SIP Phones Explained

By Gary Audin
March 12, 2014

What is a SIP Phone? Manufacturers, vendors and service providers describe the Session Initiation Protocol (SIP) as if it were the foremost technical solution for Voice over IP (VoIP). It does have numerous benefits; SIP brings enhanced VoIP and powers other technologies such as SIP phones and SIP trunks. Understanding SIP and the uses for business allows users to make the greatest gains.

First Came the IP Phone

With the introduction of the proprietary IP PBX came the proprietary IP phone. An IP phone is designed to communicate over an Ethernet LAN network connection. It is fully interoperable on private networks as well as the Internet. The limitation is that IP PBX specific IP phones use their own unique proprietary signaling protocols. Therefore, users must buy the IP phones from the IP PBX vendor. Almost no other IP phones would work on the proprietary IP PBX.

The creation of the SIP standard helped change the IP phone landscape. SIP is a standard signaling protocol, a commonly implemented standard for VoIP. It is also applied to a wide range of devices beyond VoIP including video, instant messaging (IM), and other forms of media. The development of SIP also brought a level of standardization for IP phones.

The SIP standard opened up the IP phone market to a wide range of phones at competitive prices. Eventually IP PBX vendors had to support SIP phones to meet the demand. The SIP phone has become the dominant choice for hosted and cloud-based services for customers who choose not to own an IP PBX.

A SIP Phone is an IP Phone

An IP phone must be able to operate over an IP network. In most cases, the IP phone is connected to an Ethernet network for communications *inside* an organization. Additionally, the Ethernet network is connected to a private or public network for communicating *outside* the business. IP phones are NOT designed to connect to legacy analog or digital PBXs or connect to the Public Switched Telephone Network (PSTN). IP phones can connect via SIP to an IP PBX or IP-based cloud service.

A SIP phone can best be described as:
- Using the SIP standard for signaling (establishing and managing calls)
- Transmitting SIP over the User Datagram Protocol (UDP). A few SIP phones work with the Transmission Control Protocol and are called Lync SIP phones
- Operating with the G.711 and other standard codecs
- Connecting to an Ethernet LAN or USB port on a PC
- Working under the control of a server (call manager) that is part of an IP PBX or cloud communications service

The High Level View of SIP

The most common applications for the SIP standard are SIP trunking and SIP phones. SIP sets up a session between or among endpoints independent of the media carried. Think of a phone establishing a telephone connection (a session). The phone call could carry voice, music, fax and PC modem transmission, or any other media as long as it fits into the limitations of the phone circuit.

SIP is a multi-media session establisher for IP networks. Other protocols define what is to be carried over the SIP session. Voice is the most common media associated with SIP phones, and video is not commonly supported.. The five functions of a SIP phone implementation are:

- Device type/location – SIP can locate the user and determine what end system, a SIP phone for example, will be used in the session.
- Device presence – It can then learn the user availability; can the user be disturbed or is the user busy?
- Device capabilities – SIP can determine the capabilities that are available at the user end system (SIP phone) for the session.
- Establish connectivity – The fourth function for SIP is to establish the session, a phone call.
- Manage communications – The fifth function of SIP is for managing the session such as call termination, call transfer, or changing the session (call) parameters during the call.

SIP Applications

We continue to hear about SIP phones, gateways, Session Border Controllers (SBC) and firewalls. However, there is a growing world of available SIP devices that most enterprises have never heard of; such as Computer Telephony Integration (CTI). CTI connects to IP PBX servers with software from companies such as IBM and Microsoft. Some IP PBX vendors use SIP to communicate with VoIP gateways and a few IP PBX vendors use SIP for trunking between their IP PBXs.

SIP is also used with:
- Door phone
- Audio alerter
- Callbox
- Multimedia intercom
- SIP cameras for video surveillance
- Clocks
- Paging systems

Reasons to Choose a SIP Phone

The SIP phone has become an integral part of Unified Communications implementation. Because its operation is based on a standard, it can connect to and operate with a wide range of IP PBXs and cloud/hosted communications services. As existing analog and proprietary digital phones need replacing, the SIP phone is the dominant candidate as the replacement.

Another driver for SIP phone adoption is the emergence of open source software like Asterisk. Asterisk based systems are very popular with businesses because of their low cost and the increasing number of vendors supporting Asterisk. Asterisk is a free and open source framework for building communications applications. Asterisk software turns a computer into a communications server and power IP PBX systems, VoIP gateways, and conference servers. This offers a greater range of choices for the business community.

Variations in SIP Phone

Not all SIP phones are the same; some offer extra features, others operate over Ethernet at 1Gbps and some have two Ethernet ports instead of one port. They can be wireless and have color screens, others have touch sensitive screens and many have extra keys for special functions. SIP phones come in many models from simple to complex capabilities. When it comes to purchasing SIP phones, do not assume that manufacturers offer all the same features and functions.

When you purchase, 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.

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.

Hard Phone vs. Softphone

The phone that has been on your desk for years is a hard phone. It is always on and always connected to the telephone switch and network. You do not boot up your hard phone. Once it is connected, it is effectively registered forever until it is unplugged or breaks. The SIP phone is a hard phone. It does not depend on a PC, laptop or tablet to operate. In fact, there is no need for a PC. The hard phone is a physically separate device.

When reviewing the chart below, the first conclusion is that a hard phone and softphone may not be that different in cost. The sound quality of the hard phone is usually better than a softphone unless very high quality headsets are used with the softphone. Softphones will require more IT staff support. Emergency calling is better supported on a hard phone because the hard phone is always on. If someone is working on the PC, then 911 calls may be delayed or not work properly.

Comparison Point	Hard Phone	Softphone
Cost	$100 to $300 total for all hardware and software	$70 to $120 for the headset and up to $50 for the softphone license
Audio Quality	Dedicated to speech deliver consistent high quality voice	Voice software has to share compute power with other applications affecting quality
Echo cancellation	Works better because of dedicated voice processor	Does not work as well with shared PC processor
Survivability	Always on and always available	When PC is down, idle or off, then it is not available
Function buttons	Easy to see and use	Depends on screen display content and requires point and click
Stability	100% with Power over Ethernet	Less than 100%. Depends on building power
Support	No PC expertise required	More PC expertise required
Emergency calling	Easy to do	Requires more network infrastructure to support
Always on	Supported	PCs may go into idle mode or be turned off when not attended
Special Requirements	Meet safety and regulatory requirements	Not acceptable for safety and regulatory requirements

Hard phones provide a better ROI. Hard phones last for up to 10 years compared with two to three years for cellphones, tablets and PCs, and only up to only one year for headsets. Hard phones support multiline capability easily and have directly accessible buttons for most important functions.

Hard phones are necessary to satisfy fire and safety codes. Hard phones are required in schools, elevators, hotel pools and common areas in businesses. There are many areas in an organization where a PC may not be available or desired. In all of these locations, a hard phone is the logical and reasonable choice.

SIP Phone Interoperability

At minimum, the SIP phone has to interoperate with a call manager, which establishes and terminate the call connection. The SIP phone also must be able to exchange the same size voice packets between SIP phones so that a conversation can be carried across the IP network connection. This latter capability means that the SIP phones have to use the same codec, the technology that converts speech to packets and back. SIP phones typically use the G.711 standard codec.

The SIP phone also needs to interoperate with:
- Session border controllers for connection to SIP trunks
- Gateways that translate SIP phone operation into legacy analog and digital phones the business may still own and operate
- PSTN gateways that translate SIP operation to the public telephone network
- Softphones, that is PCs, laptops, and tablets which are software driven that emulate a hard SIP phone
- The same security standard
- Network management systems

Conclusion

There are many brands of IP phones on the market. Traditionally these IP phones only worked with the IP PBX vendor's platform. As SIP has become popular, many of these IP PBX vendors started to support SIP phones. The SIP phone is the primary choice for use with cloud/hosted communications services. SIP phones have become more attractive to businesses because of their low capital cost, low fixed usage charges while delivering features that were previously only available to large enterprises. This has led to both technological and financial competition, which has enriched the SIP phone market choices for businesses.

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.