

## **Beginners Guide to VoIP**

Thinking of moving to a VoIP phone system, either for a new business or upgrading an existing system? This document covers areas to consider, advantages of VoIP over regular phone systems, steps in the process, and how to select a vendor.

You know it's time to upgrade your business phone system, The smartphone in your pocket does so much, yet the phone on your desk just ... calls and rings, and, if you're lucky, actually transfers a caller to the right extension. Most of the time.

What if your desk phone could be smarter and do more? A new phone system includes advantages like these:

- Free (or darn cheap) long distance calls
- No upfront costs and you pay only a few dollars per user per month
- Intelligence to let incoming calls transfer themselves
- Tells you where coworkers are, and helps you reach them
- Auto Attendant included at no charge
- Connect office phones anywhere, like home, branch offices, on the road
- Easy and free conference calls
- Treats remote area codes as local for callers

All these features, and more, are available in a new Internet-based phone system. The Internet has changed society faster than any previous technology, including radio, television, and telephones. In modern phones, the underlying protocols that run the Internet and World Wide Web reinvented voice communications. Most people don't see the Internet in their phones and even fewer understand it, but that doesn't matter because they appreciate the benefits.

Before 2002, voice telephone systems used data packet networking only for long distance connections. Starting in 2002, VoIP (Voice over Internet Protocol) telephone systems arrived. The result? More phone features, better call quality, and lower cost.

How well is VoIP doing in the market? In early 2013, only about a third of all installed business phone lines are VoIP. By 2016, two-thirds of all installed business phone lines are projected to be VoIP. Let's get a few details out of the way, so we'll all be on the same page.

### **VoIP**

- Processes phone calls like data
- Travels mostly over Internet, eliminating distance restrictions

VoIP, called Internet Telephony by some, built on the way AT&T converted sounds into data packets for transmission over long distance lines, including satellite links. This technology started decades ago, and now, the only actual sounds in your phone calls with the new VoIP systems are between your mouth and the receiver, and the phone speaker and ear of your conversation partner. If you call from a VoIP phone to another VoIP phone today, your call will stay on the Internet and never touch the PSTN (Public Switched Telephone Network, meaning telephone carriers (or Ma Bell if you're old enough for that reference)).

We could bore you with all sorts of VoIP technical details about TCP/IP and data packets and compression codecs, but let's not. All you need to know when upgrading your phone system to a modern VoIP system is this: the technology that makes web-surfing an integral part of modern life has been applied to telephones. The "landline" idea of wires from the phone company's central office to your building disappeared, and those wires have been replaced by data networking. In fact, exactly the same technology is used by your computers when they connect to servers in your office or websites on the Internet.

Good news: in the early days of VoIP, customers made decisions about details like H323 (multimedia communications system protocol) and MGCP (Media Gateway Control Protocol) and SIP (Session Initiation Protocol) Today, the VoIP vendors have streamlined the process. Just about the only acronym you'll see is SIP, which has become a sort of umbrella term for VoIP protocols.

### **Hosted VoIP**

- No hardware to buy except phones•
- Pay only for lines used•
- Service providers work on a month-by-month basis
- Office phones can be located anywhere with an Internet connection

Before VoIP, each company needed telephone hardware, usually hidden in a telephone closet. Wires from each phone jack ran to this closet, where the hardware (a key system in smaller companies, PBX in larger ones) connected to wires from the telephone carrier. This meant each company had to buy hardware to support a certain number of phones. If the equipment

bundled groups of 16 lines, and you needed 33 lines, you had to buy three bundles. You paid not for what you used but how the vendor organized their equipment.

Today, VoIP phone systems eliminate the need to pay for phone equipment you're not using. In fact, you can have zero hardware onsite (except for the phones themselves, of course), and budget zero dollars for such hardware. Welcome to Hosted VoIP.

One of the beautiful realities of the Internet today is that distance is now irrelevant. You don't ever say, "Oh, this website is a long way from me, so it will be slow." You don't know where websites are located, and you don't care. Distance is irrelevant in surfing, and distance to your telephone system hardware is also irrelevant.

The advantage? Hosted VoIP providers work like any Software as a Service provider, such as Salesforce.com or Google's Gmail, and offer phone connections per user per month, with no upfront fees for hardware. In the old days, businesses leased their telephone systems, paying it out monthly. But the big difference with Hosted VoIP is that if you lose a few people, you also drop your monthly phone charges. Have 24 people? Pay for 24. Three people leave? Pay for 21. Try calling your lease company and tell them you're sending less money.

### **Equipment: On-premise, or Hosted?**

- Choose financial flexibility with Hosted VoIP
- Choose more control with an on-premise system

If you have existing phone equipment, most VoIP vendors can add an adapter to switch your system from the public phone network to a VoIP link over the Internet. This allows you to keep your phones and phone hardware, yet converts your system to a modern VoIP system with most of the advantages and cost saving.

Be warned that many vendors will pitch new desk phones to take advantage of new VoIP features. Take a few minutes and decide if the benefits are worth the expense. Don't just assume the vendor is selling phones just to get your project cost higher so they make more money. That could be the case with some vendors, but most vendors can demonstrate the value of replacing some or all of your hardware. If the features make good business sense for you, take advantage of the offer.

If you are planning a new installation, whether new company or remote location, you may find

great value using Hosted VoIP. Buy VoIP-enabled phones, but no other hardware. Pay nothing for system hardware upfront, although there may be some setup and initialization charges for your account. Pay \$15-\$25 per month per phone line, and between \$100 and \$750 for phones (most people are happy with low-end phones, but those who want phone-based videoconferencing have options).

There is no right or wrong answer here, just what fits your situation. Statistically, smaller companies tend to go for the Hosted VoIP because they value cash flow. Larger companies often want the increased control of their phone features gained when purchasing the hardware.

### **Some Issues with VoIP**

- Old VoIP problem rumors abound
- Improvements have solved almost all previous issue

Every technology and product has issues that may become problems if not handled correctly. Three issues with VoIP are 9-1-1, loss of power, and loss of network.

9-1-1 systems attach a physical location to landline phones based on information from the local phone company. VoIP doesn't have a landline to the phone company, so early VoIP detractors made a fuss about emergency calls. The cell phone industry has had similar issues with 9-1-1f

When you get a new VoIP phone system, one call to the local 9-1-1 office will tie your phone number to a physical address in their database. Done.

If you have a VoIP phone in a home office, dialing 9-1-1 from that phone will alert dispatch to send help to your business location, not your physical location. If these rare cases, you'll have to tell the 9-1-1 operator your address. Done.

Power loss, another sales gambit used by old-fashioned phone vendors, states (truthfully) that telephone wires carry their own power for handsets. That's why the old handset in your parent's house would work when the power was out, because the phone company provided the power. With VoIP, there is no landline with power, so a power loss means loss of telephone service.

That's an old sales gimmick long debunked. Modern office phones have their own power, and the phone company doesn't provide the juice for your key system in the phone closet or the desk phones that need power for their LCD screens. When the power fails, you lose modern landline phones as well.

Answer? In your pocket. Just about every business person today has a cell phone, so they will have the means to make calls. If the power outage is so broad it knocks out the cell phone towers, you're in a hurricane and should take cover.

Finally, old-fashioned phone vendors point to your data network as a weak link. If your network goes down, your phones go down. Again, yes and no.

Data network switches often have battery backups, so if the office power drops, the switches continue. Ethernet cables to VoIP phones often employ PoE, or Power over Ethernet, sending the juice for your phone to your phone from the network switch. If not, and you have a battery backup for your computer that has space for your VoIP phone, you're covered. Smart businesses already have connections from two different Internet service providers, so if one has a problem, the other is still available to provide Internet access.

Yes, there are issues with power that can knock out your VoIP phone system. Those same issues will almost certainly knock out your traditional phone system. In a modern, well-protected office, VoIP may be more reliable than old-fashioned phones. Interesting twist, isn't it?

For those forward-thinking businesses planning beyond data backup for disaster recovery solutions, strongly consider Hosted VoIP. With a VoIP phone, you can make and receive calls from anywhere on the Internet. If your office is unusable for any reason, whether a minor inconvenience (two day bedbug carpet treatment) or major (fire damage caused by careless bedbug treatment), your phone system will stay up and running for you and your customers.

### **How and Why of VoIP Features and Benefits**

*The Internet eliminates distance and lowers costs*

On the Internet, there is no "there" there. Once on the Internet, distance to another point on the Internet doesn't matter. When you call over the telephone company's network, they care quite a bit how much of their network you use, and charge you accordingly. That's why long distance used to cost so much. But phone calls over the Internet are essentially free, because you already pay your Internet Service Provider for Internet access and use.

VoIP phones must connect to the regular phone network to call non-VoIP phones, so there's a tiny charge inside your VoIP fee to pay for that termination charge. Going across an ocean involves either satellite links or trans-ocean cables, both of which add costs. Outside of these special cases, any call within the United States, even to non-VoIP phones, goes over the Internet until it transitions to a local phone exchange at the Point of Presence (POP). From there, it's a local call to your dialed number, meaning no extra charges.

The other advantage of no distance? Location of your business phones. When they are connected to the Internet, anywhere on the Internet, it's like they are connected in your office. Extension number 112 can be the office next to you, but extension number 113 may be a thousand miles away. To a VoIP phone system, that's still a local call, and you transfer it just like to any other extension.

This VoIP phone flexibility makes it easy to treat a distributed company, like a sales group in one office and twenty people in home offices, as one phone system. And if you take a phone to your brother-in-law's house for a holiday and plug it into his Internet connection, the phone works exactly like it's sitting on your desk in your office.

### ***Get Hosted VoIP for no upfront hardware costs and pay only a few dollars per user per month***

If we're a service economy now, Hosted VoIP companies do a great job as "office phone providers" much like your ISP provides Internet service. You don't host huge routers to access the Internet, and with Hosted VoIP, you don't put telephone system hardware inside your business either.

### ***Intelligence to let incoming calls transfer themselves***

Ever feel embarrassed handing someone a business card with four phone numbers? Like it's their job to hunt you down when they want something? A VoIP phone system makes it easy for people who want to do business with you to find you by calling a single number that you can answer no matter where you are.

There are two features that make it simple for a person to call a single number and reach you. First, Dual Ring will ring two or even three phones, including cell phones, when someone calls a single number. No more calling your office number then your cell number: both will ring at the same time. The call connects to the phone you pick up, and the caller never knows which phone you answer.

The second feature is Find Me / Follow Me, which sequentially rolls through numbers (like the old PBX hunt group) until a phone is answered or it rolls to voice mail. You set the sequence, such as your desk phone, your cell phone, your home office phone, and then voice mail or your backup person. Again, the caller knows nothing about this process, only that someone answers their call and helps them.

***The system tells you where coworkers are, and helps you reach them***

When you need to reach a coworker, how do you track them down? Why not let your VoIP phone system do the tracking?

By using “Presence,” an indicator of when devices are on the network and available, makes it easy to see if co-workers are at their desks even if their office is a thousand miles away. With a push of a button or two on a phone, users tell the system where they are and that they are available. Add this to Dual Ring and Find Me / Follow Me, and you make “phone tag” a joke about people still using phones from the last century.

***Auto Attendant included at no charge***

While an auto attendant can be irritating, providing callers the info they need to find the person or department they want saves them time. IVR (Integrated Voice Response) systems from the past were optional systems with high price tags and higher learning curves.

VoIP phone systems did away with both of those problems by including Auto Attendant in most systems, and making it a snap to program those “Press one for sales” messages using your phone and possibly an attached computer. No extra IVR module, no extra IVR fees.

***Connect office phones anywhere, like home, branch offices, on the road***

People new to VoIP phone systems have trouble accepting that physical distance no longer limits their phone system. Growing up thinking that physical wires have to be involved becomes a mental habit that’s hard to break.

VoIP phone systems replace those physical wires with the Internet, which transfers data so quickly that an extension across the country sounds just as clear as an extension across the hall. Each VoIP phone’s individual address connects across the Internet to your VoIP phone system, no matter where on the Internet it plugs in.

Like your desk phone? Take it to your home office and it acts just like it’s back on the other

side of your commute. Like soft phones, which are software programs running on your computer? A laptop with a soft phone linked by Bluetooth to your earpiece becomes just another VoIP phone when your laptop connects to the network, whether from your home office or a branch office or a customer location or a coffee shop.

#### ***Easy and free conference calls***

Meetings can be a pain, but with conference calls at least you cut out the travel time. Conference calls, driven by new technology, cost less than before. But your VoIP phone system makes conference calls both free and easy. Set up a call with a few button pushes, and talk away. VoIP-enabled speaker phones and meeting room phones cover all conference call meeting situations.

#### ***Treat remote area codes as local calls***

Remember that distance doesn't matter across the Internet? VoIP systems use that to make it easy to tie remote area codes into your phone system (for a small monthly fee) This means customers in those remote area codes need only make a local call to reach you. This saves them money and makes you look more responsive, which is good news for everyone.

#### ***Let's do a quick summary of ways a VoIP phone system helps your business:***

##### **Costs:**

- No upfront hardware needed (with Hosted VoIP)
- Free domestic long distance, reduced foreign call costs
- Pay a few dollars per month per phone line
- Pay for only the number of lines you actually need
- Auto Attendant comes free with the system

##### **Productivity:**

- Use Presence to locate coworkers
- Improved conference call feature built-in

##### **Customer improvements:**

- Find Me / Follow Me and Dual Ring keep you in touch
- Remote area code support gives you local numbers in other areas

## **Preparing for a VoIP System**

There are two networks to examine before you get your VoIP phone system: your internal network, and your network connection to the Internet. Many companies find they have neglected both networks, and installing a new VoIP phone system gives them a chance to upgrade areas too long ignored.

Every concurrent VoIP conversation requires about 100 kilobits per second of bandwidth. If you have 10 calls at once, you need at least 1 megabit per second of available network throughput. Since the lowest-level Ethernet network components provide 10Mbps, you might think you're ready to go.

Not so fast (pun intended) Your network's Ethernet may be rated 10 Mbps, or more likely 100Mbps, but that's a best case number. Ethernet is bi-directional, meaning the effective throughput for data exchanges is 5 Mbps or 50 Mbps in each direction. File transfers, Internet access, and people watching kitten videos on YouTube suck up surprising amounts of bandwidth. Suddenly your VoIP phones fight for bandwidth, and your conversation suffers. If a large file transfer takes seven seconds rather than five, no one notices or cares. But if there's a two second gap in a phone conversation, everyone notices, and not in a good way. Your internal network may well need more horsepower, or at least bandwidth.

### ***Internal Network Updates***

Every workstation, cubicle, and office in a company today already includes phone and network connections. The small jack (4 pins) is for the phone, and the larger jack (8 pins) provides the network link.

There are two internal network options: run your VoIP phone system over your existing network (after upgrades) or install a second network dedicated to VoIP. Both options have their fans.

Upgrading your existing network will almost certainly mean upgrading your network switches and routers. Of course, you've probably ignored the switches and routers and wiring hubs and patch cables for too long anyway, so a network refresh is overdue. Adding such upgrades helps all your network traffic, not just your VoIP system.

Two Ethernet add-on technologies really help VoIP: QoS and PoE (Quality of Service and Power over Ethernet). QoS allows you to separate traffic types within the router and intelligent switches to make sure important traffic (voice calls) doesn't get slowed down by petty traffic (kitten videos). Configuring QoS properly is like adding an HOV lane for VoIP traffic on your data highway. Routers and switches supporting QoS are now commonplace and only slightly more expensive than "dumber" switches and routers.

The second feature, Power over Ethernet, powers your VoIP phone over the network cables, like Ma Ball used to do for home phones (you know, the one on your grandparent's wall in the kitchen). Whether PoE by itself is worth avoiding a wall wart phone power supply is up to you (and your preparation for power outages, as discussed earlier).

Some VoIP phones have two Ethernet ports. One connects the phone to the wall, and the second connects your computer into the phone. This allows companies to avoid installing extra wiring switches and wall jacks, although not all VoIP phone models have this option. This obviously keeps your VoIP and data traffic on the same network, which lowers the VoIP system cost.

If you install a second Ethernet network, the VoIP system costs will be higher. Often dual networks are installed during new construction, not retrofitted. Larger companies with more phones tend to choose this option more often than smaller companies that don't have bandwidth limitations.

Some VoIP phones now connect over WiFi, which works well for companies committed to wireless networking. There are fewer options, but available models tend to be wireless versions of the most popular VoIP phones. However, some administration and special use phones do not yet come with WiFi support.

For WiFi fans, the same rules about network bandwidth needs apply. For every concurrent WiFi VoIP conversation, you need at least 100k available bandwidth. Since WiFi throughput heavily depends on distance from access points, you will almost certainly need to update your wireless network infrastructure unless you have done so within the last 12 months.

### ***External Network Updates***

While your internal network probably runs at 100 Mbps or higher, your Internet access most assuredly does not. Moving to a VoIP phone system normally requires two updates for to your Internet access system: more bandwidth, and redundancy.

Your Internet Service Provider will be happy to up your Internet access speed, and has charts to help you decide the appropriate boost based on the number of VoIP phones. Smaller companies may find they actually have the bandwidth they need.

However, every VoIP phone system needs redundant ISPs, preferably connected on opposite sides of the building. After all, if the ground crew digs up a conduit, you don't want both of your Internet access carriers coming through the same bundle of shredded wires.

Talk to your network administrator about Dual WAN routers. These support two external WAN connections from different ISPs. Some models fail-over from your primary ISP to the secondary provider, others send traffic through both at all times to increase your total available bandwidth. Either way, if one ISP goes down, you'll still have your phones. And your data network, another advantage to upgrading.

### ***Identify Your Needs and Staying Within Budget***

The first part of "how many VoIP phones will you need" is easy: at least one for every phone now, and maybe more. Add in your network upgrades, inside and out, from proposals from your network vendors, and you have the bulk of your budget.

Users only see the phones, of course, so that's all they care about. For that reason, decide on a few models to show to a pilot group in the company. This keeps the decision process defined, and will result in a much quicker decision than if you let everyone surf the Internet for a phone they fancy. Of course, if you keep your existing phones and add a VoIP adapter to your phone system, these decisions are moot.

### ***Basic Phones***

This unit will be the most common phone, replacing the standard desk phone in place now. These phones will have only basic calling features, and have either no LCD screens or small ones. Expect to pay \$80-\$150 for this type of phone.

### ***Advanced Phones***

These phones will have multiple lines, larger screens, (up to seven inches), and perhaps be suitable for video conferencing (meaning they include cameras) Pick a model that won't break your budget if you have to give every manager this phone, because phone envy inside hierarchies is real. Expect to pay \$150-\$750 for these units.

### *Special Purpose Phones*

One phone in the system may have to be an administrator phone to perform system functions. Many of these can be done via computer or website portal instead, but be prepared to purchase at least one “admin” phone.

The second most common special purpose phone is a VoIP version of a conference phone. Able to support all traditional business meeting conference phone functions, these units will cost between \$300-\$900. Part of the reason for the expense is the wider audio range supported by VoIP phones. Ma Bell limited the vocal frequency range to save money building out their early networks, and after using a VoIP phone to another VoIP phone, the low-quality calls of traditional land-line phones will become annoying.

### *Selecting a VoIP Provider*

Selecting a VoIP provider differs little from selecting an ISP, accountant, Managed Services Provider, or insurance agent. In each search process, you identify prospects, interact with three or more of the most promising, and finally engage the one that makes you feel the most comfortable. Often, your technology staff or outside providers can bring in partners who specialize in VoIP. Word of mouth from a trusted partner goes further than any other reference.

### **Summary**

VoIP, IP Telephones, or Internet Telephony – whatever you call it, digital phone systems that convert voice into data for transmission over data networks is the phone of the future. You don’t need to throw out a working phone system to replace it with VoIP today. However, when the time comes to upgrade your phone system or move your office, look for several VoIP vendors and get the exact details of how little it will cost, and how much you will gain, when you upgrade your voice communications to the phone technology of the future, VoIP.

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