

What is VoIP?

Beginners Guide to Voice over Internet Protocol (VoIP)



GRANDSTREAM
CONNECTING THE WORLD

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010 466 6900 | www.zinia.co.za

What is Voice over Internet Protocol (VoIP), exactly?

Communication, and the technology used to communicate is the backbone of all business operations. At Grandstream we understand that, and continue to succeed in delivering award-winning unified communication solutions year after year.

If you're used to using analog, VoIP can seem a bit confusing at first. So we developed this starter's guide to provide you with some basic information to make the transition easier. This guide will provide you with a general understanding of how switching over to VoIP can save time and money as well as increase your productivity. VoIP solutions are also ideal because of the amount of control it allows companies to have over their communication infrastructure.

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Lower the communication costs of your organization.



Unify your team and increase productivity.



Upgrade to the most advanced technology available.



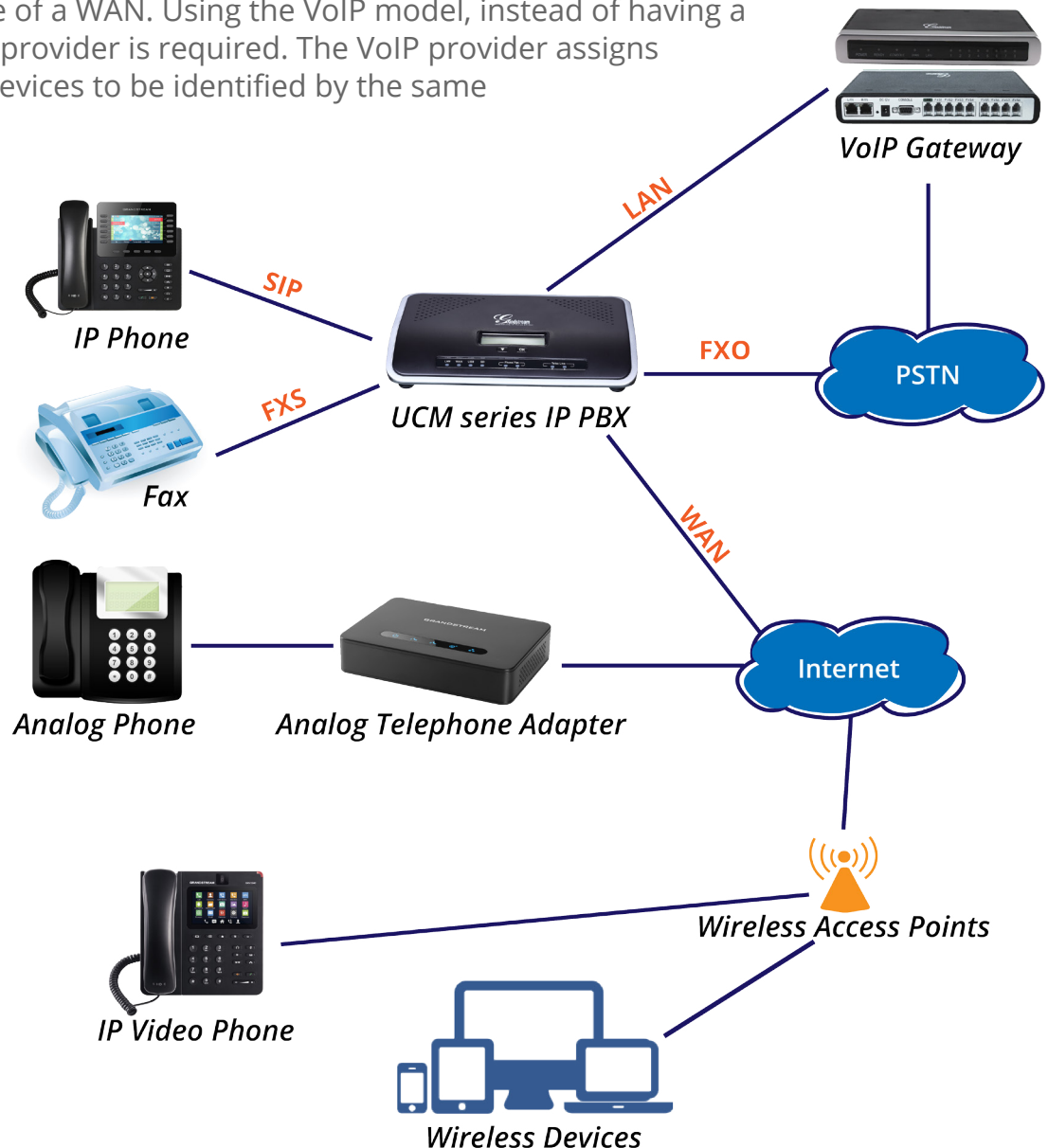
The VoIP Network

Put simply, all VoIP communication is sent as packets (chunks of data) over a LAN (Local Area Network) and WAN (Wide Area Network), as opposed to traditional copper wiring. This may sound foreign, but most likely, you interact with and use LAN and WAN every day for your business needs. Your business or organizational network is an example of a LAN, and the internet is an example of a WAN. Using the VoIP model, instead of having a traditional analogue or digital service provider, a VoIP provider is required. The VoIP provider assigns static IP Addresses to your devices, which allows the devices to be identified by the same number when they are called, every time. These static IP Addresses connect your devices to the outside world, and make them accessible to others. For a list VoIP providers that Grandstream partners with, click [here](#).

VoIP offers businesses many attractive benefits, one of the most alluring is a reduction in the overall cost of communicating. The business world is increasingly global, and businesses need to keep up and stay accessible. Grandstream offers a complete VoIP solution, our product line-up includes:

- IP Phones for Small Business and Enterprise
- IP Android Multimedia Phones
- Complete IP Video and Audio Conferencing Solutions
- IP PBXs
- ATAs and Gateways
- IP Surveillance Solutions

All Grandstream devices are easily configured and customized via the user-friendly Web GUI.



Protocols and Codecs

If you have done a little research into VoIP already, you have probably heard of a codec. Most codecs are simply referred to by acronyms and numbers. To successfully select a VoIP solution, you don't need to know all the protocols and codecs, just the basics.

A voice protocol dictates how your voice data packet is sent throughout your network. The most common protocol, and the most referenced, is Session Initiation Protocol (SIP).-it supports the vast amount of VoIP devices and technologies.

Codecs are the operation methods that are responsible for changing the analog voice stream coming from your handset into its digital packet for transferring over your network. Voice codecs determine the sound quality and the bandwidth required to send the packet through the network. Phones typically cover a multitude of codecs, from the HD Voice G.722 codec, that goes up to 64 Kbps, to a lower quality G.729, which is at 8 Kbps.

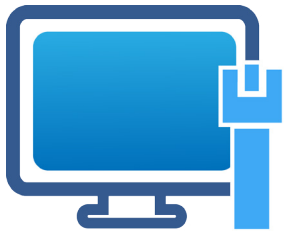


What does it all mean to you?

When choosing endpoints, IP PBXs, and other devices to comprise your VoIP solution, ensure that they all operate using the same codecs. For the most part, using the same codecs is a good indication of compatibility.

Unified Communications

The term “Unified Communications” refers to placing all communications under the same umbrella for seamless control. Unifying the communications of your company, allows for the combining of analog and IP networks, thereby streamlining all in and outbound communication. When making a product selection, to streamline your means of communication, it is important to keep in mind the structure of your LAN and WAN networks.



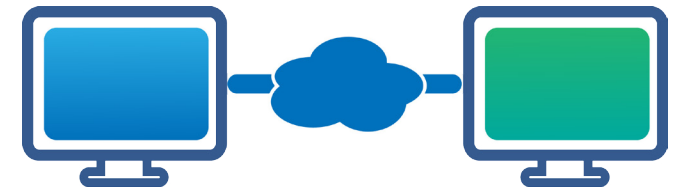
VoIP and LAN

Internally, VoIP moves along the IP lines within your organization’s LAN. Although all networks are set up according to the individual organizations’ needs, the configuration will be basically the same with VoIP products. The majority of VoIP products can be managed and configured via a Web Graphical User Interface, referred to as a Web GUI, or a Web UI. The Web GUI can be accessed by typing in the device’s IP Address (its address in your network) into any web browser, this IP address will open a log in page. After logging in, you

can edit and adjust the phones functions, configuration, and features. From a technical standpoint, this is what makes VoIP incredibly competitive. It seamlessly integrates with your organization’s local network, and can communicate to other devices more efficiently and effectively.

VoIP and WAN

A fully integrated communications system that exists within your organization’s network sounds great! While internal communication is important, you will also need to use your VoIP to communicate with the outside world. VoIP Networks require an internet connection and SIP accounts or SIP trunks-these can be purchased from a VoIP provider. As VoIP becomes more common, many household cable and internet providers also offer VoIP options in addition to digital/analog options. Through these providers, you can keep the same lines, numbers, and features which you traditionally would have through a legacy phone system, but at a much lower cost due to communications being transmitted over the internet.



FXO and FXS Network Integration

Many organizations make the transition to VoIP but still keep active POTS legacy lines active as well. This can be done for many reasons, from wanting to have the benefits of a local VoIP network while using external POTS lines, or simply wanting to keep some of your old legacy system investments for a few more years. When it comes to these sort of networks, you may hear the terms FXO or FXS in reference to ports, IP PBXs, [gateways](#) and [ATAs](#).

In order to connect a traditional analog phone line to a VoIP system you would need an FXO gateway (or an ATA). This allows you to connect your incoming analog FXS line, the line from the telephone provider, to the FXO port of the gateway. The analog phone line is then translated to VoIP. This is a great choice for organizations that want to enjoy the features and savings of an Internal VoIP unified network but do not have the internet access to support large amounts of external ingoing and outgoing data.

Legacy communication investments that aren't quite past their prime can still be protected with the use of FXS gateways and ATAs. You can use these as tools to connect one or more devices to an internal VoIP network and system, or to even connect an entire traditional system to a VoIP or ITSP provider. This is one of the best ways to cut costs while still keeping your existing system.

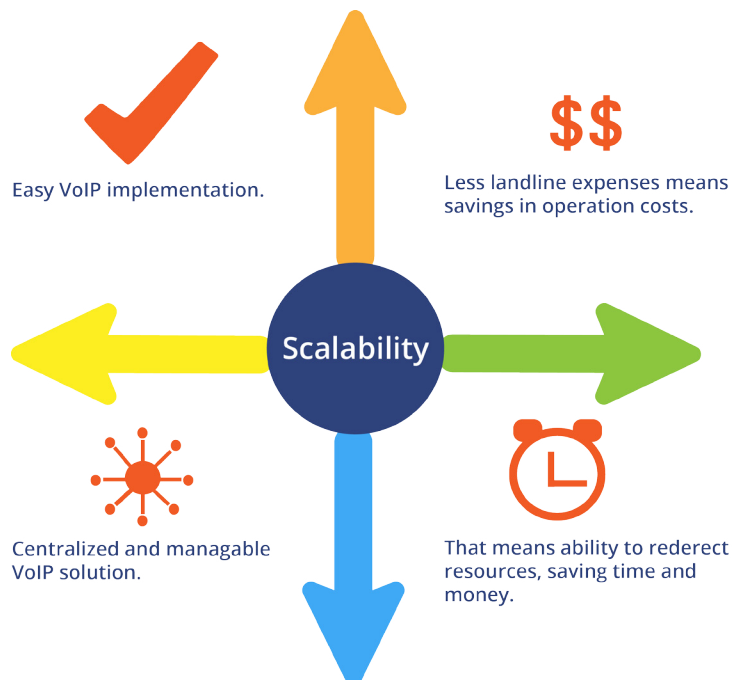
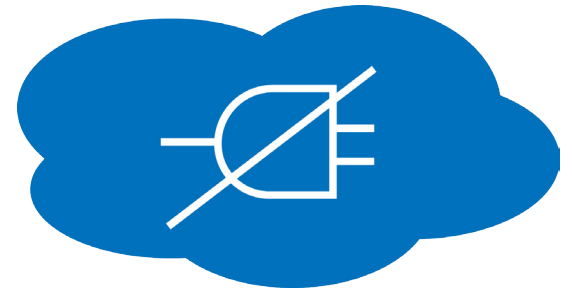


VoIP Advantages

VoIP is an innovative tool for maintaining a competitive edge in communications and collaboration. You can enjoy many advanced telephony features without having to pay any additional fees, and the configuration of your network is streamlined and scalable. Your employees will enjoy an increase in productivity and fluidity throughout your network.

Less Wires. Less Hardware. Less Problems.

When communicating through copper wiring or POTS, the signal must travel across long, physical distances which can lead to failure. Having communications occur through the cloud and allows for less physical transfer points and more reliable communication. Less wires mean less of a hassle, and cuts down on time and resources spent organizing and maintaining wires throughout your building and network. Since VoIP devices connect directly into your network, configuration can be done by accessing the devices over their Web GUIs on your computer's browser. Additionally, adding, removing, editing, and modifying lines, extensions, and connections to end-points can all easily be configured solely through the IP PBX's Web GUI.



Scalability

Externally, upgrading and implementing your VoIP infrastructure is a much easier task than it may seem, due to less reliance on functional landlines and outside POTS lines. Additionally, you will experience a large reduction in operation costs as a result of not using traditional telephony providers that require copper analog lines. Internally, scalability is as simple as having an internet connection for the phone to plug in to. You will not need miles of copper phone lines to running from point to point. Setting up a new device and a new extension is as simple as a few mouse clicks, and even [small scale IP PBX's](#) support a high level of concurrent calls and end-points compared to their traditional PBX counterparts.

Features and Devices

You can enjoy all the telephony features that were available to you on a traditional network on a VoIP network, and much more. Call parking, forwarding, hunt groups, HD voice, and call conferencing are all available features to name a few. Additionally, because the majority of a VoIP network is conducted via software rather than hardware, advanced features are available on basic end points. This allows for any employee to be able to utilize and take advantage of advanced telephony features, increasing productivity and simplifying operations. You can even access and share documents, host and join [virtual meeting spaces](#). Faxes and voicemails can be routed to specific email accounts associated with certain extensions.

Having a physical landline is not required to connect to your VoIP network. Because of this, traveling and road-based employees can connect to your network from anywhere as long as they have access to the internet. It is even possible to link your cell phone to your work extension, via a free [softphone app](#) to receive calls while out of office or on the road. Since the technology is based on a network/internet system, it allows for more advanced telephony features to integrate with a network IP connection.

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To Phone, and Beyond!

It is important to have the right end-point for the right environment. You wouldn't put a 1 line desk phone on a conference table nor would you put a conference phone at a construction site. Lucky for you, the ease of implementation that comes with VoIP makes finding the right solutions for your environment easy. As if that wasn't good enough, VoIP technology is not limited simply to phones. It is a solution for all of your business communications, including data and [video](#). Here are a few different devices and endpoints that make VoIP great, and some examples of how they can be implemented into your business.

Desktop IP Phone

The key to communications in any environment, these phones have a wide variety of functionality to fit the roles in an organization, but at their core they are your standard business class desktop phones. That being said, the requirements for a receptionist phone versus the requirements of a phone for kitchen staff are very different. Lines, conference capabilities, call features, and call volume are all examples of phone features to consider. Desktop IP Phones are ideal for use in offices, work stations, and of course, desks. Feel free to look through some of our desktop solutions [here](#).



Video IP Phone

Video IP phones are similar to Desktop IP Phones, however they have the capability to connect to video streams, conferences, other video phones, and even virtual conferencing software. These phones are great for conducting face-to-face meetings or joining in on video conferences, these phones are definitely a great choice for remote workers or for managers who need an [all-in-one communication solution](#). Additionally, these devices provide home and residential complex solutions, such as being able to be linked with IP surveillance devices like entrance door cameras. They are also a great selection for executive business class phones.

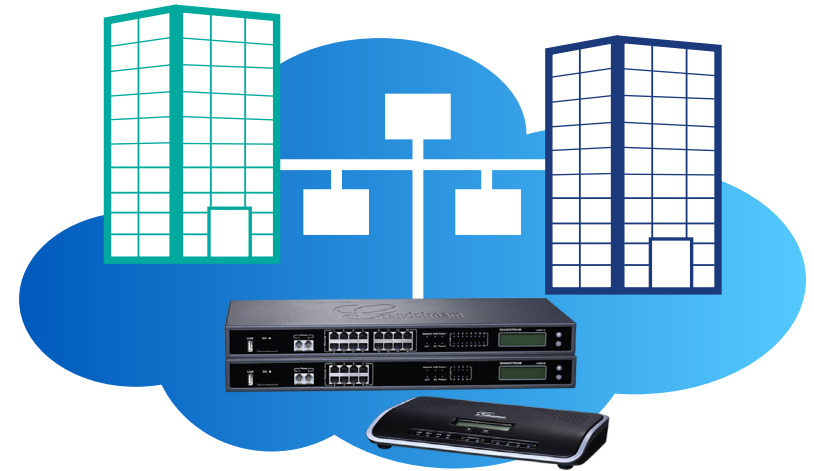


Business Conferencing Devices

Video Conferencing was traditionally reserved for larger enterprises, however, due to the cost efficiency of VoIP affordable solutions are now available for small businesses, startups, and enterprises alike. IP Conferencing solutions exceed the functionality of older, analog devices. For example, Grandstream's [GVC3200 and 3202](#) can bridge in Google hangout, Skype, and other video inputs coming from business conferencing software. The GVC3200 series can also connect to your network via a Wi-Fi connection to allow for a flexible meeting space with no wires required.

IP PBX

The IP PBX offers many of the same features as a standard PBX but for IP devices and IP Services. An IP PBX is the brain that unifies the networks incoming and outgoing voice, video, and data. Most IP PBX's come loaded with features, and can handle large call volumes and data transfer. For an example, look into our [UCM6100 series IP PBX](#) and the features it provides. The UCM6100 series is a great IP PBX for small to medium businesses and residential complexes. It can handle up to 500 SIP endpoints, control 60 concurrent calls, host up to a 32 person conference, and has many other competitive features for small to medium businesses. When selecting an IP PBX, it is important to consider your business limitations and volume both presently and what you will be growing into. Because it is based on IP technology, the great amount of IP PBX's will allow for a lot of growth dependent on your business size.



Gateways and ATAs

VoIP can easily be implemented into an existing system as a result of the flexibility to keep existing end-points and devices. With [gateways and ATAs](#) (analog telephone adapters) it is possible to connect existing legacy end point devices into a new VoIP network. Additionally, these devices commonly support telephony features that can be operated on all phones connected to it. They are great options if you want to take advantage of a VoIP network while retaining your legacy devices, or if you are looking to slowly integrate into a full VoIP network. An ATA is a perfect choice for individual analog phones in a small office or even home environment.

The Right Fit

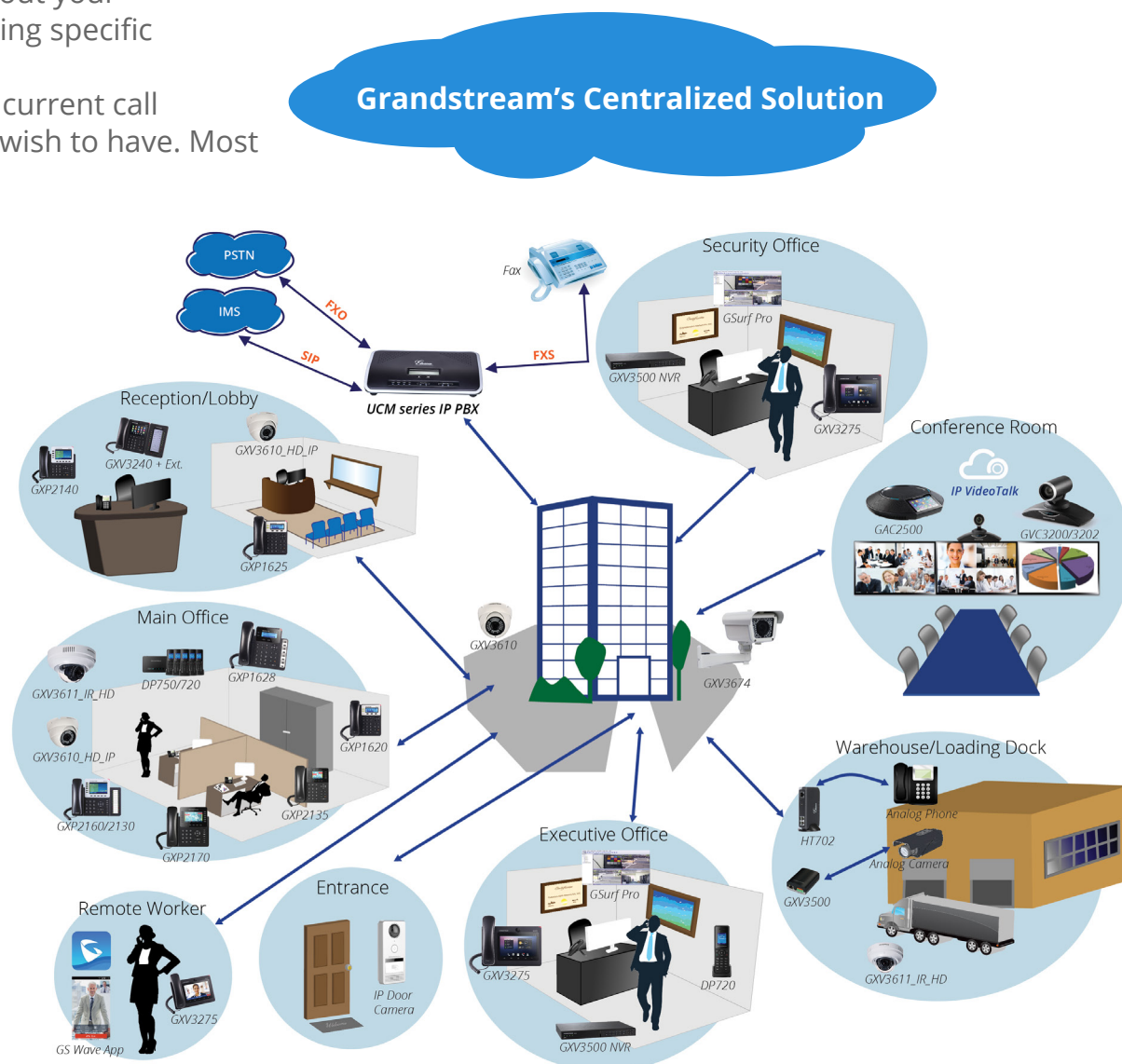
Choosing your VoIP devices and your network configuration takes a lot of careful thought and planning. Take into account the roles within your organization and the network you want to create. What sort of call functionality do you believe each of those roles require? What is your existing call volume? What is the anticipated growth in the next few years??? Will your selection support this growth? VoIP technology allows for incredibly efficient scalability. Consider mapping out your organization by position or department and ranking specific

call volume and feature needs. Think of both the current call features you need/possess and the features you wish to have. Most of all, take your time to explore and understand the different features and functions different VoIP end-points provide and how you can implement them. Grandstream has a wide variety of VoIP devices with a strong focus on providing feature rich devices. To get a feel for what the market offers, [take a look](#) through a few products in each of our categories.

Why Grandstream

Grandstream devices are very flexible and offer a lot of sought after features. For example:

- Android based devices (IP Multimedia Phones, Audio and Video Conferencing)
- Asterisk-based IP PBXs (UCM Series)
- Zero Config for all Grandstream Phones, auto-provisioning
- All GXP and GXV phones are shipped with a power supply, even if they use PoE



Acronyms and Definitions

ATA – Analog telephone adapter. Allows for the connection of legacy devices to a VoIP system.

Auto Attendant – An automatic response system which receives key commands to handle incoming calls.

BYOD – Bring Your Own Device. VoIP providers sometimes allow a person to supply their own equipment or ATA.

Codec – The way which your analog voice information is broken down from your handset and into digital packets.

CDR – Call Detail Recording. Details about a specific call that includes duration, origin, destination, and other information.

DHCP – Dynamic Host Control Protocol. A communication Protocol that lets network admins supervise and distribute IP addresses from a central point.

DID – Direct Inward Dialing. A service that allows individual phone numbers to each person within a local network.

Echo Cancellation – The process of eliminating echo from voice communication to improve quality.

IP – Internet Protocol. A virtual address for devices.

IP PBX – A VoIP version of a public branch exchange that allows for extensions and call control.

ITSP – Internet Telephone Service Provider – A company which offers telecommunication services based on VoIP.

IVR – Interactive Voice Response. A software which allows for an automatic operator to understand and assist callers.

Jitter – Variation in the time it takes for packets to travel from one point to the other.

Latency – The time it takes for a packet to reach its destination. Usually communicated in milliseconds.

POE – Power over Ethernet. Power that is delivered to a device over an Ethernet cable as opposed to a traditional adapter.

POTS – Plain Old Telephone Service. Your traditional legacy service.

Protocol – The way which your voice data packet is sent across your IP network. The most common being SIP.

PSTN – Public Switched Telephone Network. The network of local, international, and long-distance carriers which make up the traditional telephone network.

SIP – Session Initiation Protocol. The most common protocol used for VoIP.

SIP Trunking – The use of VoIP to facilitate the connection of a traditional PBX to the internet. The internet replaces the conventional telephone trunk, allowing a business to communicate with a traditional PSTN subscriber.

Softphone – IP telephone which is run over software rather than a hardware/software desk phone.

STUN – Simple Transversal of UDP through Nats. A protocol for assisting devices behind a NAT firewall or router.

Switch – A device which keeps a record of the MAC addresses of all devices connected to it and channels incoming data from all incoming ports to a specific outgoing port.

VoIP – Voice over Internet Protocol. Voice and data that is transmitted over the internet.