

IP Telephony

Private Branch Exchange(PBX)

vs. VoIP

Billy Short

Abstract

Internet Protocol telephony (frequently referred to as IP telephony) is an important concept in enterprise communications technology. IP telephony refers to all real-time applications over IP, which include many different instant messaging programs, video-conferencing, fax services, and Voice over Internet Protocol (VoIP). This document will focus mostly on the VoIP aspect of IP telephony. Most large companies and corporations already have an established IP telephony system implemented, but we are seeing more and more small to medium sized companies turning from analog telephone systems to more advanced digital telephone systems such as IP telephony. There are many driving factors that must be taken into consideration as companies decide to upgrade older phone systems to newer network IP-based systems. The main purpose of this document is to identify and explain these driving factors of implementing IP telephony, as well as focus on the history and future of IP telephony. As with any technology, there are advantages and disadvantages of deploying this type of infrastructure upgrade. These

advantages and disadvantages will be discussed in depth, as well as real world examples of how IP telephony may be utilized for exceptional communications internally and externally for any company. This document will also include an application called Skype for Business 2015, which was formerly Lync by Microsoft. Skype for Business may be deployed to work in conjunction with IP devices in order to fully implement IP telephony. Some of these devices may include wireless network IP phones, network phones, and group conferencing devices, all of which may utilize IP telephony. Throughout this document, we will discuss the beginning stages of the decisions around implementing IP telephony, the actual implementation, and real world examples of how IP telephony will be beneficial for corporations of all sizes.

Introduction

Internet Protocol telephony (frequently referred to as IP telephony) is an important concept in enterprise communications technology. IP telephony refers to all real-time applications over IP, which include many different instant messaging programs, video-conferencing, fax services, and Voice over Internet Protocol (VoIP). This document will focus mostly on the VoIP aspect of IP telephony. Most large companies and corporations already have an established IP telephony system implemented, but we are seeing more and more small to medium sized companies turning from analog telephone systems to more advanced digital telephone systems such as IP

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IP Telephony

IP Telephony is the use of the Internet to carry voice communications, thus bypassing expensive telephone company charges (Oxford Reference). The most common method of IP telephony is via Voice over Internet Protocol (VoIP). Businesses of all sizes

use some sort of telephony, whether it is an analog based system or a IP or network based system. IP or network based systems are also referred to as digital systems. There are many advantages of implementing a network based telephony system in comparison to keeping and maintaining an analog telephone system. Some of the advantages include decreased costs to businesses and enterprises. Decreased costs may be due to single cable lines paired with backbone infrastructure that supports both voice and data communications. Less telephone lines will also be needed, overall diminishing telephone service providers because networks will route these calls instead. Long distance savings may also be factored into cost saving benefits. Global enterprises may take advantage of much cheaper international phone calls by using a VoIP based type of communications instead of being charged traditional telephone service long distance charges. Telephony systems also allow for increased user mobility. Due to IP phones being linked to networks, users may change or move locations, but only need a network connection instead of needing physical line installations by telephone service providers. Service options are increased in an IP telephony environment. Architectures are considered open, so users may use their own preference in devices that they may want. Unified services such as voice mail, accessing email accounts, and voice mail are accessible via seamless interfaces. Users may also take advantage of the fact that IP telephony is network based, which commonly communicates with other domain servers, providing users quick and easy access to corporate directories via IP phones (UFIT Telecommunications).

VoIP

Voice over Internet Protocol (VoIP) is a communications technology that carries telephone traffic over a data network (Khasnabish, Bhumi). Because VoIP uses IP, it can be sent globally to send and receive packets of data over the internet. VoIP technology converts sound into a digital signal that uses Internet Protocol to be transferred via networks to its destination. As long as the source and destination have networks to translate the sound, communications via VoIP may be used with a variety of end user devices which include IP phones, cell phones, and other VoIP applications such as Skype for Business (VoIP). According to many sources, VoIP will overtake analog telephony as the primary source of communication between clients and business partners in most mid to large sized corporations (Uys, L. (2007). VoIP).

Skype for Business

Skype for Business is an application by Microsoft that was created to deliver enterprise VoIP functionality. This includes hosting and attending meetings and collaborations with colleagues and business partners around the world (Rashid, F. Y). Skype for Business offers customers of all sizes competitive pricing and price packages that may be used for just about any enterprise applications and cover all enterprise needs. Enterprises may also choose whether to have on-site dedicated servers or cloud-based services. With Skype for Business, phone systems may easily be integrated with other commonly used Microsoft business applications such as Microsoft Exchange and SharePoint (Rashid, F. Y).

Problem Statement

Communication is a vital component of an enterprise's ability to work effectively, efficiently and achieve the mission of the company. More and more companies are transitioning from old analog phone systems to digital network phone systems. By switching from analog phone systems to newer digital phone systems, companies of all sizes will enjoy benefits, some of which include lower cost of communications, flexibility of digital communications, and increased functionality that digital systems may support that were not at all possible with analog systems.

Skype for Business 2015 is a widely used IP Telephony based application that many enterprises implement. Companies that do not have an IP telephony based phone system typically have an analog system called a Private Branch Exchange . PBX lines are private telephone networks that are within a company or organization. These lines are used to make external phone calls, faxes, and other forms of communication to destinations outside of the company's internal network (What Is A PBX..). VoIP is an IP Telephony based service that allows users in an organization to make voice calls using an existing internet connection ("Voice Over Internet Protocol"). The main purpose of this publication is to weigh in on whether small to mid-size companies should upgrade to a digital IP Telephony based phone system, or continue to utilize the analog PBX phone systems. What considerations should companies weigh before deciding to upgrade their phone infrastructure from an analog system to digital? An in-depth comparison of the costs in relation to returns on investments, total cost of implementation, maintenance and knowledge will also be discussed. Most large corporations already implement some form of IP telephony, but should

small and medium sized businesses also utilize this newer technology? This writing will help answer these questions.

Results

Methodology

The methodology behind this writing will largely be a comparison of traditional PBX phone systems and VoIP based phone systems. A cost analysis of each system, as well as what equipment is needed will be included. Each system has its own benefits, disadvantages and limitations. Each of those will be explored in the results section of this document. In most cases, references to total cost of ownership and implementation is based on replacing an older PBX phone system, but can be an accurate estimation for new corporations that are contemplating on whether to go with a traditional PBX phone system or a VoIP based phone system. Figure 1-1 shows a typical IP telephony based PBX system, which is completely separate from corporate local area networks. VoIP gateways separate VoIP devices such as fax lines and IP phones from the cloud-based PBX system ("What Is a PBX Phone System and How Does It Work?").

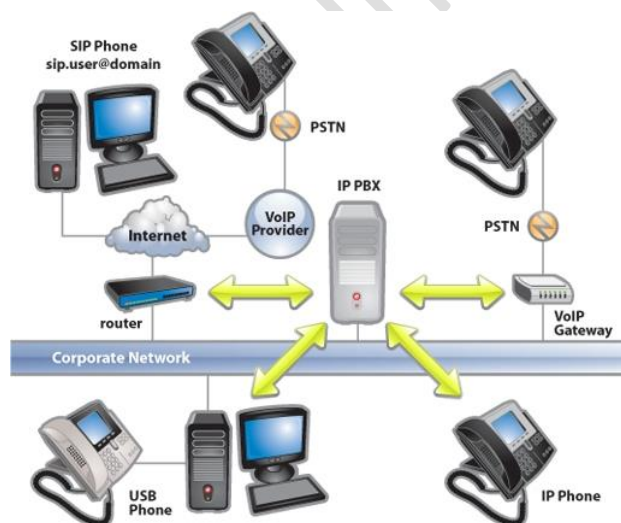


Figure 1-1

-Total cost of ownership

Cost of implementation is one of the largest factors that companies must weigh in deciding whether or not to upgrade their existing analog PBX systems. What are some of these costs of PBX systems as compared to IP telephony based VoIP systems? In order to get accurate information, it will be required to complete a cost analysis and total cost of ownership of an analog PBX system versus a digital VoIP system.

One of the largest cost factors is a result of equipment. PBX systems require equipment on-site. Much of the time, this equipment is decades old, so most PBX system parts are not made anymore. This results in high prices of replacement parts. In regards to VoIP, PBX's are located in the cloud. This means that customers do not have to worry about the cost of equipment if something fails.

Another aspect of cost differences between these two systems is the fact that on average, traditional PBX systems may cost upwards of \$500-\$900 per employee (How Much Should a New Business Phone System or IP PBX Cost?). For VoIP based phone systems, prices average from \$250-\$500 per employee. This can result in a significant amount savings for a company with a large amount of employees that utilize calling features.

Benefits

IP telephony based phone systems can be utilized in most organizations. There

are many benefits of a digital VoIP phone system over a PBX phone system. The biggest benefit of VoIP implementation is cost, which is explained in detail in the results section of this writing. Older PBX systems must have on-premise equipment, which takes up valuable space in server rooms or network cabinets (Khasnabish, Bhumip). Traditional PBX systems also typically have very outdated technology. If this equipment fails, customers struggle to find replacement parts for this system. If they do find these parts, they are typically expensive because these parts are not manufactured anymore.

With IP telephony based VoIP phone systems, customers sign up for virtual PBX subscriptions, which are cloud-based. Corporations purchase or lease DID (Direct Inward Dialing) number blocks ("DID"). These numbers will be used for routing purposes. Typically, DID's are mapped to user extensions, just as with a PBX system. With the usage of a server based application such as Skype for Business 2015, users assigned extensions are mapped through a company's domain, and these numbers are routed via Skype for Business to make internal and external phone calls. Because VoIP relies on a cloud-based PBX, customers do not need to house expensive and nearly obsolete equipment anymore. This also takes any equipment liability out of the customer's responsibility. These virtual PBX systems in reality are in data-centers, yet the customer may still be able to utilize the VoIP features.

Limitations and Disadvantages

Although there are many benefits to VoIP telephony implementation, there are some limitations and disadvantages of this technology over traditional PBX systems. Because VoIP, which stands

for Voice over Internet Protocol, is based on internet connectivity, quality is at the mercy of available bandwidth, latency, and other Internet Service Provider issues (Federal Communications Commission.). Internet connections must remain stable and constant in order for there to be no interference or disturbances in VoIP features such as voice calling, webinars, and video meetings. If a customer's internet service provider has any issues with latency or service downtime, the customer and it's VoIP calling will be affected.

On the other hand, traditional PBX systems are more reliable, mainly because they are constant. Traditional PBX systems do not require an internet connection, so they are not adversely affected by internet issues by internet service providers. Many older enterprises that still have PBX systems in place are systems that have been in operation for decades with no issues ("UFIT Telecommunications.").

Leading applications

Traditional PBX systems do not rely on anything but their hardwired connection to a local phone company. Equipment within an organization routes calls made by users to external numbers and this completes the call. PBX systems can be defined as hardware based phone systems.

Voice over Internet Protocol systems that are based on IP Telephony utilize server-based applications in order for users in an organization to make calls. An on-premise server such as Microsoft's Skype for Business 2015 is the leading application that companies use in conjunction with their IP based

phone systems. Figure 1-2 shows that Skype overall has increased its user base in the consumer and commercial sides.

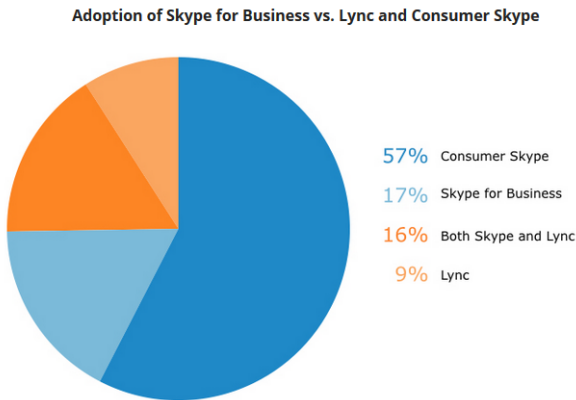


Figure 1-2

Integration

Although many companies have either a traditional PBX phone system or IP based phone system, some utilize both. Because of the superior reliability of traditional PBX systems, objectives that are mission critical may stay on the traditional PBX system, while other objectives are used by the IP based phone system. For example, many corporations use fax as a primary method of communications. Some companies do not accept electronic mail as an acceptable form of information transfer. Fax lines traditionally use PBX based phone systems to reach its destination. Also, some fire systems actually communicate via PBX lines. If an internet service provider was having issues with its internet service, fire communication lines could be cut. In an emergency, fire departments may not receive the signal for distress. For these types of communications that require an extremely reliable connection, PBX based systems are the answer. Many corporations have been using both PBX and VoIP for quite a

while successfully. Depending on company needs and mission goals, a combination of PBX and VoIP may be the answer for some companies.

Conclusion

Corporations will continue to explore more options when it comes to expanding usability and features with their existing phone system infrastructure. Whether a company has a traditional PBX phone system or an IP based phone system, companies must use the option that gives their users the most usability and features for the amount of money they are willing to spend. This is also based on a company's needs. As stated in the integration section, companies may use one system or another, and some companies actually utilize both VoIP and PBX based systems in order to maximize functionality for their corporations. This writing was meant to compare and contrast existing PBX systems and view costs of ownership and maintenance, and functionality between both systems.

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