Voice Over IP – is it hype or can it work for me?
By American Business Communication Inc.

In the world of telecom, it seems like everywhere you turn there is a buzz about Voice over IP (VoIP). Hardly a day goes by when we don't get asked by a company if VoIP is right for them. You can't read a business publication without seeing an article or advertisement having something to do with VoIP. Businesses are being told that the future is VoIP, and the time is now to move to this new technology.

So, what is VoIP?

From a technical point of view, VoIP refers to the methodology of taking human speech, packaging it, and adding a priority marker so the voice can be transported from point A to point B via a network using Internet Protocol (the "IP" part of VoIP). With VoIP, voice conversations can be transported on a local area network, wide area network, private network, or the Internet. The only qualifier is that the transmission medium (wireless or wire line) must support Internet Protocol (IP).

Please note that by no means is the "voice" required to travel over the public Internet. Today, very little VoIP traffic is carried over the public Internet. The Internet is a network that supports Internet Protocol.

This process is in contrast to how telephony has been for over 100 years. Traditional voice calls travel via specific paths (lines or trunks) on voice-only public or private networks. This transport is called the Public Switched Telephone Network (PSTN). If we were naming this network today we might call it "Voice over the Public Switched Telephone Network" (VoPSTN).

The convergence of voice and data is not new. There have been different technologies available from both data and PBX vendors since the mid-80's. The technology has gone through a series of evolutionary steps to where we find ourselves today with VoIP.

With all the hype, it may be difficult for companies to discern if VoIP is right for them. The purpose of this article is to help you decide if VoIP is the best solution for your business.

There are several perceptions we hear from businesses concerning VoIP that we would like to address, but first, let's talk about what VoIP really means. VoIP is actually a very broad term that can include many technologies and software applications. In some ways, VoIP represents an umbrella that covers multiple technologies, products, and network services.

The VoIP Umbrella
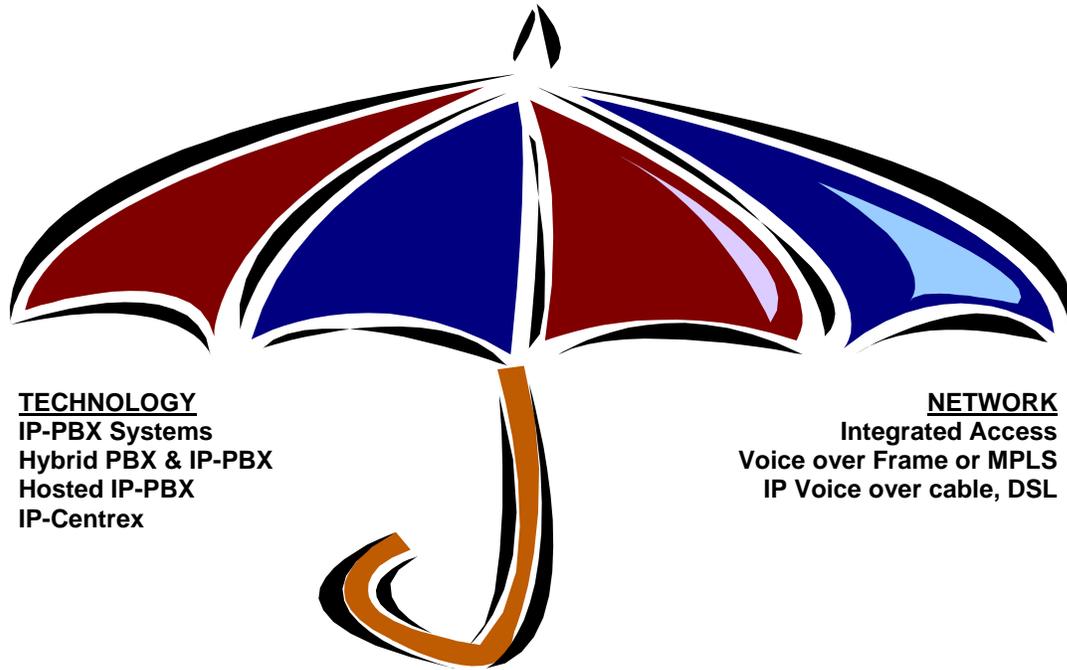
TECHNOLOGY
IP-PBX Systems
Hybrid PBX & IP-PBX
Hosted IP-PBX
IP-Centrex

NETWORK
Integrated Access
Voice over Frame or MPLS
IP Voice over cable, DSL

The **"technology"** side of the VoIP umbrella focuses on how voice service is provided to the desktop. In other words, the phone system, hardware, and applications (i.e. call centers, voicemail, messaging, etc.)

If you are moving into new office space, performing a major expansion, or need a new phone system, you should consider using VoIP technology - it's the technology of the present and foreseeable future of business communications. VoIP technology in the office will save you money because:

- Your voice calls will travel on your local area network infrastructure using the same cable and routers.

- The cost for moving desks and offices can be reduced because telephone wiring and data wiring are one in the same.

- The cost for administering users profiles and locations (including moves, adds, changes, or disconnects) can be reduced sine the configuration or profile is not hardwired to a particular handset or phone port.

The **"network"** side of the umbrella focuses on how voice calls, data communications, and conferencing services are transported to the carrier's VoIP network cloud. The network side also focuses on how the information is transported across the internet network and is terminated on the other end.

If you have multiple geographically distributed office locations and have a large need for inter-office communications, you should consider using VoIP networking. Also, if you are looking for integrated access to combine voice (local and long distance) and data services on a single T-1, then you may want to consider VoIP as a method of access.

So, one of the first things to do when you think that you want VoIP is to identify what you need – technology, network, or both?

Will VoIP save my company money?

With the above information in mind, let's talk about if and how VoIP can save you money. The most common perceptions we see from companies today are:

1. VoIP will give you "free" long distance calls.

2. VoIP will give you "free" inter-company calls.

3. VoIP will save money.

Perception 1: Long distance calls are free.

Just like there is no free lunch, there are no free VoIP telephone calls either. You replace the per-minute charge for long distance with increased bandwidth charges - you still need to buy sufficient bandwidth to access a network that can support your converged data and voice needs. Also, if you are making "outside" calls, the party you are calling is not part of your IP network. As a result, you will need to hop off the VoIP network and onto the old PSTN to get from your IP-based network to the person you are calling.

Figure 1 illustrates that if you place an outbound call to a telephone number outside your own network, at some point the call must leave the VoIP environment and go out on the PSTN network. When the call hops off, in most cases there will be a charge back to you.

- **Step 1: You call a number.**
- **Step 2: The call is routed to the VoIP "network cloud."**
- **Step 3: The call hits the VoIP cloud and is routed to a PSTN gateway.**
- **Step 4: The PSTN gateway places the long distance call to the telephone number.**

Figure 1
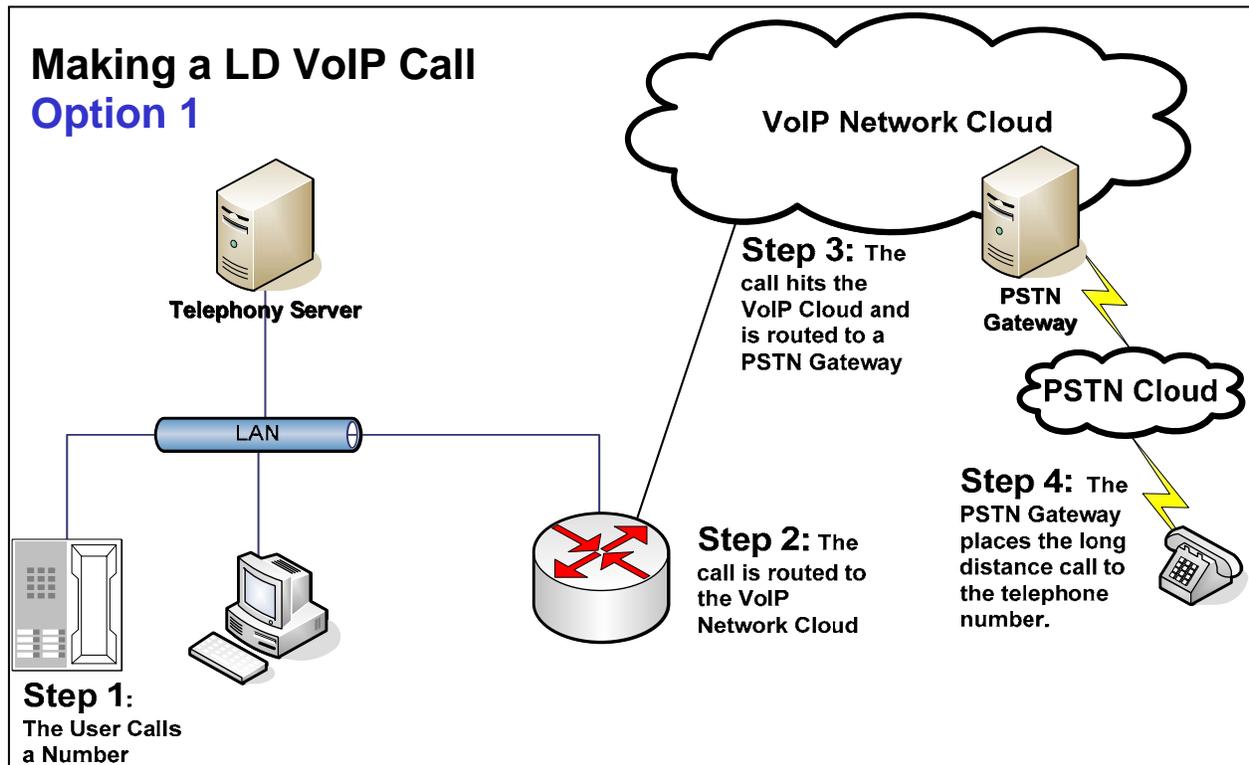
Alternatively, Figure 2 illustrates a configuration where a PSTN Gateway would be on your network.

If you have an IP-PBX on your site you may want the PSTN Gateway as a part or your IP-based telephone system. In this case you bring in lines and trunks from local and long distance carriers. These lines get connected to the PSTN Gateway.
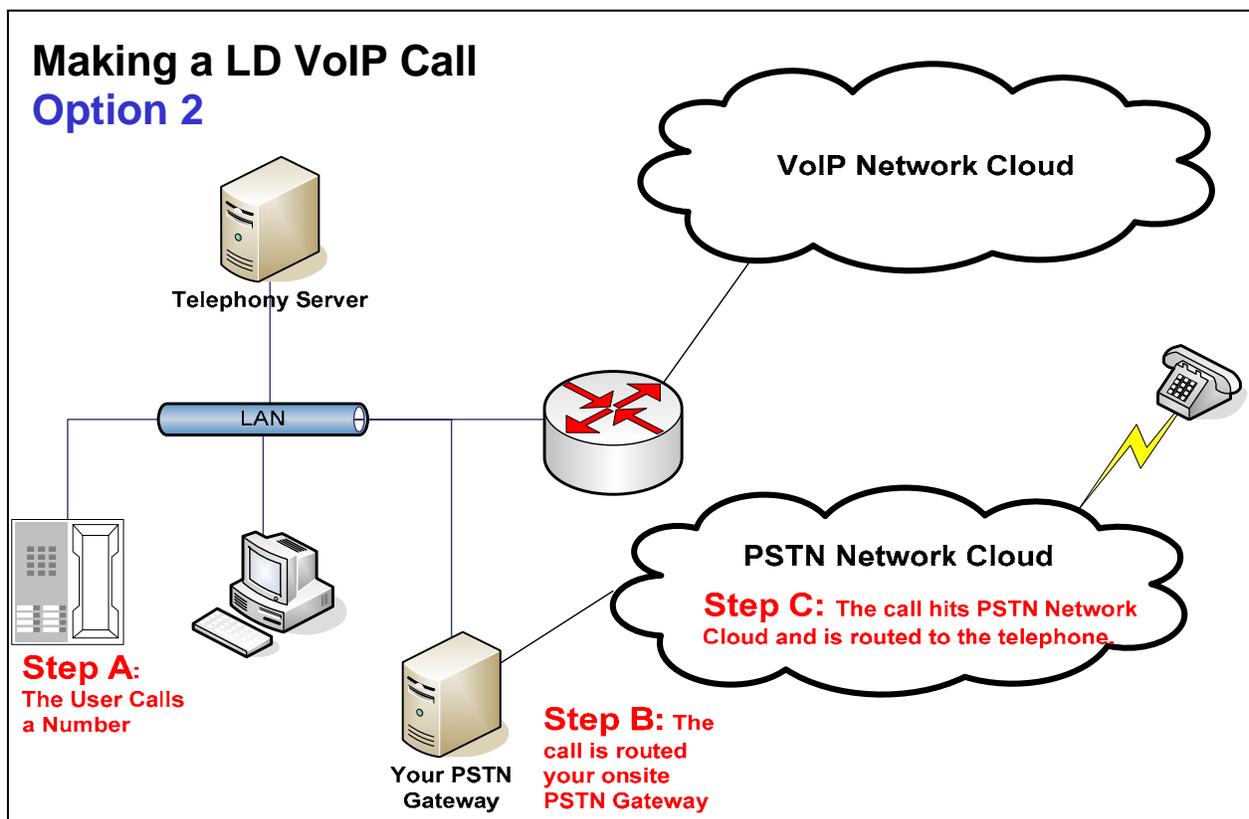
The PSTN Gateway converts IP-based calls and converts the Internet Protocol to the PSTN protocol. The call goes out over the PSTN circuits to the destination phone number.

> **Step A: You call a number.**
> **Step B: The call is routed through your onsite PSTN gateway.**
> **Step C: The call hits the PSTN "network cloud" and is routed to the telephone.**

Figure 2

If you have toll-free numbers, the same thing happens in reverse. A caller dials your toll-free number and gets routed to a PSTN Gateway. The PSTN Gateway converts a PSTN-based call into Internet Protocol. The call can now be routed to your office. The VoIP network provider can supply the PSTN Gateway, or you can have that capability in your office.

In these two examples, the traditional PSTN network is still involved in placing and receiving calls to and from the outside world. As a result, you will either pay on a per-call basis, or buy service packages that include some quantity of inbound and outbound minutes. Either way, there are no "free" LD calls.

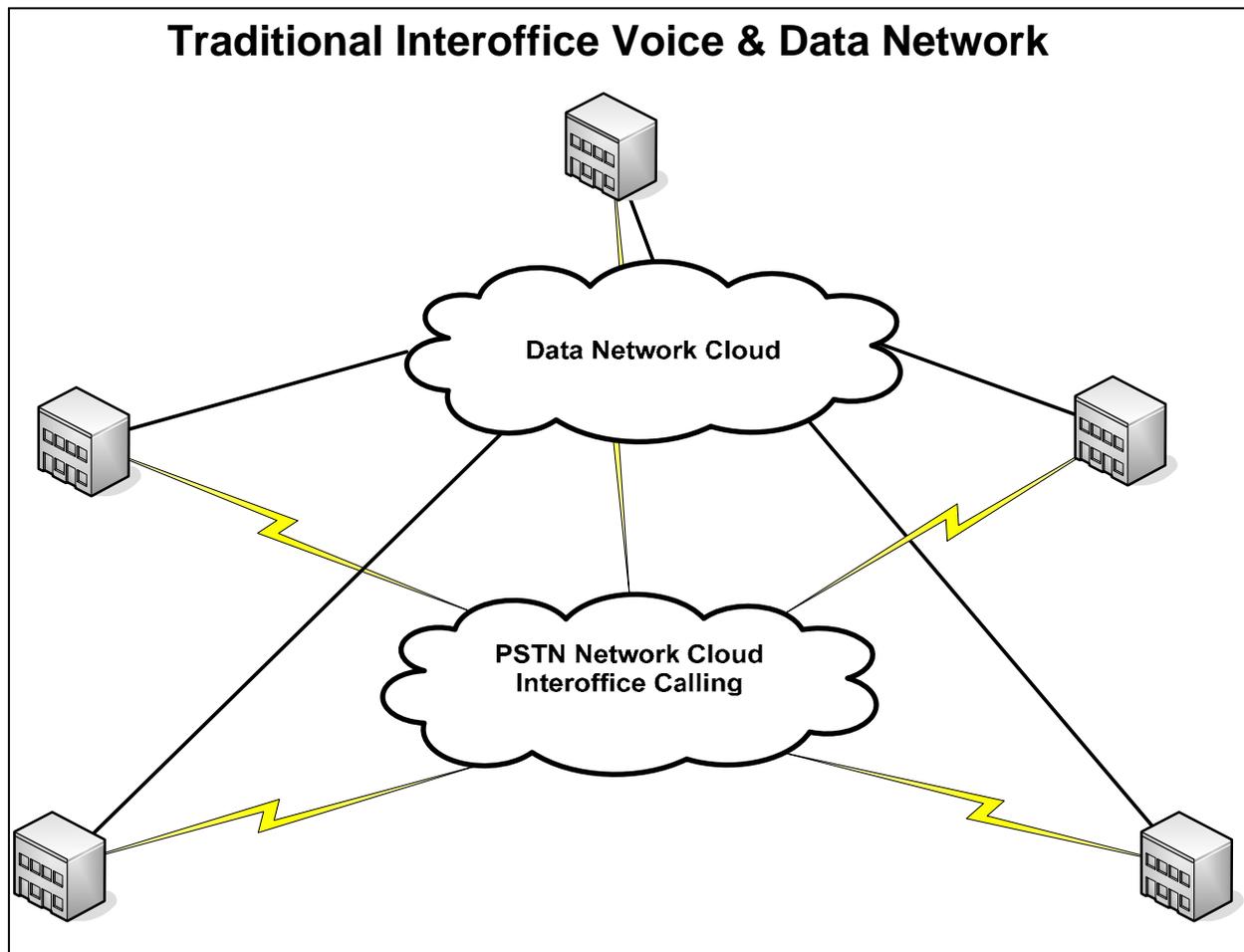**Perception 2: With VoIP I can call my other offices for free.**

If your enterprise has a number of geographically distributed offices with a fair amount of calling between the offices AND you have an inter-company data network, inter-company calls may be free.

In a traditional environment, voice and data networks are separate. With the data network, you pay for the amount of bandwidth you need to get the response time and reliability desired. With the voice network you pay for lines and trunks in a quantity that reduces the number of busy signals for employees and callers.

When you add the cost of the voice and data networks together, it can look very expensive. In most VoIP cases it can be assumed that these costs can be reduced. However, in some cases it is not true.

The promise of VoIP is that you can save some of the voice network costs related to inter-location calling. A portion of the savings can be used to expand the data bandwidth to handle the data traffic and inter-company calls. This configuration would create a network like the one shown in Figure 3.

Figure 3

Traditional Interoffice Voice & Data Network

Data Network Cloud

PSTN Network Cloud
Interoffice Calling

The key to making the "free" configuration happen is to add little or no bandwidth. If your data network has more bandwidth than is really needed for your business, then adding the inter-company calls could be absorbed without additional costs. Having more inter-company bandwidth available than can be consumed is a fairly rare occurrence.

VoIP technology has the ability to dynamically allocate bandwidth, providing more bandwidth for voice during high calling times. If you have too little bandwidth, however, voice and data quality can suffer. If you overbuy the bandwidth, the network becomes too expensive to operate. Your network must be sized adequately to support the bandwidth requirements of both voice and data.

Figure 4
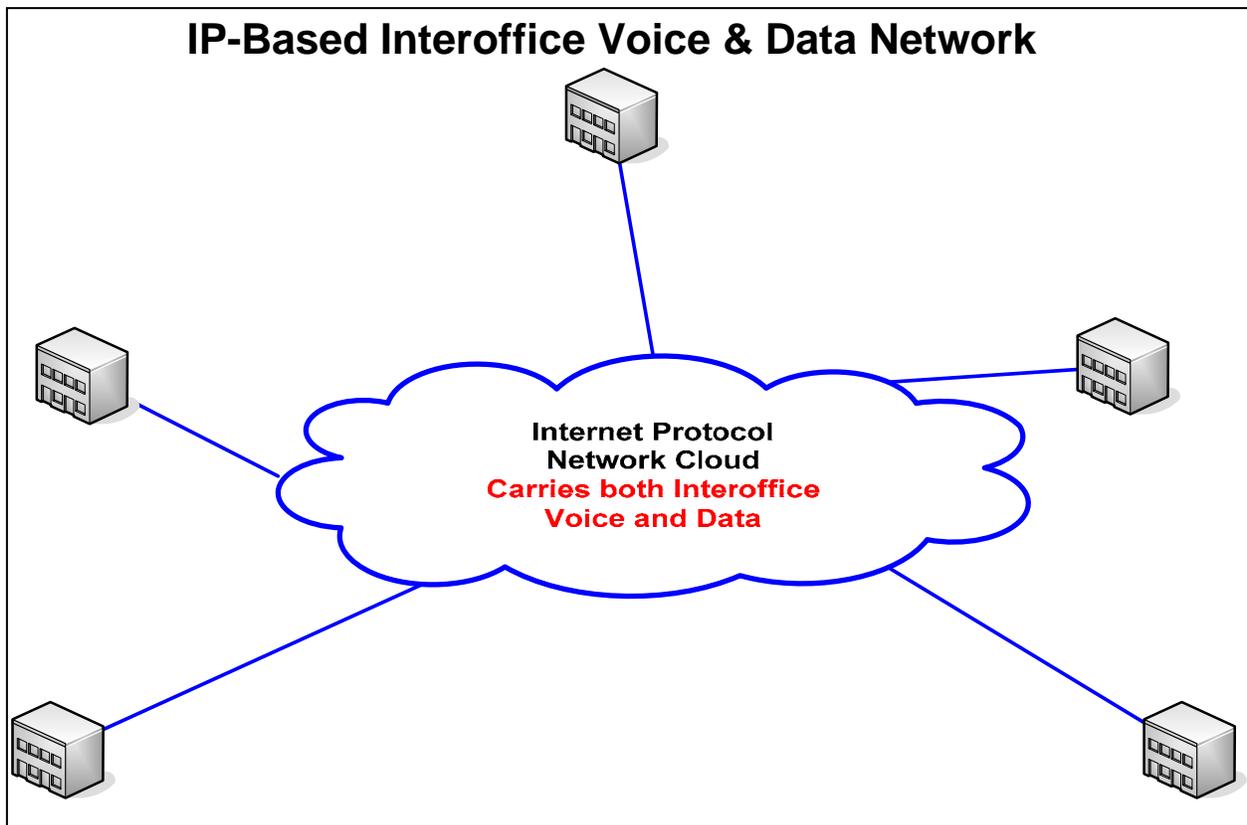
Your carrier most likely can perform a network study to show the current performance of your data network. You will then need to model the impact of adding the inter-location voice traffic to determine your total network bandwidth need.

Another question: What is the price of current long distance? Per-minute costs of traditional long distance have continued to drop, and it is not uncommon for businesses, even those with modest LD needs, to get rates of 3 cents per minute or less. For every 200 hours (12,000 minutes) of inter-office calls the cost would be only $360. Even at 5 cents per minute the cost would be just $600. It takes a lot of inter-company calling to justify buying extra bandwidth to carry voice.

Perception 3: VoIP will save you money.

Case Study:

Recently ABC had an opportunity to help a customer resolve a problem with their VoIP implementation.

The company had multiple locations, and had implemented stand-alone IP-PBX systems at each site. Along with the VoIP implementation, they had installed a frame relay network to support data and their inter-company VoIP.

Their problem: Poor voice quality for VoIP calls between the locations.

After discussions with the company and its vendors, the diagnosis of the voice quality problem was that the frame relay network's bandwidth needed to be increased. Before placing an order, we had to determine the bandwidth required to carry both data and voice.

During this process, ABC created a ROI model to make sure the network upgrade costs needed were financially justified. The ROI model looked at the cost of the frame relay network plus the cost of the bandwidth expansion. This cost was compared to a more traditional solution that combined a data VPN with the PSTN for the inter-office voice calls.

The ROI model indicated that the company should:

1. Take out the frame relay network.
2. Implement a data Virtual Private Network (VPN).
3. Use the PSTN for all inter-location voice calls at a rate of 2 cents per minute.
4. Keep the IP-PBX systems installed, which simplifies system and remote user administration, reducing administrative expenses.

This particular customer saved over $32,000 by <u>not</u> using VoIP for inter-location telephone calls. So much for "free" inter-company calls!

In summary, VoIP *might* save you money, but it is important to perform the ROI:

1. Determine your telecom costs based upon the current situation.
2. Determine your total telecom costs if you use VoIP.
3. Then determine your telecom costs if you did incremental changes based on more traditional methods and designs.

Creating an ROI model that only compares steps 1 to 2 may indicate that VoIP implementation will save money over current costs. However, the comparison of steps 1 to 3 may provide a better interim step that provides a superior return with minimal efforts.

In short, you need to do your homework to see if VoIP is hype, or right for you.

VoIP and 911

About 1.5 million customers use VoIP service (the bulk being consumers), and the number is growing rapidly. Most of the media coverage surrounding VoIP and 911 stemmed from an incident in Texas where an elderly couple was attacked and nearly killed in their home while their daughter frantically dialed 911 from an upstairs room where she was hiding. The state of Texas is sued Vonage, the service provider, for failure to provide 911 service. The suit filed by the Texas Attorney General alleged that Vonage didn't do an adequate job of disclosing that 911 service wasn't included.

As a direct result of this and other similar cases, on May 19, 2005 the FCC ordered interconnected VoIP service providers that are similar to traditional telephone providers to provide 911 services.

The order reached the following conclusions:

- Interconnected VoIP providers must deliver all 911 calls to the customer's local emergency operator. This must be a standard, rather than optional, feature of the service.

- Interconnected VoIP providers must provide emergency operators with the call back number and location information of their customers (i.e., E911). Although the customer must provide the location information, the VoIP provider must provide the customer a means of updating this information, whether at home or away from home.

- By the effective date, interconnected VoIP providers must inform their customers, both new and existing, of the E911 capabilities and limitations of their service.

- The incumbent LECs are required to provide access to their E911 networks to any requesting telecommunications carrier. They must continue to provide access to trunks, selective routers, and E911 databases to competing carriers. The Commission will closely monitor this obligation.

FCC Commissioner Michael J. Copps said, "By moving quickly, we will save lives."

VoIP 911 won't work if the Power is Out!

It is very important to know that in the event of a power failure or loss of your Internet connection the VoIP 911 connection to a 911 operator is **_NOT_** possible for a VOIP customer.

If you have a plain old telephone line from the "phone company" in your home that is directly connected to the phone line, the phone is powered from the line. In the event of a power outage, the phone usually works unless the phone lines are down, too.

VoIP service arrives at a home via a broadband connection, usually in the form of DSL or cable. The broadband service must be connected to a modem and/or router device. This device is plugged into a wall outlet. Also, the VoIP phone may need to be plugged into a wall outlet as well. So, in the event of a power failure, your VoIP phone would be out of service.

If you are concerned about having phone service during power outages, or if you live in an area of the country that is prone to natural disasters, you may want to invest in a small UPS system. The broadband modem/router and VoIP phone may all need to be plugged into the UPS.

Small UPS devices can be purchased at most computer or electronic stores. The size and cost of the UPS is dependent upon the number of devices you want to power, the current draw of each device, and the amount of time you want to use the device during a power outage.