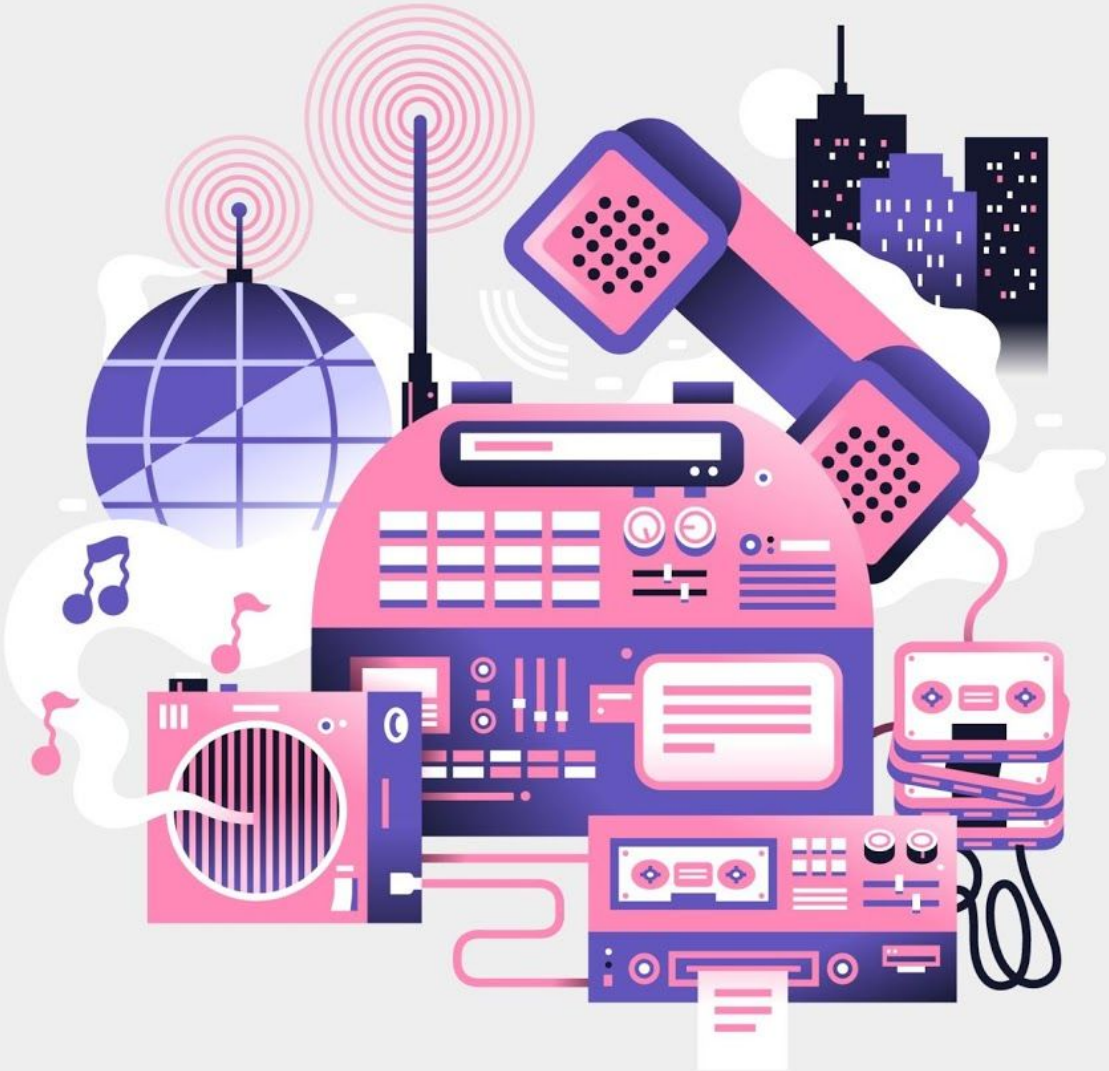
What Is VoIP

PBX



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Contents

1 Introduction

Voice over Internet Protocol (VoIP) Private Branch Exchange (PBX) is a business telephone system similar to standard PBX systems, but operating over Local Area Network (LAN) or Wide Area Network (WAN), as opposed to circuit-switching networks that function based on the traditional Public Switched Telephone Network (PSTN). VoIP, also known as IP PBX, can be a hardware-based model, or can utilize virtual technology and function as software.

What makes VoIP so appealing to corporate enterprises is its ability to converge data using a single line for each employee, rather than accruing the expense of a complex network of channels for the various ways we use to connect with each other on a daily basis. IP PBX engages one network, allowing audio, video, and internet communication on the same line. This is great at facilitating cost savings for the growing enterprise, and in addition, it does not require the long-term maintenance of multiple information networks.

2 PBX

PBX is a cost-saving telephone exchange that serves a particular business or office. It is different from the common carrier telephone company, which operates for the general public or different businesses and is not for private purposes. Other terms for private branch exchange are:

- PABX: private automatic branch exchange
- EPABX: electronic private automatic branch exchange

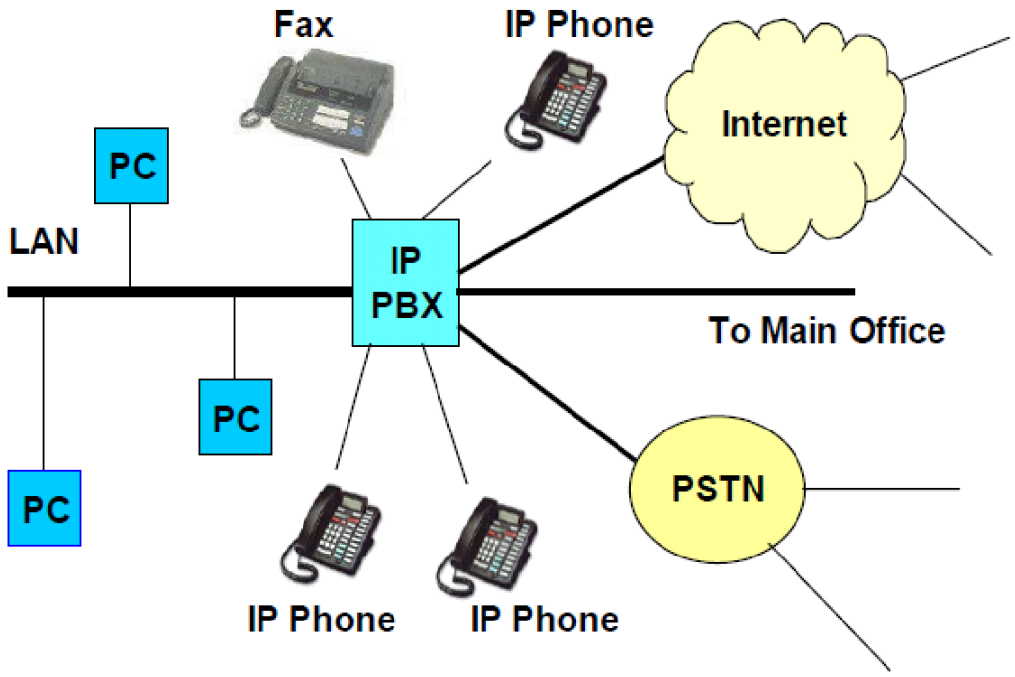
PBXs facilitate internal connection of private companies' telephone lines, as well as connecting those lines to the PSTN (Public Switched Telephone Network) with the aid of trunk lines. Businesses originally used key systems to manage their telecom needs, allowing the operator to transfer calls to different extensions (any final point of the branch) manually by pressing lighted buttons. What separates PBXs from key systems is that with PBXs, outgoing lines are automatically selected. If you have ever dialed "9" for an outside line, you were working with a PBX system. Because key systems evolved over time and began to incorporate some of the features of PBXs, hybrid systems were developed. These systems featured elements from both systems, and hybrid systems are commonly used in financial institutions.

During the 1960s, Centrex marketed a PBX solution that was designed to provide features similar to central telephony systems. With the prevalent use of PBXs came additional services not offered through the traditional operator network, such as call forwarding, hunt groups, and extension dialing. The technology expanded as businesses began to focus more on core competence, coming to the realization that trying to manage their own telecommunications needs was not their strong suit. This awareness led to the advent of hosted PBX services.

In a hosted setup, the PBX is located at and managed by the telephone service provider, and features and calls are delivered via the Internet. Hosted PBX eliminates the need for purchasing and maintaining costly hardware, as the equipment is taken out of the business altogether and held at a more central locale. One only needs to sign up for this service, making it very accessible to large and small businesses, and helping to reduce operating costs.

As time went on, PBXs continued to advance. The rapid growth of data networks that provided packet switching and the presence of the Internet as a global delivery center in the 1990s contributed to the development of VoIP PBX technology.

3 IP PBX



IP PBX (Internet Protocol Private Branch Exchange) is a business used telephone system that is responsible for delivering voice or video over a data network, and operates together with PSTN (Public Switching Telephone Network). In order to reduce the expenses incurred by long distance voice calls, VoIP (Voice over Internet Protocol) gateways in combination with conventional PBX can be used to provide a single network for normal voice function and data transfer. Advanced CTI functions are capable of use on mainly IP systems, which provide more cost reserves, better mobility, and larger redundancy. An IP PBX can be present physically as hardware or as a virtual software structure.

3.1 How It Works

Many people believe that VoIP means that phone calls are transferred through the internet. However, in this case, Internet Protocol (IP) is not referring to the World Wide Web. It actually means communication between two networks – i.e. inter-net. It is the protocol for transferring digital data packets over a network. VoIP takes voice energy from a phone call and converts it to data packets of "digital voice" that then travel through the network to be converted back to voice once the data packets reach their desired destination.

An IP PBX or an IP telephone system consists of Session Initiated Protocol (SIP) trunk lines that are managed by an Internet Service Provider (ITSP), which is likened to a "phone company" for the

internet. These systems offer the option of using a VoIP gateway in order to connect to present PSTN lines. The working of IP PBX is similar to the workings of a proxy server. Whether they use virtual or hardware based phones, SIP clients can register with the IP PBX server and thus establish a connection. A telephone directory includes all phone users and their corresponding SIP addresses, so IP PBX can make an internal call or an external call through a VoIP gateway or service provider.

3.2 Functions of IP PBX

Most of the IP PBX efficiency is offered in software, and that is why it is comparatively reasonably priced. That makes it is easier to add extra features like conferencing, XML-RMC management of live calls, TTS/ ASR (Text to Speech/Automatic Speech Recognition) and IVR (Interactive Voice Response). The PSTN has an interconnection ability to support both digital and analog circuits for VoIP that include SIP, H.323, Jingle (XMPP extension protocol initiated by Google Talk), and Inter-Asterisk exchange.

3.3 Benefits of IP PBX

- It is much easier to install and configure than the conventional phone system
- Easier to manage because the configuration interface is internet / GUI based
- Using VOIP providers can be used to save costs
- No need for telephone wires
- Eliminates the need for vendor lock-in
- It is scalable
- It is able to provide better customer service and productivity
- Has more than double the phone system features, at half of the cost.
- Provide features of hot-desking and roaming.
- Phones are much easier to use.

4 Evolution of IP PBX

The evolution of the technology from circuit switched PBXs to hybrid platforms (TDM/digital PBX hardware with built in VoIP) paved the way for the development of true IP telephony solutions. VoIP began as an expensive and only slightly reliable application. Nowadays, phone system manufacturers are creating new IP PBX hardware that is less expensive and has more advanced features and applications.

IP PBX resides behind the traditional PBX so that calls can continue to be routed via the present PBX. Additional configuration can make the existing PBX, IP-enabled. Software based IP PBX is a cheaper option that eliminates the need for costly telephone calls, as it is possible to use software applications to connect easily to IP PBX over the network. IP PBX is easier to configure and install, and it requires less maintenance.

4.1 Fuelling Factors

In recent years, IP-PBX systems have greatly contributed to enterprises both large and small. Though the cost of systems has decreased, PBX has progressed into a more intelligent system, continuously offering additional features. With IP-PBX and hybrid systems, businesses can unify communications using one gateway, resulting in higher ROI values. IP-PBX and hybrid systems offer more advantages than the traditional TDM PBX.

For many organizations, IP-PBX means lower Total Cost of Ownership (TCO). IP-PBX is capable of routing video, data, and voice over the network. Connection between local and remote offices is much easier, international calling is less costly, and with unified communications, telecommuting positions a more viable option for employees.

4.1.1 Demands from Enterprises

The demands of business entities differ by their size, location, and modernity. High-end, mid-sized and low-end businesses alike use IP telephony as a component of an integrated informative strategy, which includes MPLS based and Qos based LANS and WANS. IP telephony has become mainstream, leading to a reduction in equipment expenses and lower overall TCO. Due to its immense advantages, the demand has now filtered from mainly larger networks to small businesses. Its sophisticated presentation can make even the small business appear as though it is a large-scale enterprise.

4.2 Issues with IP PBX

There are two issues associated with QoS and reliability:

- QoS issues such as jitter and lost packets arise, when VoIP is used on the public network

- QoS issues such as jitters also arise when the telephone and the PC are connected on a shared LAN as voice and data packets compete for the LAN.

The traditional PBXs are known for reliability. The IP PBXs are created on PCs by using commercial software applications. Therefore, the software cannot offer 100% reliability in providing 24/7 operation.

4.3 Advantages of IP PBX

If we compare IP PBX with a conventional PBX, then we can observe the following advantages:

- It can handle both voice and data
- Costs less as only a single network needs to be installed and maintained
- There is not a lot of equipment required, as only IP-based products are needed
- There is a reduction in long distance charges for internal office calls as data network is used
- An easier provision
- More flexible
- More scalable
- Allows remote configuration over the internet and supports software upgrade and newer technologies

5 USAGE OF VoIP PBX

Running a new business effectively requires time and money, and savings wherever possible. Because IP PBX utilizes converged data and voice networks, it can help reduce operating expenses for the growing business. With audio, video, and internet communications provided via a single line for each employee, there is no need to purchase expensive hardware for your office or expend time and energy in network management.

5.1 Standards Used in IP PBX

5.1.1 G.711

This device aids in programming the voice on 64 kbps channel

5.1.2 G.723

This interesting device helps to compress the voice to a level of 6.4 kbs. This compression is accomplished without compromising voice quality and it is as audible as the original voice. All IP telephone numbers support it.

5.1.3 H.323

This device signals information of IP packets regarding data, video, and voice.

5.1.4 IVR (Interactive Voice Response)

It enables callers to chat by using voice menu.

5.1.5 SIP (Session Initiation Protocol)

It shares its similarity with H 323 but is a little different. (Siyan, 1977)

5.2 VoIP Benefits

With easy set-up and little necessary maintenance, IP PBX technology is within economic reach of any sized business. The following apparatuses are required to set up IP PBX:

- IP PBX server
- Phones (VoIP softphones, VoIP phones or regular phones with VoIP adapters)
- SIP Gateway (to call other people on the PSTN)

Digital or analog VoIP gateways convert voice and fax calls into digital information packets, and conversely, they convert digital packets back into voice. With the assistance of VoIP, one can make calls using PSTN lines or via an IP network. VoIP gateways can be both external (hardware), and

internal (software), and they make it possible for outsiders using traditional phone lines to communicate with your business.

VoIP gateways offer a number of benefits to the growing business:

- With less need for PSTN lines, telecom expenses are reduced
- Compatible with various VoIP systems and devices, easily converting existing telephone systems to work with VoIP technology
- Calls can be made through standard telephones, and the use of IP reduces the cost of long distance charges
- Professional solution that can contribute to a polished image for your brand
- Capacity for unlimited SIP trunk lines

5.3 Things to consider before choosing a VoIP gateway

Budget: Determine your budget. VoIP hardware is more expensive, but offers a superior level of secure and reliable service to software options. On the other hand, software is much more affordable, sometimes even free, and it can be employed on pre-existing equipment.

Compatibility: When choosing a VoIP gateway, make sure it is compatible with numerous technologies, as service providers and corporate communication networks frequently change. Determine how many trunks the gateway can support, how many calls it can handle at once, and what upgrades are available, should the need arise.

Security: Security should always be a top priority when it comes to any telecom solution. Investigate ways to protect sensitive data and implement whatever controls, anti-virus software or spam filters are necessary to eliminate security threats to your network.

Network Set-Up: Check your network to ensure adequate bandwidth for voice traffic, require defined bandwidth for your SIP trunks, check network cables to locate any issues that should be resolved prior to implementation, and remove all network hubs that can impede proper operation.

6 Innovations in IP PBX

IP PBX's open source communication is innovative. When its authors make source code accessible to the user, users who are skilled enough can modify the code and enhance it accordingly to make it more beneficial for use in their business (Schulzrinne & Rosenberg, 1999). Open source systems are widely available in Linux operating system, Mozilla, and Firefox web browser. They offer multiple benefits including flexibility, stability, rapid development, and economical accessibility, as they are half the price of establishing proprietary systems. IP PBX can enhance office communications, collecting and integrating data and improving its availability to the workforce. IP PBX systems will steadily gain in popularity as the telecommunications industry continues to advance.

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