connect to analog endpoints and to the traditional PSTN network is to deploy an external gateway that acts as a bridge between the phone network and the LAN.

Another open-source telephony platform is Yate, which stands for "Yet Another Telephony Engine". Yate can be compiled to run both on Windows and Linux. Apart from being used as a telephony platform or a VoIP server, in an enterprise, Yate can also be used as a VoIP client, a CTI bridge, a VoIP-to-PSTN gateway, a H.323-SIP proxy, a SIP router, a SIP registration server, an IAX server and/or client, a call center server or an IVR engine. Yate has been written in C++ and is licensed under the GPL.

CallWeaver, formerly known as OpenPBX, is yet another open-source PBX software project. Originally derived from Asterisk, CallWeaver is a full-featured PBX in software. CallWeaver can be deployed on a variety of platforms including Linux, MacOS X/Darwin, Open/Solaris, FreeBSD, NetBSD and OpenBSD.

The projects listed above do not have the same amount of traction or recognition in the business market as Asterisk. Open-source software is only as good as the community backing it and the activity level in the group because high activity level indicates constant feature introduction and debugging. Accordingly, Asterisk has the largest community and the most active one at that. By October 2008, Asterisk had claimed over 400 active contributors for the past 12 months and more than 56,000 people currently active on forums. Also, by October 2008, Asterisk had experienced around 4 million downloads with a 50 percent increase from 2007 to 2008.

Such traction has also allowed the emergence and growth of the "Digium|Asterisk Marketplace". The Marketplace gives the Asterisk community of end-users, integrators, developers, small businesses and enterprises a one-stop online destination for all their VoIP deployment needs. The technology partners in the Marketplace include vendors of certified hardware and software products solutions fully tested with Asterisk as well as certified SIP

trunking providers and authorized training partners. The Marketplace thus provides access to numerous technologies from which users and VARs can create solutions, including add-on's like speech-to-text, text-to-speech, and compression codecs to allow for bandwidth optimization.

Overall, Level 1 provides the core technologies from which users can create solutions. At this level, the user or integrator needs to have a fair amount of technical knowledge but can create highly differentiated end products and solutions. Currently this level is attracting highly technical IT resellers and in some cases PBX manufacturers themselves. Some of the more common applications using these core technologies include full service call centers and high volume call recording environments.

Level 2 - Open-Source Distributions and User Interfaces Aid Adoption

The community continues to add to the wide variety of graphical user interfaces and frequently develops these into customized distributions depending on the final function of the platform. For example, there exist distributions/interfaces that configure Asterisk as an IVR or as a call center solution or as a complete unified communications (UC) solution. By virtue of the fact that Asterisk currently dominates the open-source telephony market, the most popular distributions are mostly architected using Asterisk. Within Asterisk-based interfaces and distributions, currently the most prominent ones in the market are trixbox CE with FreePBX GUI and AsteriskNOW with AsteriskGUI and FreePBX GUI.

FreePBX is one of the most popular graphical Asterisk configuration interfaces and offers a full Web-based user interface for managing Asterisk. FreePBX is written in PHP, and connects to a local MySQL Database. Some of the features that FreePBX allows users to provision and manipulate include "Follow Me" functionality, and paging and intercom functionality for SIP and IAX phones that support it (e.g. Snom, Aastra, Grandstream, Fanstel, ADTRAN, etc.). The popular trixbox CE distribution package described next leverages the FreePBX GUI that has been recently forked from the main FreePBX project.

Formerly known as Asterisk@Home, then as trixbox, and now as trixbox CE, this distribution makes it fast and simple to install and configure a business-class telephony system that is based on the Asterisk PBX software along with surrounding applications needed to support the business. Trixbox CE works as a turn-key, bootable .iso CD image that installs Asterisk, Linux, the forked FreePBX GUI, Apache, MySQL, and Perl/PHP/Python. trixbox also includes the AsteriskGUI as an optional component in the most recent distributions. Currently reputed to have one of the largest Asterisk-based communities, this is also one of the most popular distributions in the market. trixbox is currently being maintained and supported by Fonality after it took over the project in late 2006 and renamed it trixbox CE.

AsteriskNOW is an easy-to-install turnkey distribution of the complete Asterisk software introduced and promoted by Digium. It is a software package that includes a customized

version of Linux, Asterisk, the AsteriskGUI, and all other software needed to deploy an Asterisk system. Some of the key features of this distribution include ease of provisioning VoIP service providers and IP phones. Once installed, the distribution allows users to choose providers directly from the list available in the GUI and their solutions will be pre-configured for the installation. As of version 1.5 released during Astricon 2008, AsteriskNOW includes compatibility with FreePBX and CentOS. AsteriskNOW 2.0, planned for 2009, will also offer support for AsteriskGUI and offer commercial subscriptions for Asterisk support for the first time. Several popular Linux distributions will be supported as well, which will in turn allow differentiation by resellers and integrators as well as personalization by users.

Overall, at Level 2, the user interfaces and distributions are free and frequently make it easier than the solutions at Level 1 for vendors and channel partners to bring solutions to market. Beside the open-source distributions, many vendors offer free downloads of their complete solutions with limited capabilities. These include Switchvox Free edition, Trixbox Pro free edition and Evolution PBX free edition. This is encouraging both less technically savvy end users and resellers to test the products before they download or buy them. The list of distributions is continuing to grow, with each one trying to establish a unique value proposition or solve a challenge that exists with one of the current popular distributions.

Level 3 – Complete Solutions and Turn-key Appliances

Many of the solutions described in this section are currently gaining traction in the market partly due to feature sets and partly due to innovative marketing and channel strategies employed by the vendor providing the solution. Frost & Sullivan points out that, in spite of the use of the same open-source software code to produce complete turn-key solutions, the final products are relatively varied. There are significant differences among vendors and platforms in terms of feature sets designed to cater to specific market sizes and specific verticals. Because most of these solutions are for the SMB market and users rarely try to manipulate the underlying code, in the end, some of the turn-key solutions are functionally equivalent to the closed boxes from proprietary vendors and compete with them for the same target markets.

The following chart shows the commercial competitive structure of the open-source telephony market in 2008.

Commercial Open-source Telephony Market Competitive Structure (2008)

Types of Competitors	Vendors with their own open source software or distribution software communities
	New entrants - telephony system vendors that use the open source code to develop commercial products
	Incumbent telephony vendors that are OEMs or are leveraging open source software
	VARs that are leveraging open source software and creating customized telephony solutions
Distribution Structure	Mostly direct - use of online retailers and own websites for sales, lead generation and marketing
	Increasing focus on indirect channels and tiered distribution partners - system integrators, IT VARs, telephony VARs and Tier 2 and 3 service providers
	OEM relationships
Key End-user Groups	Education vertical - universities
	Small and medium businesses
	Small call centers
Competitive Factors	Price
	Support for installation, management and maintenance
	Value-added applications
	Ability to customize

Source: Frost & Sullivan

Digium is the leading provider of complete solutions based on open-source telephony. Currently most well known as the sponsor, maintainer and owner of rights to Asterisk, Digium is a private company headquartered in Huntsville, Alabama. The company's dedication to the Asterisk project is demonstrated by the fact that close to 50 percent of its resources and efforts are spent in supporting the Asterisk project and its ecosystem. The company has expanded over the last few years to over 150 people and an additional office in San Diego. As of October 2008, Digium has experienced 27 consecutive quarters of profitable growth. The company is rapidly gaining mindshare in the business telephony market.

Digium's business objective can be summarized as 'All things Asterisk'. In executing upon that strategy Digium supplies a broad range of offerings from complete turn-key IP PBX systems to a series of components that systems integrators can use to design and deliver custom Asterisk-based communications solutions. Today these components include traditional telephony interface hardware necessary to connect Asterisk-based systems to the Public Switched Telephone System, appliances tailored to run the various implementations of Asterisk, as well as support and training services. It is also important to note that Digium is unique in their ability to be able to supply commercially licensed versions of Asterisk to application developers.

Digium's Switchvox family of turn-key IP PBXs offers end-users the benefits of Asterisk, packaged as easy-to-use phone systems specifically tailored for the needs of small and

medium sized businesses. This family of products is sold and supported through Digium's global network of value added resellers.

Based on the commercial version of Asterisk, Switchvox is available in a SOHO and SMB version. The SMB version offers some features such as the Switchboard, a real time, web-based call control application with integrated panels for SugarCRM, Salesforce.com and Google Maps, and Meet-Me conferencing that are not available for the Switchvox SOHO platform. Switchvox SOHO customers who want the additional features can migrate from a SOHO to a SMB platform with a simple single click software upgrade. As of version 3.5 of Switchvox SMB, Digium has introduced features that companies require for larger deployments such as automatic phone detection and configuration, enhanced administration features and Switchboard features that improve ease of use for end users.

Digium also offers an appliance called the AA50 that is ideal for application builders looking for a starting point to create custom telephony solutions. Digium has multiple OEMs for this smaller solid state appliance and currently offers voice prompts in 3 languages – English, Spanish, and French.

The following chart provides a snapshot of Digium products offered in 2008.

Digium Inc.	Asterisk Business Edition (commercially licensed software only)
	AA50 Asterisk Appliance (embedded Asterisk Business Edition)
	Switchvox Free (Software Only)
	Switchvox SOHO (Software or on AA60 appliance)
	Switchvox SMB (Software or on AA60, AA300, and AA350 Appliances)

Source: Frost & Sullivan, Digium

MARKET AND TECHNOLOGY TRENDS

Appliance-based Solutions Gather Steam

Multiple vendors are now introducing hardened appliance-based solutions for the SMB market, both in the proprietary IP PBX market and in the open-source telephony market. One of the main reasons for the appearance of appliance-based solutions is the ease of implementation and management of such solutions. In the open-source telephony market, this is even more compelling as vendors are frequently faced with limited or lacking IT/Telecom expertise at the customer end.

From a vendor perspective, the free nature of open-source software is allowing new vendors to enter the market with innovative appliances without having to duplicate the effort needed to create the telephony application. Accordingly, appliances range from those

performing just telephony/call control functions to all-in-one multiservice business gateways that bundle voice, data and sometimes wireless functionality into one device.

Most of the popular open-source solution vendors now offer appliance-based turn-key telephony solutions. For instance Digium has multiple appliances running different Asterisk software distributions that cater to the varied capacity and feature requirements of business. The AA50 has the embedded and optimized Asterisk Business Edition software and the AA60, AA300 and AA350 run Switchvox software.

All-in-one multi-service business gateways that bundle voice, data and sometimes wireless functionality provide the advantage of a single management interface/single GUI for the voice and data infrastructure, single security solution and a single point of accountability from a vendor for both voice and data. On the proprietary side, solutions such as those from Samsung, Cisco, Vertical, ADTRAN, GrandStream and AT&T are examples of multi-service business gateways introduced in 2007 and 2008.

In the open-source market, vendors such as Critical Links are leveraging software like Asterisk to bring to market multi-service business gateway appliances. A solution such as Critical Links's Edgebox leverages Asterisk to replace multiple single-function devices, such as a router, security appliance, network access server, file, web, and email servers, VoIP gateway and Wi-Fi access point, with one device. As an open-source solution, Critical Links is coming to the market with a very competitive price of \$50 to \$70 per user without the phone, and the added value proposition of cost savings on the other devices such as the router and the Wi-Fi access point. These types of solutions are beginning to attract the attention of Tier 2 and Tier 3 service providers that want to improve their total solution offering and/or compete with vendors like AT&T that are already offering similar solutions.

A primary challenge that exists with such multi-service business gateways is the overkill in capabilities that the product offers if the business does not need all of the included functionality. An additional challenge is that traditional North American telephony VARs typically do not have the data background and skill set needed for the implementation of such solutions. Many a proprietary vendor have changed strategies or shelved products due to these challenges and the same danger lies ahead for vendors leveraging open-source telephony software to manufacture such devices.

Open-source Telephony Serves as a Platform for Creating Innovative Applications

Innovation typically flows from the large enterprise segment into the small business segment. Companies such as Microsoft, IBM, Cisco and Avaya are currently introducing and popularizing UC, Web 2.0 and enterprise mash-ups in the medium and large enterprise segment. Open-source telephony could change that paradigm and allow small businesses to more rapidly experience all the benefits of IP telephony. One of the primary benefits of open-source telephony is the ability for entities with IT application expertise to focus on

creating value-added applications on top of the telephony platform rather than developing the core telephony platform itself. Essentially, this is similar to creating a large-scale Avaya DevConnect or similar developer community offered by the incumbent telephony providers. For example, open-source creates opportunities for application developers who focus not only on new features but also on integration of telephony with other business applications. This in turn allows for much quicker than normal development processes which in turn generates a greater volume of innovation.

Many of the turn-key solutions mentioned before are striving to bring to market specific applications that can solve business challenges. Switchvox, now part of Digium, uses Web services to offer a mash-up application by the name of Switchboard. Here, Switchvox mashes together the PBX functions, presence, agent functions, CRM software, and any other web application. So with incoming calls, users will see pop-ups with information from CRM systems (such as Salesforce.com and SugarCRM), along with information from Google Maps which tells the user where the call is coming from, and custom mashup panels that display any relevant information for your employees. Other web services available in Switchvox enable functionality where the ACD placed on the same platform can route the call to a branch nearest the caller and the caller will receive localized service. These web applications delivering targeted solutions using screen panels and popups is enabling outstanding customer service and great user experience in vertical markets.

The following chart shows a snapshot of the Switchvox Switchboard.



Source: Digium/Switchvox, Frost & Sullivan

OPEN-SOURCE TELEPHONY USER CHARACTERISTICS

Incumbent Telecom Equipment Vendors and Resellers

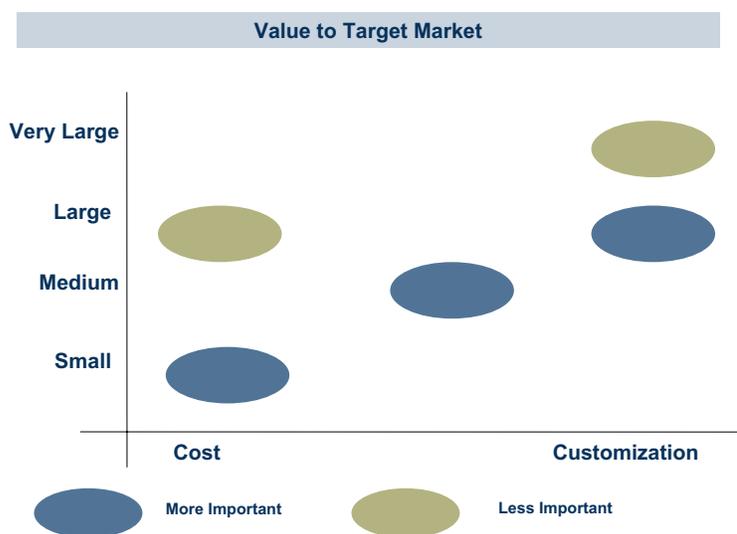
Incumbent vendors that already have closed-source solutions are leveraging the accelerating innovation that's happening in the open-source community to reduce their development cost and time to market. Incumbent telephony vendors are not the only vendors leveraging open-source telephony software. Aspect Software uses Asterisk to target the price-sensitive mid-market segment with a very price-competitive bundle of Asterisk with its Unified IP contact center software. Indosoft has leveraged Asterisk to come to market with a low-cost highly customizable audio conferencing bridge. Dell is now reselling Nortel SCS and Fonality's Asterisk-based PBXtra solutions for its SMB customers.

For resellers, the main driver for adding open-source telephony to their portfolio is quite frequently dissatisfaction with their current vendor. Either the margins are not good, or the innovation is not fast enough or the vendors' support and maintenance structure is not flexible enough. Of course, it also helps that open-source telecom products can offer anywhere from 20 to 50 percent product margin, which is far higher than the 10 percent range commonly seen in proprietary offerings. Services revenue can often be double that generated from traditional deployments. These services fetch pricing premiums, consulting fees and support contracts from customers.

Customers of Open-source Telephony

For the customer, dissatisfaction with traditional telephony systems is the strongest driver. Customers do not specifically look for open-source but rather seek a solution to meet their needs.

The following chart shows the open-source telephony target market in 2008 - what types of customers are looking at open-source telephony and why.



Source: Frost & Sullivan

For large and very large corporate businesses, cost savings from deploying open-source telephony is not the biggest driver. Open-source telephony needs to deliver something over and beyond what the very robust telephony solutions of today deliver in order for large businesses to consider deploying it. This could be a bridge to an older technology, the ability for extreme customization or the need to leverage the innovation in the community. For example, large enterprises can use their IT expertise to customize open-source-based telephony features to integrate with their existing business processes. This improves productivity and lowers costs to the enterprise. At this level, the business is mostly using the freely available open-source software code – unfettered but also unmonitored.

Universities have been great examples of large deployments of true open-source telephony software. In fact, the expectation is that more than 70,000 lines will be deployed across high-ed campuses in the U.S. The reason is that they typically don't fit the structure of corporate organizations. They usually do not have a single unified Active Directory, for example, and typically have multiple campuses with different migration timelines, and they often need customizations not found in off the shelf communication systems. Also, in most cases they have human resources to throw at an open-source project and are typically looking for the almost \$0 product cost associated with open-source telephony. State and local government organizations are other verticals, where usage of open-source is being encouraged. Finally, the technology vertical, that has in-house technical resources to handle deployments and non-profit organizations seem to be also looking for open-source software.

The mid-size segment of roughly 100 to 500 users is truly heralding the stage where telephony becomes a commodity. Such businesses are using open-source telephony to gain other benefits. At this level, the entity is typically using freely available open-source software with a certain degree of customization or in Asterisk's case, the Asterisk Business Edition – still open-source, still customizable, but with some degree of quality control and vendor support.

At the lower end, the driver is mostly cost. Because of the virtue of the closed-box approach that vendors have taken and also because this business segment seldom meddles with the telephony solution, customization at that level is not as important. As we go lower into the packaged solutions based on open-source, adoption trends across all verticals are somewhat uniform.

FORWARD LOOKING CONCLUSIONS

Open-source telephony directly competes with existing proprietary vendors that have well-established market positions, installed bases, brand image, strong distribution networks and solid relationships with customers. The SMB market appears to be the low-hanging fruit for open-source telephony, and is also currently the target of most proprietary vendors as well.

Open-source telephony vendors suffer from low brand awareness and the messaging of open-source telephony success stories is muted as most of these vendors rely on word of mouth advertising to build market awareness and acceptance. This low awareness is magnified by the market perception that open-source telephony doesn't deliver the desired feature robustness and reliability of enterprise communication equipment. In fact, IP telephony as a whole is only slowly overcoming this perception. There seem to be multiple successful deployments of open-source telephony software or instances where it has been incorporated into commercial products, which have not been brought to light.

As with other emerging technologies, there is an increased risk of any particular company that supports the technology going out of business. However, in the case of open-source telephony, the underlying code is being worked on by a community so the business can find others to support the system. Also, with providers such as Digium providing training and certifications, businesses can find professional VARs and system integrators to support their systems – not just geeks working from their garages.

Vendors in the open-source market have to be very careful about running a business while not affecting the open-source sensibilities of the community. Accordingly, they have to come up with some innovative business models to compete. One example of this is Digium's acquisition of Switchvox. To stay true to the nature of open-source, Digium decided to contribute a number of enhancements that Switchvox had made back into the open-source version of Asterisk and leverage those enhancements by using the Asterisk Business Edition within the Switchvox solutions. In the process, Digium is securing the long-term prospects of the Switchvox solution as it now receives the benefit of leveraging the constant development of Asterisk by the community.

Open-source telephony solutions have immediate short-term adoption potential in the North American SMB market, both due to the new solutions/vendors in the market, as well as the incumbent telephony vendors targeting the SMB market with such solutions. Open-source telephony technology is looking very attractive to SMB-facing IT channels. These companies provide either hosted applications like email, or website hosting or IT services and already have an opening into the customer. An open-source telephony solution that leverages their existing expertise is a no-brainer for them. Further, partnerships such as the Digium-Skype integration that enable the installed base of Asterisk users to acquire low cost trunking are providing additional value to the starving SMB market.

Meanwhile, in the enterprise space, the challenge of a policy against open-source is quickly going away with the push from other open-source technologies forcing enterprises to open their doors. The next-generation telephony solutions that are being sold in the market are

being deployed on servers that are using open-source operating systems (OSs). Since 2004, Linux has replaced Windows in most of the new products rolled out and most tier-1 telephony vendors' flagship products run on open-source OS with Linux ranking highest on choice. The opportunity for open-source solutions in general in the enterprise is huge.

Overall, Frost & Sullivan believes that the wave of next-generation communication technologies including Web 2.0, social networking and mash-ups are going to heavily incorporate open-source elements. Considering that telephony has to interface with such technologies, telephony will either take the open-source route or become standards-based and open enough to allow easy integration.

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