Selecting the Right SIP Phone for Your IP PBX

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There are many Session Initiation Protocol (SIP) phones on the market manufactured by IP PBX vendors and third parties. Selecting the best phone for your use is both a technical and a business decision. The selection process starts with the choice of SIP phones based on technical requirements. Once the SIP phones have been selected, possibly from more than one manufacturer, then the manufacturer's geographic coverage, sales channels and financial strength will narrow down the potential choices. This paper will guide you through this process by first providing an understanding of the SIP phone landscape and then the process for phone selection.

SIP for VoIP

SIP is a standard signaling protocol that is commonly implemented for Voice over IP (VoIP) communications. Many proprietary access and signaling protocols have been developed for VoIP. The development of SIP has brought a level of standardization to IP phones and led to the creation of the SIP phone. SIP can also support unified communications (UC), multi-media, video, chat, conferencing and instant messaging (IM). As a result, SIP phones are largely displacing legacy analog and digital phones.

SIP Phones and the IP PBX

SIP phones are designed to communicate directly over an Ethernet LAN network or through a Wide Area Network (WAN) IP network connection that is either private or public like the Internet. A SIP phone is fully interoperable with the Internet Protocol (IP).

An IP PBX is the controller of the phone calls. It is the modern replacement for the legacy PBX and telephone key systems. An IP PBX is a server with call manager software. The server can be located at a data center or even in an office closet.

The call manager software can be proprietary or it can be software-based like Asterisk® by Digium®. Asterisk is a free and open source framework for building communications applications. Asterisk software turns a computer into a communications server and powers IP PBX systems, VoIP gateways and conference servers.

The IP PBX communicates over IP and Ethernet networks. Locally connected SIP phones connect through a LAN switch to the server. Remotely located SIP phones connect through a LAN, connected to a router that is connected to an IP WAN. The call manager sets up the voice call and manages its operation, but the voice does not go through the call manager. The call manager sets up a peer-to-peer, SIP phone to SIP phone connection over the LAN if the call is local or over the WAN to a remote location. The call manager is in an idle state during the call and disconnects the voice connection when the call completes.

If a call needs to be transferred to the Public Switched Telephone Network (PSTN), then the call must be routed through a gateway that converts the voice and signaling to a PSTN compatible format. The SIP signaling and VoIP are converted in the gateway and the call goes out over the PSTN.

SIP Phones and the Cloud Communications Services

There are literally hundreds of cloud/hosted communications service providers in the world. Most of these have selected SIP phones as their endpoint devices. Although there have been some proprietary IP phones selected, the providers are moving to standardize on the SIP phone. Therefore, selecting a SIP offers a wide range of service providers to choose from that can support SIP phones.

IP PBX/Cloud Interoperability

For conversations to be carried across the IP network connection, the SIP phones must be able to exchange voice packets. This requires the SIP phones to use the same codec; the technology that converts speech to packets and then converts the packets back into speech. The codec in each SIP phone must be identical. Typically, the G.711 standard codec is used in SIP phones, but it is important to confirm when researching a purchase.

The SIP phone also needs to be interoperable with:

- Session border controllers for connection to SIP trunks
- Gateways that translate SIP phone operation into legacy analog and digital phones that a business may still own and operate on their premises.
- PSTN gateways that translate SIP operation to the public telephone network
- Softphones that are software-driven that emulate a hard SIP phones on PCs, laptops and tablets
- The same security standards such as Sercure RTP and TLS for SIP signaling
- Network management systems

IP PBX vendors certify that the SIP phone will interoperate with their call managers. This is where a SIP phone, such as the VTech ErisTerminal™ series, is important since these SIP phones are interoperable with Asterisk based systems. There are tens of thousands of Asterisk installations and hundreds of resellers supporting the Asterisk systems worldwide.

When it comes to using a cloud/hosted communications service, interoperability is also important. BroadSoft® produces a software call manager system called BroadWorks®. This software is installed at over 500 service providers who offer communications services. The VTech ErisTerminal SIP phones are certified to operate with BroadSoft call managers, thereby opening the opportunities for the enterprise to select from a large number of potential communications service providers to satisfy their requirements.

SIP Phone Selection Process

There are many dimensions to the SIP phone selection process. SIP phones vary from basic models to those with many extra features and functions. The SIP phone selection process should first cover the technical requirements, then the cost, and finally the manufacturer's ability to deliver and support the SIP phones.

Going through these decision points will help to clarify what each point means as well as identify where and when they apply.

- **Features and keys –** Most phone features are generated and supported by the call manager, not the phone, so there are not many differences among SIP phones, but there are differences when it comes to programmable and soft keys. Most basic SIP phones don't have these. If there is a requirement for programmable and/or soft keys, then you need to look at the higher end SIP phones.

- **Line support –** All phones support at least a single line appearance. Do you need multiple lines to appear? You may need multiple lines if more than one person will have access to more than one line.

- **Codecs –** The G.711 codec is the default choice and virtually all SIP phones support it. G.711 is also the codec used to connect to the PSTN. The G.729 codec is the most popular choice if you want to reduce bandwidth consumption by about 70 percent. G.729 is slightly poorer in voice quality, but is still acceptable. If you are connecting SIP phone to SIP phone, then you may want a G.722 codec since this offers high definition voice (HD) without consuming more bandwidth when compared to the G.711 codec. A less popular codec, G.726 further reduces the bandwidth consumption but sound quality suffers. Voice compression is unnecessary on a LAN connection but can prove beneficial on WAN connections.

- **Display –** The minimum display is black and white. A color display is an extra cost but may be nice to view. If you want to support video calls with the SIP phone, then you need a video capable display. Adding a touch sensitive screen is also useful for implementing soft keys. A backlit screen works well if there are other strong light sources near the display.

- **Phone connections –** The common SIP phone connects to Ethernet at 10/100 Mbps. SIP phones with a single Ethernet connection are slightly less expensive phones but require a separate LAN switch port and cabling, which negates the savings for the single port phone. Most enterprises choose the dual Ethernet port phone. In this configuration, the desktop PC is connected to the phone and then the phone is connected to the Ethernet. This works with the existing LAN ports and cabling and is well worth the investment. If the desktop requires 1 Gbps support, then a 1 Gbps SIP phone will be necessary, otherwise the SIP phone will degrade the desktop speed to 100 Mbps. Some manufacturers can connect the SIP phone to the desktop with a USB connection. This works well in contact and call centers but requires the desktop to be always on which is not always feasible for other phone users. The final choice is whether the user wants a corded or cordless phone for the flexibility to move around a lot.

- **Power –** Most SIP phones derive their power from the LAN switch. This is called Power over Ethernet (PoE). If LAN switch power is not available, then a separate transformer, sometimes called a brick, will be required. It is an extra cost and is not typically included in the purchase price.

- **Auto provisioning –** Auto provisioning is the automatic setup of devices without manual/human intervention. Think of auto-provisioning as a plug-and-play operation. Auto provisioning reduces implementation time, expensive staff labor and errors when installing the phone.

- **IP version 4 and 6 –** All SIP phones support IPv4. Most do not support IPv6 since there are few networks supporting IPv6. IPv6 may be a requirement in the future, but not now.

- **Compatibility/interoperability –** The SIP phone should be able to interoperate with any call manager that supports the IETF RFC 3621 standard server like Asterisk call managers. For cloud/hosted connections, interoperating with BroadSoft call managers provides the widest range of communications service providers.

- **Warranty –** Most SIP phones will have a multi-year life. The warranty period is more of a business decision than technical. It may be cheaper to purchase spare SIP phones than to pay extra for the longer warranty.

The checklist below offers a review of the decision-making points in SIP phone selection. Divide your requirements into three categories; what are mandatory, what are optional, and those elements that are beyond the goals for the phone selection.

SIP Phone Selection Checklist

Requirements	Necessary	Optional	Not Applicable
Standard Feature Keys			
Programmable Feature Keys			
Soft Keys			
Line Support			
Single Line			
Multiple Lines/ # of Lines			
Standard Codecs			
G.711 Default			
G.729 Compressed Voice			
G.726 Compressed Voice			
G.722 HD Voice			
Display			
Black & White			

Color			
Video			
Touch Sensitive			
Backlit			
Phone Connections			
One Ethernet Port			
Two Ethernet Ports			
USB			
10/100 Mbps Ethernet			
1 Gbps Ethernet			
Cordless			
Power			
Power over Ethernet (PoE)			
AC Brick			
Auto Provisioning			
IP Version 4 Support			
IP Version 6 Support			
Compatibility			
Broadsoft® Based Cloud Service			
Digium® Asterisk			
RFC 3261 Standard Server			
Warranty Period			
1 Year			
2 Year			

What to Watch Out for when Selecting a SIP Phone

You will discover that there are many SIP phone manufacturers. IP PBX vendors promote their own SIP phones although you may find that they also support third party SIP phones like the VTech ErisTerminal SIP phones.

Third party manufacturers offer an array of choices. Read the product descriptions carefully and consider how the phone will be used for your business now and in the future. Sometimes manufactures describe their entire SIP phone line without delineating the differences between models. For example, if your employees use headsets, the VTech SIP corded phones feature clear HD audio and wireless headset capability to help employees easily move throughout a facility. Consider how many phones you will be purchasing. The VTech system can be easily expanded to unlimited deskset phones and up to six cordless handsets all customized through a simple web-based administration.

VTech is the world's largest manufacturer of cordless telephones and offers its ErisTerminal™ SIP phones with both wired and wireless models. The corded phones feature clear HD audio and wireless headset capability to help employees easily move throughout a facility. Managers can easily expand the system to unlimited deskset phones and up to six cordless handsets, all customized through a simple web-based administration.

Vetting the SIP Phone Manufacturer

When you purchase a SIP phone, also consider the manufacturer's credentials.

- Financial strength to ensure that the product line will not be changed or dropped.
- A successful track record manufacturing and distributing phones beyond the SIP phones offered.
- A range of features and functions, not just one device.
- An international presence so businesses will not have to select a different manufacturer for an international location.

Conclusion

With so many SIP phones on the market, take the time to ensure the functionality will work for your employees and your business needs based on available information. Once you've selected a SIP phone, you'll find the technology will be a helpful and reliable addition for daily communication.

Gary Audin has more than 40+ years of computer, communications and security consulting and implementation experience. He has planned, designed, specified, implemented, and operated data, LAN, and telephone networks. These have included local area, national and international networks as well as VoIP and IP convergent networks in the U.S., Canada, Europe, Australia, Caribbean, and Asia. Gary Audin's many articles can be found on www.webtorials.com, www.telecomreseller.com, www.collaborativeplanet.com, and www.acuta.org. He writes a weekly blog on communications subjects that can be found at www.nojitter.com and publishes technical tips at www.searchtelecom.com, www.searchnetworks.com and www.searchunifiedcommunications.com.

VTech is the global leader in electronic learning products from infancy to preschool and the world's largest manufacturer of cordless phones. It also provides highly sought-after contract manufacturing services and telephony solutions for the hospitality industry. The company has leveraged its expertise and success in cordless telephones to offer a portfolio of cost-effective, cutting-edge business phone solutions as well. Founded in 1976, VTech's mission is to design, manufacture and supply innovative and high-quality products in a manner that minimizes any impact on the environment, while creating sustainable value for our stakeholders and the community.

For more information on VTech Business Phones, visit **businessphones.vtech.com** or call 888-913-2007 to speak to a product specialist.