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Cut the Cord!

The Consumer's Guide to VoIP

An easy-to-understand, hands-on guide to Internet phone services

- Use Internet technologies to obtain free or low-cost telephone service
- Quickly compare the technologies and services available to you
- Learn what you need to know to purchase and set up a VoIP service

Jerri L. Ledford

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The Consumer's Guide to VoIP

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For Mom and Dad...
because you gave me wings and taught me to fly.

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About the Author

Jerri Ledford has been a freelance business technology writer for more than ten years. During that time, more than 700 of her articles, profiles, news stories, and reports have appeared online and in print. Her publishing credits include *Intelligent Enterprise*, *Network World*, *Information Security Magazine*, *DCM Magazine*, *CRM Magazine*, and *IT Manager's Journal*.

Jerri also develops and teaches technology training courses for both consumer and business users. She's developed courses on security, customer service, career skills, and technology for companies such as IBT Financial, Writer's Village University, You Don't Say, LLC., Hewlett-Packard, and CNET. She is also the author of *Web Services: Understanding Service Level Management* (ContentCan, 2002) and *Marketing Your eBook: The Only Guide You'll Ever Need* (Roberts Publishing, 2001), and is a contributor to *The Writer's Online Marketplace* (Debbie Ridpath-Ohi, Writer's Digest Books, 2000) and *Unbelievably Good Deals and Great Adventures That You Absolutely Can't Get Unless You're a Student* (Marian Edelman Borden, McGraw-Hill, 2001).

When she's not writing for a consumer audience, Jerri also produces corporate collateral—white papers, case studies, Web content, and presentations. Her corporate clients include Switch & Data, The World Health Organization, FujiFilm, Coca-Cola, and NaviSite.

In her off-time (which is infrequent), Jerri homeschools her two children, and spends hours playing with her electronic gadgets. She's fondly referred to as "tech support" by friends and family members.

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Introduction

In 1876 Alexander Graham Bell invented the telephone as he was trying to develop a new telegraph system that would allow more than one telegraph to be transmitted simultaneously. It wasn't long before the first telephone line was established and many more followed.

There was no way Bell could know at the time what he was creating. Since then, telephones have become an integral part of our daily lives. They are our main means of communication; our lifeline to the rest of the world. But even lifelines need to be replaced once in a while.

Unfortunately, not much has been updated in our telephone system since shortly after it was established. Sure, there have been some advances, such as improvements in switches, but for all practical purposes, the telephone technology that you use today is the same technology that Bell used when he made his first call to his assistant, Thomas Watson. That call, which consisted of less than ten words exchanged over a copper wire, changed the way the world communicates.

The time has come for another change. The traditional telephone has served us well for more than 125 years, but advances in technology now give us other options. Voice over Internet Protocol (VoIP) is one of those options, and though it's still in its infancy, it's shaping up to be an excellent option. It brings with it the promise of a future that's better than the past.

Indeed, VoIP might be the first step in the next shift in the way you communicate, but before far-reaching changes can happen, VoIP must take hold. It's a matter of time. In that time, consumers will learn how VoIP has matured and changed. You'll be drawn to the technology by the price, which is considerably less than that of traditional telephone service. But as the technology matures and gains market strength, VoIP will become the future of communications.

It all sounds pretty technical, doesn't it? Don't fret. This is all just a way to say, VoIP is here to stay. People are ready to get out from under the big telecommunications companies. People are ready for choices. VoIP gives you those choices.

To that end, this book is your VoIP consultant. In the pages that follow you'll learn about VoIP, how to decide what's right for you, and how to get it set up and operational. You'll find all of the information you need to make a decision about VoIP and then to put that decision to work.

The following pages contain information about VoIP and how it compares to traditional telephone service, as well as resources to help you decide if VoIP is right for you. If you decide it is, then you'll find resources to help you find the right VoIP service and service provider.

Along the journey there are checklists, Web site resources, tips, and notes to help you understand VoIP and get the most from it. You'll find guidelines for installing and configuring the VoIP service that you choose, and examples of real VoIP services that you can try before you make your decision.

I'm excited about VoIP, and not just because it's a new technology, but because of the choices that it finally gives us for communications. Those choices have been a long time coming. Now that we have them, the future of communications once again looks bright.

It is an interesting technology, but even more interesting is the potential that the technology brings to the telecommunications industry. Not for more than 125 years have we seen this kind of a shift in the way people communicate. VoIP is one step in that direction, and it looks like it could be a very interesting journey.

1

CHAPTER

What Is VoIP?

Have you looked at your telephone bill lately? Even as it seems that the cost of telecommunications is decreasing, your bill keeps getting larger. Telecommunications companies are scrambling to lower rates and hold on to customers, but the draw of the cellular phone and its unlimited potential is making that difficult. Cellular phones, after all, offer users the option to have set monthly bills with a specific number of minutes to be used each month. Some plans even offer unlimited usage, and that really appeals to a lot of customers.

Traditional telephone companies never believed that cellular phones would be a threat. In fact, some telephone executives in the '80s didn't believe that cellular phones would even become as widely accepted as they are. Now Internet telephones are adding to the pressure, and traditional telephone companies are finding their customers leaving in droves for other service options. In response, those traditional phone companies are rushing to offer better, and less expensive, service plans to existing customers. Unfortunately, the efforts that telecommunications companies are now making might be too little, too late.

Consider all of the channels you use to stay in touch with friends, family, and colleagues. Most people today have an Internet connection, a cell phone, a landline telephone or two, and maybe even a pager or two-way radio. The sheer volume of equipment needed to stay in touch with all of those people is overwhelming, and that's before you even take the cost for those services into consideration.

A trend is poised to change the way you communicate. Or more accurately, it's set to converge all of these methods of communication to make it faster and easier to stay in touch no matter where in the world you go. This convergence is centered around Internet telephones and is called *IP Telephony*. It encompasses the transmission of fax, data, video, and voice via the Internet. If you focus specifically on voice communications via the telephone, what you think of as a phone line today may not be a "line" at all in the future. Instead, telephone calls are more likely to take place over the Internet with your voice being broken into small bits and then reassembled to create conversation.

What's pushing this change is *VoIP* (Voice over Internet Protocol) and it's going to change the way you hold telephone conversations. To understand the power of VoIP it's helpful to know a little about telephone history. It's been nearly 130 years since Alexander Graham Bell discovered he could communicate across distances using copper wire and electricity.

He actually made the discovery as he was working to develop a telegraph line, called a *multiple telegraph*, that could transmit more than one message at a time. He and electrician Thomas Watson were working together to produce a working multiple telegraph that was based on transmission of harmonic frequencies when Bell heard the sound of a spring transmitted over a copper wire. It then occurred to Bell that he might be able to use this method to transmit voice electronically.

He and Watson began testing the theory as they continued to work on the multiple telegraph and soon discovered that voice could be transmitted via a copper wire as long as electricity was involved. On March 10, 1876, the first telephone call took place between Alexander Graham Bell and Thomas Watson.

Unfortunately, telephone technology hasn't improved much since 1876. Sure, there have been some improvements, mostly in how calls are routed from one place to another, but at its very core, telephony as we know it is still about making calls that are transmitted via copper wires on dedicated networks.

VoIP is set to finally move telephony into the twenty-first century. With VoIP, telephone calls are transmitted, not over a dedicated network, but instead over the Internet. In fact, a large majority of international calls are already transported this way. It's just not something that telephone companies advertise.

The reasons this form of communication is gaining so much attention are numerous, but two stand out. First, communications via the Internet are *much* cheaper than communications that are delivered via a dedicated line. There's less maintenance involved, and even the equipment required is dropping in price, making it affordable to everyone. The end result is that you can have virtually the same telephone service that you currently have, with improved and expanded features, and pay less than you're currently paying.

Another, and equally important, reason that VoIP is gaining attention is because it's the first step to communications utopia. That's a place where you use one device to make telephone calls, no matter where you are, in addition to having access to e-mail, *short messaging services* (SMS), data transfer, and myriad other communications services. This communications convergence will feature VoIP and wi-fi capabilities. And when it's complete, which is likely to be a few years down the road, communication will be a completely different activity than what it is today. It will be faster and it will cost far less.

VoIP Basics

I have your attention now, don't I? But I'll bet you're wondering "What, exactly, is VoIP?" It's more than just a concept. VoIP is happening right now, and chances are, you know someone who uses VoIP daily. You may even use it in your office or work environment and not even know it.

Simply put, VoIP is a way to have telephone conversations with others using the Internet rather than a traditional telephone line. So the acronym, VoIP, stands for Voice over Internet Protocol—a computer application that is used to send voice data over the Internet.

For example, if you make a telephone call using a traditional telephone service today, your phone is connected to a jack in the wall that connects to the *Public Switched Telephone Network* (PSTN). You pick up your phone, dial a number, and the call is routed across telephone lines that criss-cross the nation.

VoIP differs by using the Internet to transport the call. So instead of being connected to a phone jack in the wall, your telephone is connected to an adapter that plugs into your Internet connection. When you make a VoIP call, you pick up your phone, dial the number, and your call is transmitted via the Internet.

It's more detailed than that, but we'll get into those details in coming chapters. This is the most basic difference between traditional telephone service and VoIP phone service. It's the difference that will probably change the telephone industry, and on a larger scale the telecommunications industry, forever.

VoIP of the Past

You may remember VoIP from its early days in the mid-1990s. During that time companies began testing the waters for VoIP and there was a push to use Internet telephone services that allowed users with specific software installed on their computers to call other people who also had the same software installed. The calls had to be made using the computer and a microphone headset, and usually those calls were more frustrating than valuable. Users spent a lot of time fighting dropped calls and repeating themselves because of the garbled nature of the incoming audio.

Those early VoIP services were very rudimentary. Technology wasn't ready for the demands that VoIP placed on it, and the result was poor-quality phone calls that were unsynchronized and delayed. Many people compared the quality of those calls to the quality of talking on a two-way radio, except

it was less reliable. What's more, those calls were very limiting. If the person you wanted to speak with didn't have a computer *and* the same software you were using, you couldn't call them. This is not to say a lot of people didn't take advantage of the technology, even in its early stages. In some instances, the frustration and aggravation of early VoIP was worth it. For example, for military couples where one spouse lives in the U.S. and one spouse lives overseas, even early VoIP was a blessing. It meant considerably lower phone bills and more communication, even if the communication wasn't always understandable.

The speed of Internet connections also contributed to the lack of quality at the time. Recently, more people have turned to broadband Internet services, and that's changed the landscape of communications tremendously. As with any other data, voice data can only travel as fast as the signal carrying it. Dial-up Internet service, which is not very fast, often resulted in portions of a conversation being dropped or the call being prematurely terminated. And even if all of the voice data traveled across the connection, the delay was frustrating and annoying.

Today those issues that plagued earlier generations of VoIP services are being solved. As they are, consumer adoption is taking place at a much more rapid rate. In fact, more than 14 million people have made at least one call using VoIP technology in the past few years, even if they didn't realize they were using VoIP.

The technology used today is much more mature. It features dedicated hardware processing and more advanced VoIP communications protocols in addition to the widespread use of broadband Internet access. These factors all combine to create a technology—*Internet Telephony*—that is more reliable, more consistent, and much more useful than the VoIP of the past.

How Does VoIP Work?

A conversation using VoIP begins like any other phone conversation. You pick up the phone, dial a number, and you are connected to the person you're calling. What's different between analog telephone service (that's the phone service you know so well) and VoIP is how the conversation is carried

from one place to another. With analog telephone service, your voice travels over a copper telephone wire as an electrical impulse. Millions of miles of these wires cross the U.S., and although they work well, they're relatively inefficient because the only data that can travel across that wire is your voice, and each conversation taking place requires a dedicated line. So, if you make a telephone call, you can't send a fax on the same line at the same time.

Note

There is one exception to this. A *dedicated subscriber line* (DSL) is an Internet connection that uses the high-band of your telephone line. Using DSL, you can access the Internet at the same time that you're using the telephone, which uses the low-band of your telephone line. DSL makes it possible to multitask to some extent, but still limits the capabilities of a telephone line to voice and Internet.

With VoIP, a telephone conversation is carried over the Internet and millions of conversations can take place in the same "space" simultaneously with other activities, such as data transfer, streaming video, and streaming audio. This makes VoIP far more efficient than traditional telephone service and reduces the cost of communications.

To make a call using VoIP service, your telephone is connected to a box called an *analog telephone adapter* (ATA; you may also hear it referred to as a *multimedia terminal adapter* or MTA). The ATA is then connected to the router that provides your Internet connection, as shown in Figure 1.1. This makes it possible for the ATA to transmit your voice over the Internet.

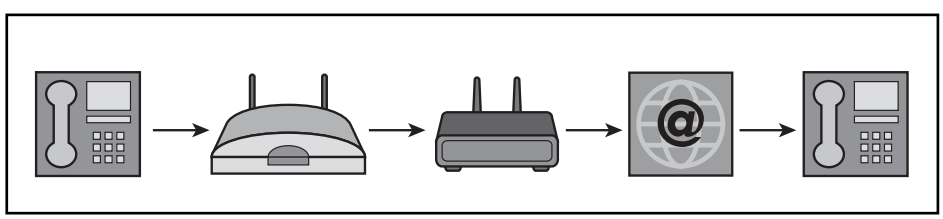

Figure 1.1

How VoIP calls are routed from one phone to another.

The ATA converts your voice into data, which is then divided into small pieces called *packets* that are sent over the Internet to your call's destination, regardless of whether the person you are calling uses *plain old telephone service* (POTS) or VoIP. The packets contain no less than 10 milliseconds but no more than 30 milliseconds of voice data, and they are encoded with information that indicates how the packets should be arranged and decoded when they reach their destination. So, when those packets of data arrive at the receiving end of the call, they are decoded and reassembled so that the person receiving your call hears your voice, just as if you were speaking to them through a copper telephone wire.

The primary protocol, or program, used today to convert your voice to data and then back to voice is called *sessions initiation protocol* (SIP), which is designed to support voice transmissions. In the past, a protocol known as *H.323* was the primary protocol for delivering voice communications via the Internet. But H.323 was primarily designed for data transmission, making it inefficient for voice transmission. Though both protocols are still in use, SIP is gaining more favor in the marketplace for reasons that you'll learn about in Chapter 4.

Other protocols exist in addition to SIP, however, and many vendors use their own proprietary protocols or, more commonly, a combination of proprietary protocols and/or SIP and H.323. This might all sound like Geek Speak to you but what it boils down to is increased call quality for every call that you make. These enhanced protocols, combined with broadband Internet access, translate into VoIP service that is easily as good as POTS, and some people think it's much better. Today's VoIP makes it possible to have a conversation using the computer rather than the telephone. The main difference is in how the call data is carried from one end of the conversation to the other. And today, even plain old telephone companies are using this method of call transport, especially for ultra-long-distance calls like those going overseas, because VoIP is a much less expensive technology than traditional telephony.

It's a dirty little secret that telephone companies don't exactly advertise. But why shouldn't they use the Internet to transport calls from one destination to another? It's far less expensive and the quality is just as good.

Which is all the more reason for you to consider VoIP. If it's good enough for the phone company, shouldn't it be good enough for you?

2

CHAPTER

Flavors of VoIP

During the '90s, Rebecca heard about an Internet telephone service that would allow her to make phone calls over the Internet for free. She simply needed a voice-enabled headset and a software program that turned her computer into a phone so she could call anyone she wanted, at any phone number. Excited, she downloaded and installed the software from the then fledgling company, Net2Phone. Then she connected her microphone headset and started making her first VoIP calls.

For Rebecca, like so many other people who tried earlier generations of VoIP, the experience was both frustrating and disappointing. The conversation was garbled, call segments were dropped, and she experienced frequent disconnects. At the time, VoIP technology wasn't ready for mainstream use even though service providers tried to push it forward. There was good reason: VoIP promised an advancement in technology after a century of standstill. Even with this excitement and push, the technology wasn't ready for consumer use and the immaturity of it left a bad impression on many users, including Rebecca.

Today's technology is better and more advanced. Both the hardware and software used to achieve VoIP have matured, and today's VoIP features better quality as well as more options. The widespread adoption of broadband Internet access also plays a role in the improvement of VoIP. Past generations

of VoIP relied on slower, dial-up Internet access that proved to be too slow to support VoIP technology.

Your VoIP choices in the past were also pretty limited. Most VoIP services in earlier generations operated with the computer as a main component of the service. Today, four general flavors of VoIP exist: PC-to-PC VoIP, softphones (also called PC-to-Phone), Internet telephones, and analog telephone adapters. Each of these differs in the way that phone calls are made, but the way the technology works is essentially the same. All of them use some combination of both hardware and software, but in some cases, it's not even necessary to have a computer to use VoIP.

Another differentiator for each type of VoIP is the way in which it is used. Some types of VoIP are throwbacks to past generations and require that you change the way you make phone calls by using a computer instead of a phone. Others use the same telephone equipment that you're accustomed to; it's just connected differently. You may also be limited to whom you can call using each different type of VoIP.

Some VoIP services require an additional piece of hardware, but calls are dialed using a regular telephone and don't require that you learn new skills or applications. Your communication needs determine which method of VoIP calling suits you best. The rest of this chapter is dedicated to explaining each type of VoIP and how it's used.

PC-to-PC VoIP

PC-to-PC is VoIP in its purest form and it happens to be the Internet phone service that so many people tried during the early '90s in hopes of being able to make long-distance and international telephone calls over the Internet for free. It's a software application that works by connecting people together over the Internet via an IP address, screen name, or URL. But anyone who used those early offerings will tell you the service was terrible. As with Rebecca's experience with early VoIP, calls were dropped or garbled, or were so terribly delayed that it was impossible to have a conversation without talking over the person on the other end of the line. Early VoIP users eventually gave up in frustration and went back to *plain old telephone service* (POTS).

One of the problems with those early VoIP offerings was the slow speed of the average Internet connection. Dial-up Internet access doesn't offer enough speed or resources to support both the communication from the modem and the data transmitted via a VoIP application. Today, PC-to-PC VoIP is better, especially over a broadband Internet connection. Some PC-to-PC VoIP applications are even acceptable when used over a dial-up connection. This is because VoIP has matured over the past few years. Even so, it still has limited capabilities.

PC-to-PC VoIP operates via a software program that turns your computer into a telephone. You download the software provided by companies such as Skype and Inter-Fone. If your computer has an installed sound card, all it takes to make a phone call is a microphone and speakers. A multimedia headset works better and is more convenient, but it isn't essential.

Note

Some people prefer to use a Bluetooth headset with their PC-to-PC VoIP service. It requires that you install a Bluetooth adapter and then sync the headset with the computer. However, it can be a little frustrating. Bluetooth headsets, as shown in Figure 2.1, are designed to be used with cell phones, so installing a Bluetooth headset on your computer could be a little tricky. You can learn more about using a Bluetooth headset with your PC-to-PC VoIP at http://www.bluetoothpcheadsets.com.

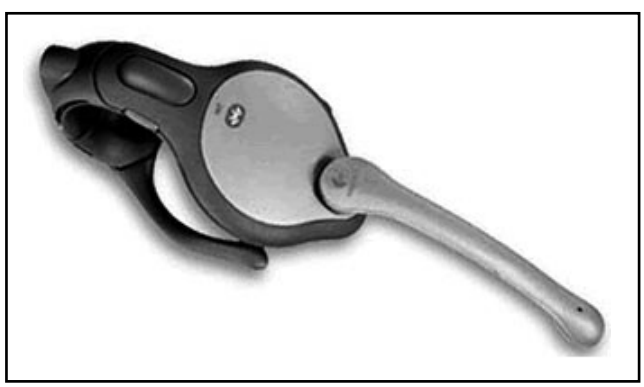

Figure 2.1

A Bluetooth headset.

To make a PC-to-PC VoIP call, you simply connect the speakers and microphone or multimedia headset, start the VoIP application on your computer, and use your keyboard and mouse to control the dialing actions of the software control panel. The software sets up the call, maintains the connection, and disconnects the call. The call is delivered from you to the person you're calling entirely over the Internet. It never enters the public telephone network. Figure 2.2 illustrates how a typical PC-to-PC VoIP application might look. Navigating the software is as simple as navigating a Web page.

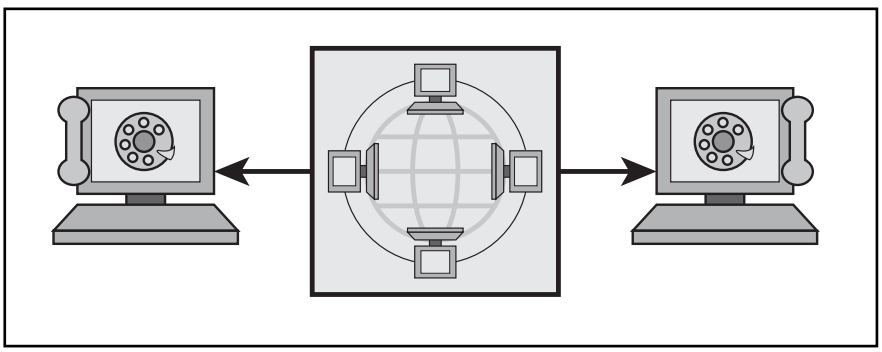

FIGURE 2.2

PC-to-PC VoIP delivers audio conversations from one computer to another via the Internet.

Once you tell the software to make the call, the connection is made using the Internet and the conversation is carried back and forth over the same Internet connection. The constraining factor of PC-to-PC VoIP is the fact that both the caller and the person being called must have the PC-to-PC VoIP software installed and have an active Internet connection for the call to go through. If there's no Internet connection, there's no way to transport the call. Furthermore, you can't call a regular landline phone from a PC-to-PC application, nor can you receive calls on your PC-to-PC application from landline telephones. Your calls are limited to only those from other people using the same PC-to-PC VoIP software. Without this application installed, a computer can't process an incoming call, and most PC-to-PC VoIP providers allow only users of their particular VoIP software to connect.

Quality and Reliability

The quality and reliability of PC-to-PC VoIP is dependent on a few factors:

- **Your computer:** Your computer should have at least a 166-MHz processor or higher, 56 MB of RAM or more, and be operating on a Windows 98 operating system or higher.

Note

Some PC-to-PC VoIP applications also support other operating systems. If you're using an operating system other than Windows, be sure that the VoIP application you choose works with your version of the operating system.

- **Your Internet connection:** One of the greatest failures of early VoIP offerings was that most users tried to operate it over a dial-up connection. VoIP will work over a dial-up connection, just not well. For VoIP of any type to be truly effective, a broadband connection is the minimum requirement, and as you learn in a future chapter, not all broadband connections are equal. For now, it's enough to know that a *dedicated subscriber line* (DSL) or *cable Internet connection* will improve the quality and reliability of your PC-to-PC VoIP calls.
- **The receiver's Internet connection:** If you're using a broadband Internet connection, but the person you're calling is using a dial-up Internet connection, the slower dial-up connection creates quality issues on both ends of the call. This is because dial-up Internet service just doesn't have the speed and resources necessary to efficiently carry a VoIP conversation. That lack of resources on either end of the call causes garbled or dropped calls or other quality issues. For the best possible call, both the sender and receiver should use a broadband Internet connection.

The most frustrating aspect of PC-to-PC VoIP is the inability to call a regular telephone number. You can only use your PC to call other people's PCs if they have the same software installed on their computer. The receiving

computer must also be turned on and connected to the Internet for the call to go through. So, if you want to call someone and they aren't expecting your call, you won't be able to connect with them.

Many people who travel frequently like this type of VoIP because it makes it possible for them to make and receive phone calls from loved ones for free if they are in another state or even another country. For example, many military couples use PC-to-PC VoIP services to keep in touch while separated by overseas assignments. The spouse on the overseas assignment takes a multimedia-enabled laptop, and uses a local Internet connection. The spouse that stays in the U.S. uses a multimedia-enabled home computer and both spouses have the same PC-to-PC VoIP software installed on their computers.

The couple establishes a standing "date" to speak on the phone. So, for example, every Wednesday at the appointed time, they boot up their computers, sign on to the Internet, and one person uses the VoIP software to call the other. It's inconvenient, but the inconvenience is worth the extra effort because otherwise, military couples separated by an overseas assignment might get to speak to each other only every couple of weeks or even just once a month. And the amount of money saved in international long-distance fees is astounding.

Note

Some instant messaging (IM) programs, such as Yahoo! Messenger or AOL Instant Messenger (AIM), now feature VoIP software that allows you to talk to the person on the other end of the IM if you both have multimedia-enabled PCs. You usually only need to click a button to use the VoIP feature of the IM program. For example, Figure 2.3 shows the AIM VoIP capability.

Others find PC-to-PC VoIP useful as well. Amanda and her best friend both have high-speed, always-on Internet connections, and they both keep their computers turned on all the time. They also happen to live on opposite ends of the U.S., so they use an instant messaging program that has VoIP capability. Yahoo! Messenger is such a program. If Amanda and her friend

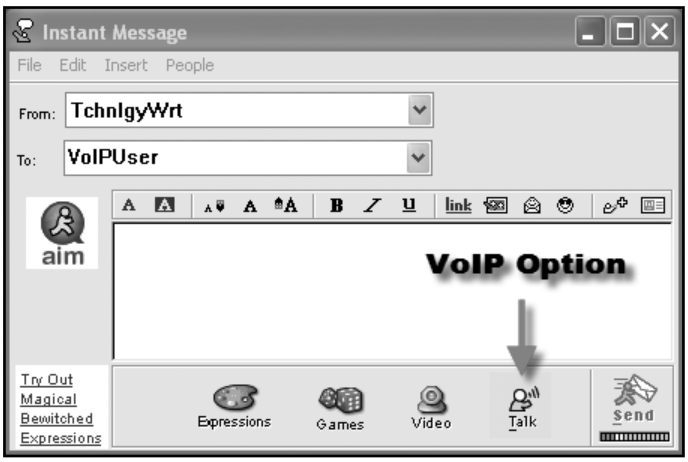

FIGURE 2.3

AOL Instant Messenger with the VoIP feature highlighted.

are both on the computer at the same time, it's easy for them to use the program to connect for free. PC-to-PC VoIP makes a great supplement to their existing traditional telephone service.

Even with the limitations of only being able to make free calls to other people with the same VoIP software, some PC-to-PC service providers allow you to call a landline telephone number with their service, but it will cost you. Remember the 'net phone of the early and mid-'90s? It took the Internet by storm. Everyone with Internet access jumped on the bandwagon. The buzz was that if you had a multimedia-enabled PC and Internet access, you could make calls to anywhere in the world for free, as shown in Figure 2.4. You could, too. The person you called didn't even need a computer. Unfortunately, as with all early VoIP services, the quality of the call was terrible and many users quit using VoIP in frustration.

Net2Phone was the first to popularize VoIP through a PC-to-Phone application. Unfortunately, the technology was ahead of most users' capabilities. Today services such as SkypeOut charge a nominal fee for the ability to use your computer to call any telephone anywhere in the world. But most PC-to-Phone VoIP service providers require that you have broadband access to use their services.

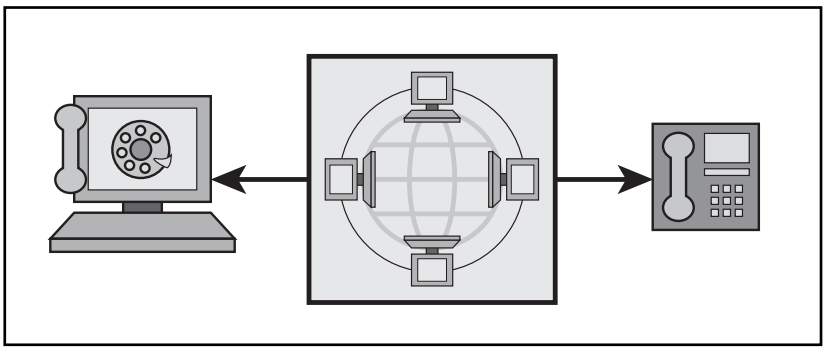

Figure 2.4

Calls made using PC-to-Phone VoIP are routed over the Internet.

What you'll get from your PC-to-Phone VoIP services vary according to provider. Some providers offer a prepaid calling plan where you purchase a set number of minutes to call POTS phones either in the U.S. or abroad. When those minutes are gone you can purchase more, usually in increments of $10. Some providers charge a flat monthly fee for the privilege of calling whomever you might want to speak with. Those fees generally start at around $5 per month and increase to about $40 per month depending on the number of minutes included in the plan. Any minutes over the number included in the monthly plan cost additional per-minute fees that range from about $0.02 per minute to as much as $0.07 per minute, depending on where you call.

Note

The software used for PC-to-Phone VoIP is also called a *softphone*. You learn more about softphones later in this chapter.

SkypeOut, shown in Figure 2.5, allows you to prepay a long-distance rate of about $0.02 per minute to make phone calls to any landline telephone anywhere in the U.S. and in some major overseas countries. All you need to do is sign up for the service and then use your computer to make your calls, just as if you were using Skype's free service to call another computer. You might think of it as PC-to-PC VoIP on steroids.

Figure 2.5

The SkypeOut application enables you to make VoIP calls from your computer to any landline telephone number.

PC-to-PC is the most mature form of VoIP, and it's also the easiest to implement. Most computers already have multimedia capabilities, so all you have to do is download and install the software. But even though it's been around the longest, it's not the most advanced VoIP service. If you're just looking for a way to cut down on your long-distance bill or to supplement the telephone service you already have, this form of VoIP will probably meet all of your needs, even with its limitations. Many people are much more comfortable using PC-to-PC VoIP because it offers them a way to cut down on their long-distance costs without being tied to a monthly service contract or predetermined bill. However, if you need more advanced features or if you want to replace your traditional phone service completely, you might want to consider a more robust VoIP offering.

Softphones

Softphones are very much like PC-to-PC VoIP. These software telephone applications work in the same manner as PC-to-PC VoIP; the software controls and manages calls from inception to completion and you use a multimedia headset to conduct the call. However, softphones are usually provided by a VoIP service provider as an addition to a monthly VoIP service plan. The additional fee on your VoIP service bill is about $10 per month, depending on your provider, and the softphone can be used to call any phone number anywhere in the world. You may also find some softphone services, such as the SkypeOut service mentioned previously, that offer a softphone application with prepaid minutes that you can use to call all POTS phones. When you run out of minutes, you simply purchase more instead of being responsible for a long-term contract or recurring monthly bill.

Note

Some prepaid calling plans have an expiration date. If the prepaid minutes aren't used within a specified amount of time—usually 30 to 90 days—those minutes become invalid and you are required to purchase additional minutes before placing a call. Be sure to read the fine print of any prepaid VoIP plan.

If you're using a VoIP softphone as an addition to your monthly VoIP service, here's how the softphone works: You sign up for a monthly telephone service with a VoIP provider and select the softphone option in addition to your monthly service plan. You'll probably pay around $10 per month for this option. You then download the software application to your computer, and after it's installed you can begin using your computer to make telephone calls to any number that you choose.

The computer you use to operate your softphone doesn't need to be a desktop computer. In fact, softphones are most valuable when installed on a laptop or handheld computer. That gives you the freedom of portability so that you can use the VoIP calling software from any location in which you have broadband Internet access.

To use a softphone, you'll need to have a multimedia-enabled computer, or you'll need a multimedia-enabled headset such as the one shown in Figure 2.6.

Figure 2.6

A multimedia headset features both an earpiece and a microphone for listening and capturing speech.

Note

A PocketPC makes a great softphone, especially when you're traveling. You need a data connection such as a wireless network connectivity card. Then you simply load the softphone software onto the PocketPC, connect a multimedia headset, and you're in business. You can make VoIP calls anywhere you have a wireless network connection.

Once you've fulfilled the hardware and software requirements of a softphone, you simply use your keyboard and mouse to navigate the program's control panel, which will probably look similar to the softphone interface shown in Figure 2.7.

People who travel a lot find softphones to be a useful addition to the VoIP service they use at home. Softphones make it easy to make calls on the road without paying a lot of extra money or carrying a VoIP converter with you everywhere you go. However, those who want to replace their traditional home phone service with VoIP find that a softphone alone isn't enough to meet their communications needs.

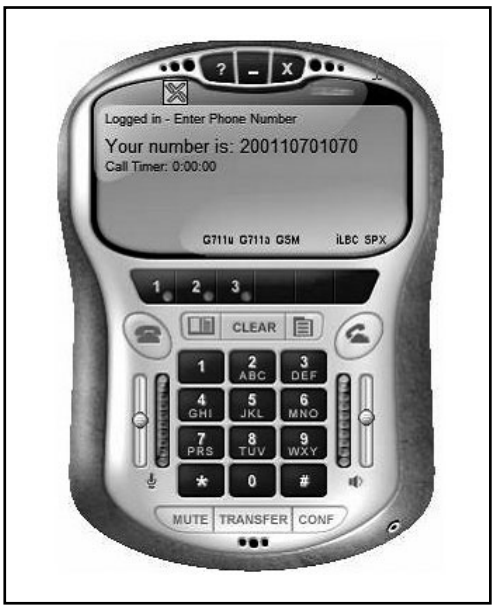

Figure 2.7

A softphone is a software application that lets you make calls to any number from your computer using speakers and microphone or a headset.

A good example of when a softphone comes in handy is the story of a young lady named Cindy who had just moved out on her own. Facing the burden of paying her own rent for the first time, Cindy decided not to have a landline telephone installed. She did, however, have a high-speed Internet connection activated in her apartment because her career required that she work from home frequently.

Cindy's job as a marketing consultant also kept her on the road regularly. The need for a telephone finally drove her to activate VoIP phone service because it was much less expensive than traditional phone service. However, because she traveled frequently, she quickly found that her cell phone bill was far more than she was comfortable paying. Then a colleague mentioned that she should try a softphone from her VoIP provider.

After looking into softphones, Cindy did try it and found that it was convenient and easy to use. She saved money on her cell phone bill and was still able to connect to her friends, family, and her office while she was on the road. Best of all, she didn't have to carry any additional equipment with her. She installed the softphone application on the laptop that she always carried and added a multimedia headset. That combination allowed her to

speak with anyone she needed to while she was traveling. Ultimately, Cindy saved more than $100 per month in cellular phone usage fees and calling costs from hotel rooms.

The quality of a softphone is as good as the quality of PC-to-PC VoIP. Some factors affect quality, however. For example, if you are using your computer to send e-mails, upload or download files, or surf the Web at the same time you're using the softphone to conduct a call, you may experience quality degradation. Heavy network traffic might also affect your quality.

Softphones are an excellent choice for cutting your communications costs while on the road. These applications give you the option of making and receiving calls that aren't routed over the public telephone network, and therefore won't cost you an arm and a leg. However, you may need a VoIP option that does more or works more like a regular telephone. If that's the case, an IP phone or other hardware-based VoIP service might be more what you're looking for.

Internet Phones

The next level up from PC-to-PC VoIP or softphones is a hardware-based Internet phone, also called an *IP phone*. IP phones, such as the one shown in Figure 2.8, are telephones that are preloaded with all of the software necessary to make VoIP calls using the Internet. These phones connect directly to your Internet router and allow you to make telephone calls without connecting to the public telephone network.

Figure 2.8

Internet telephones contain all of the necessary software to convert analog voice data to digital voice data.

Another type of IP phone is an IP handset, which isn't actually a whole phone unit. As shown in Figure 2.9, an IP handset is just that, a handset that may or may not have a dialpad and display on the unit. These devices usually connect directly to your computer via a USB port and are most often used in conjunction with a PC-to-PC VoIP application.

That's not a steadfast rule, however. In some cases, IP handsets connect directly to the Internet router and are used in the same manner that IP phones are used. It's just the same with IP phones; occasionally they are used in conjunction with PC-to-PC VoIP software.

Figure 2.9

VoIP handset designed specifically for Skype users.

An IP phone can be used to make calls to other people who also have IP phones, and those calls are usually direct phone-to-phone calls. To use the direct calling method, you must dial the *IP address* of the person you're calling rather than a phone number.

An IP address is similar to a telephone number in some respects. A telephone number is used to identify your phone on the public telephone network. And IP address is used to identify your computer on a network, like the Internet.

An IP address looks like this:

216.182.169.04

Note

There are many ways to learn the IP address of your computer, but the easiest is to have someone else determine it for you. To find out what your computer's IP address is, go to http://www.myipaddress.com.

What makes Internet phones different from other types of VoIP is that these phones have all of the necessary software loaded directly into the telephone unit. In most cases, there is no need to download and configure software on your computer and no need to have any additional equipment. However, in some circumstances an Internet phone works in conjunction with VoIP software such as PC-to-PC VoIP.

One of the downfalls of IP phones is that these telephone units are about 25 percent more expensive than regular phones and are usually only popular with enterprises that use VoIP within their organization. They really aren't practical for the average consumer because you can only use an IP phone to call other people who also have an IP phone, or if you have VoIP software from a service provider that supports IP phones. Even then, using an IP phone may require a change in the way you're accustomed to making phone calls.

Still, IP phone users are often pleased with the quality of VoIP they achieve using the phones. Because the hardware is dedicated to VoIP, the quality of calls is often better than when made using the computer, and some of the issues that affect PC-to-PC VoIP or softphones, such as call interference, are less prominent when you use an IP phone. So for some, the tradeoff of additional cost for improved quality is worth the extra expense.

A good example of how IP phones are used is a small consulting business that has three office locations in different states. Each office location has an IP phone and all three offices connect using the IP phones. The offices still have traditional phone service installed to communicate with customers, but the IP phones reduce the cost of calls between offices. IP phones can have the same effect for family members or friends that communicate frequently.

One of the most difficult challenges for VoIP is that it requires, to some degree, a change in behavior that you've learned during your lifetime. Telephone usage is ingrained in you from about the time you begin to have the ability to carry on a conversation.

That ingrained behavior is very specific. When you think of making a phone call, you think of picking up a handset, dialing a seven- to ten-digit number, and being connected to the receiving party on the other end of the line. Internet phones play to that ingrained behavior, but ultimately VoIP is set to change that behavior to some degree.

VoIP makes it possible to make a phone call without having a phone. But that's going to be a slow change. Most people don't want to use the computer to make a call. Either the thought of using the computer is more complicated than the average person wants to consider, or the thought of being tied to a computer during a telephone conversation is just too confining. Either way, what you want is to be able to pick up your telephone, punch a few buttons, and be connected to the person that you want to speak with.

Internet phones allow for this to happen by using VoIP capabilities. It requires only minor changes in existing behavior. Unfortunately, it's not practical for most users because of the restrictions imposed by the equipment, and the added cost of IP phones is more than the average person is willing to pay. It's possible that IP phones will have a place in your future, but that place won't be apparent until VoIP takes a more prominent spot in the telecommunications industry.

Analog Telephone Adapter

A far more useful option than any of those mentioned previously is the analog telephone adapter (ATA), which you can think of as phone-to-phone VoIP. If you're seriously considering replacing your POTS telephone or even if you just plan to use VoIP on a daily basis and keep your traditional phone line, this is the easiest, most reliable form of VoIP.

Figure 2.10 shows an ATA. It's basically a small box that has your phone number programmed into it and connects to your broadband router. Your telephone then connects to the box, and with little more than some software

adjustment via the Internet, you have phone service that uses the exact same telephone you currently use to make and receive phone calls. When you pick up the phone you get a dial tone. You dial the seven- or ten-digit number just like you learned to do when you were four years old, and your call is connected to whomever you're calling without any additional thought on your part.

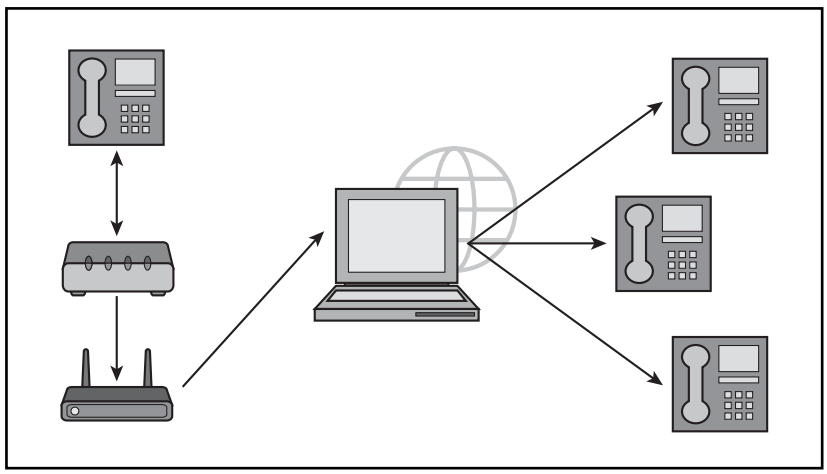

Figure 2.10

The ATA connects the telephone to the broadband router so that you can make calls using the Internet as a carrier.

Basically, the ATA is a signal converter. Most ATAs connect to your Internet router via an Ethernet connection and convert analog audio signal, like the sound that travels over phone lines, to digital audio signal, like a song that you download over the Internet.

Note

Some signal converters convert digital signals into several forms, such as audio, video, or data. These converters are referred to as *multimedia terminal adapters* (MTAs) *or integrated access devices* (IADs). These devices perform essentially the same function in VoIP as the ATA, so for the purposes of this book, ATA is the only term used for signal converters.

The ATA converts both voice and control information into a format that can be transported over the Internet. It simulates a standard phone line by creating a dial tone and allowing touch-tone dialing. Once the ATA converts the analog signal to digital, it breaks that digital signal into small pieces called *packets* that can be delivered via the Internet. This is called *packetized communications*.

Vint Cerf, who is called the "Father of the Internet" because of his design work on the earliest version of the Internet (called ARPANET), explained packetized communication as postcards. In his analogy, postcards are packets of data and the Postal Service is the Internet.

Each postcard can contain a very limited amount of information. In the case of a voice data packet, that amount is 10 milliseconds to 30 milliseconds of data. Once the information is placed on the postcard, it's sent via the Postal Service from your location to its destination.

However, some messages require more space than is available on a single postcard. So to send longer messages, you would need multiple postcards. That's how it is with a VoIP conversation. Many packets of data are necessary to convey the full message.

With longer messages, there has to be some mechanism in place to order each piece of the message for the entire message to make sense. In the postcard example, the mechanism could be a system of numbering each postcard sequentially in the lower right-hand corner of the card. Then when all the postcards are received, they are reassembled in the correct order and the full message is conveyed.

For VoIP, the ordering mechanism is controlled by *CODECs*, which are compression/decompression algorithms that divide voice data into packets and encode the packets with sequencing information. In this manner, packets can arrive at the destination out of order but the conversation will still be coherent because the packets are decoded in order, regardless of how they were received. VoIP CODECs makes that "perfect" reassembly possible. At the receiving end the person you are calling hears your voice, just as if you were calling that person from a landline telephone. This is called *packet switching.*

It's also possible that some of the postcards might be lost between origination and destination, so a mechanism that compensates for lost packets also needs to be in place. In VoIP, that mechanism is also built into the CODECs.

One way to compensate for lost VoIP packets is to include a snippet of the previous packet in each new packet. This ensures that a lost packet can be reconstructed so your conversation flows smoothly.

Note

The PBS.org Web site has a great demonstration of how packet switching works. You can find it at http://www.pbs.org/opb/nerds2.0.1/geek_glossary/packet_switching_flash.html.

The catch with an ATA is that you have to have a VoIP service package, through a VoIP service provider such as Vonage or AT&T, for the ATA to be useful. As discussed in a future chapter, those plans cost anywhere from $10 per month to around $50 per month, depending on what you need from the VoIP service and which provider you choose to go with.

Curtis can attest to the value of VoIP using an analog telephone adapter. On the advice of his brother he decided to take advantage of his expensive broadband connection to reduce the cost of his telephone service.

Curtis signed up with the VoIP service provider, Vonage. When he received the ATA from Vonage, he connected it to his phone and his broadband router and in minutes he was making calls to friends and family using the VoIP service.

Curtis's reward was a huge reduction in his telephone bill. Before Vonage, Curtis's phone bill was about $85 per month. When he started using the VoIP provided by Vonage, his phone bill dropped to about $28 per month, but his call quality and phone usability remained the same.

For Curtis, VoIP using an ATA was the perfect solution. He got quality phone service at a fraction of the price of traditional service, and the only thing he had to change was the telephone service provider and the way he connected his phone. In short, he cut the cord on traditional phone service.

Wireless VoIP: VoWiFi

There's an acronym for you. VoWiFi, which stands for Voice over Wireless Fidelity, or wireless VoIP, is the next VoIP technology that is gaining attention. The concept is that consumers should be able to use a single mobile phone to seamlessly access both VoIP calling and cellular calling. When you're in an 802.11b/g wireless hotspot, you use VoIP to transport a call. If you get outside of the wireless hotspot, the cellular network picks up the call.

It's a great concept, but currently some challenges have to be overcome before this type of hybrid VoIP/cellular service can be viable. The most difficult of the challenges is how to switch seamlessly from VoIP to cellular transmission. Fortunately, some equipment manufacturers are working to figure that out.

For example, the VoWiFi-capable phone shown in Figure 2.11 released in early 2005. It looks like a cell phone, it acts like a cell phone, and it will switch from VoIP to cellular when the carrier activates the service. However, no carrier has yet been announced, probably because no carrier has the capability to seamlessly pick up a wireless VoIP call just yet. It's coming, but probably not for a few more years.

Figure 2.11

This handset is a VoWiFi-capable phone.

Still other challenges have to be overcome as well. For example, how do you bill for a call that's carried partly over a VoWiFi network and partly over a cellular network? And what standards will govern the VoWiFi industry? These challenges must be overcome before VoWiFi can become a reality.

Wireless standards are a real issue, too. Currently 802.11b and 802.11g are the prominent wireless standards. 802.11b supports network speeds of up to 11 Mbps but doesn't stand up well to higher network traffic rates. It also is subject to interference from common household appliances because it operates on the 2.4-GHz frequency, just as those appliances do.

Another wireless standard, 802.11a, was actually created before 802.11b, but it's predominantly used by businesses. 802.11a supports network speeds of up to 54 Mbps and operates on the 5.4-GHz range, but because of this higher frequency, 802.11a has a harder time penetrating walls and other objects (like furniture). In other words, 802.11a has a shorter range signal than 802.11b.

The wireless standard 802.11g is probably the one you're most familiar with. This standard combines the best of 802.11a and 802.11b. It supports network speeds of up to 54 Mbps and uses the 2.4-GHz frequency for greater range.

The very fact that more than one 802.11 standard is in use creates problems for VoIP. For example, 802.11b and 802.11g are compatible on most levels. However, 802.11a is not compatible with 802.11b or 802.11g. What's more, additional 802.11 standards are in development so there are likely to be changes in the future.

Once all of these challenges are overcome, the greatest challenge of all comes into play. Will consumers really want VoWiFi? Logic says yes, simply because VoWiFi will reduce the cost of communications even further. That logic is supported by the current growth rate of both the wireless market and the VoIP market, and manufacturers' push to create wireless devices that support VoIP. However, as with any new technology, there will be an adoption period during which users will decide whether or not the technology is valuable. And although all of the analysts and market watchers think they know what users want, how can they really be sure?

So, where VoWiFi is concerned, from a consumer's standpoint, it's interesting technology. But the value of that technology remains to be seen.

Which to Choose?

Now you're familiar with the options that you have for VoIP calling. The question you're probably asking yourself now is which of these technologies best meets your needs? The short answer? You have to decide.

Consider what you'll be using VoIP for. Is it a supplement to your existing phone service? Or do you want to cut the phone cord completely? If you want to supplement your existing phone service without giving up the reliability of Ma Bell or one of her children, a PC-to-PC solution or softphone might be your best option. Internet phones are useful if everyone you want to call has one. Otherwise, these VoIP devices are best left to large organizations with internal VoIP systems. If you're looking for something entirely new to replace your existing telephone service, go with a VoIP service provider that is going to give you an ATA and VoIP service that you can use to call anyone, anywhere.

As for VoWiFi? Well, if you love to play with new technology, maybe you should give it a shot when it becomes more readily available. Otherwise, wait a while. It's likely to be a few years before this technology is mature enough to be a driving force in the communications market. Why not make the most of what you have available right now?

Don't be in too big of a hurry to make a decision, though. There's still a lot of ground to cover. And in fact, you may not even be certain that VoIP is what you're looking for. The next chapter should clear that up for you, so if you're wondering why you should go VoIP, read on.

3

CHAPTER

Why Go VoIP?

Communication is the cornerstone of today's society. Thanks to the unprecedented popularity of cellular phones, everywhere you look you see someone talking on the telephone. In fact, there are more than 180 million cellular phone subscribers in the U.S., and as wireless networks become more readily available—approximately 60,000 public wireless networks exist in the U.S. today—more and more people will rely on their computers almost as much as they rely on their cell phones. It's the glory of connection and it means that business, whether it's personal or corporate, can happen anywhere, anytime.

The problem with all of this connectability is that it's really cumbersome. Think about how many electronic devices you carry with you in a given day. Almost everyone has a cellular phone. Many people now have a laptop computer that goes everywhere they go, and possibly even a handheld computer or personal digital assistant (PDA). You may also have other portable electronics such as pagers, two-way radios, MP3 players or digital recorders, and Blackberry devices. Carrying all of those electronics gets confusing and tiresome. It means constantly juggling devices and searching for the device you need, when you need it.

If you don't believe it, just take a long, hard look at traveling businesspeople in any airport in the world. They look weary, don't they? It's because of the 50 pounds of electronic equipment they're carrying, not because of the travel. But they need all of those devices to conduct business and stay connected when they're away from the office.

Now, imagine being able to stay just as connected to your office, your family, or your friends using a single device. This device would allow you to send and receive e-mail, surf the Internet, exchange text messages and instant messages, record your voice notes, and accomplish dozens of other tasks as well. This isn't a device the size of a laptop computer, either. This communications device would look similar to a cell phone or voice-enabled PDA.

It's the promise of future communications—go anywhere, do anything from the palm of your hand.

It's called communications convergence and it's the ability to use the same network to communicate using voice, data, or video. VoIP is the first step in that integration, or convergence, of communications methods. Convergence isn't the first benefit you see when you choose VoIP, however. On the surface, VoIP seems to be about saving money and having more control of your telephone communications. But in the long run, there's way more to VoIP than just a smaller phone bill, and communications convergence is the greatest benefit.

Data networks have grown at a tremendous rate, thanks to the popularity of the Internet. Using those networks, VoIP enables all kinds of services that were never possible before—for example, the *Cable Triple Play*.

The Cable Triple Play allows you to receive cable television service, cable Internet service, and VoIP telephone service, all on the same network. It also allows for a reduction in cost for all of those services, because they are all provided by the same service provider.

It's all improved service, too. The television service can be digital, which means you can pause and record live television to be viewed at any time, in any way that you want to view it. The Internet service is always on, so there's no hassle with dialing out. Internet is faster, too, meaning you don't have to wait around for pages to load or files to download.

Then there's the VoIP telephone service. As you'll see in Chapter 5, standard features of VoIP are much better than standard features for traditional telephone service and that's before you even take the advanced features of VoIP into account. Some of the advanced features of VoIP will completely blow your mind! They're features you've dreamed of, but never thought possible.

Sure, VoIP has some pretty common attractions. Who wouldn't be attracted to the tremendous cost savings and the new and enhanced features? There's also freedom of choice to consider. VoIP isn't geographically limited.

Because VoIP is enabled by the Internet, you don't have to be in the same region as your service provider. In fact, there's absolutely no reason you can't use a service provider that's located on the other side of the world if that's what you choose to do (as long as they offer service in your area). You're free to choose who you do business with, no matter where they are located.

So, yes, there are already some compelling reasons to choose VoIP over traditional phone service. These simple benefits are already generating tremendous interest in the technology. However, there's more just below the surface. As you dig deeper into VoIP technology, you'll find that it's the future that makes VoIP so attractive.

The Benefits of VoIP

VoIP isn't new. In fact, the first VoIP calls were made in 1995 when some hobbyists in Israel were looking for a better way to communicate. However, VoIP didn't begin really gaining momentum until around 1998, and even then it was an immature technology that was ahead of its time.

After a little growth and stretching, the timing is finally right for VoIP. That's evidenced by the nearly 5 million subscribers worldwide. And whereas the improvement of the technology that makes VoIP possible is an enabler to the technology, the most attractive feature of VoIP, and the one that seems to get the most attention, is the cost savings you can realize by switching from POTS to VoIP. The average consumer in the U.S. who has a single telephone line with caller ID, call waiting, voice mail, and an unlimited long-distance package will pay $50–$80 per month for traditional telephone service, depending on the service provider and the carrier chosen to provide long-distance service.

With VoIP, however, the same single line with those same features and maybe even a few more will cost about $25–$40 per month. Why is that? There are two main contributing factors. First, VoIP is considered an emerging technology and as such, the Federal Communications Commission (FCC) has taken a hands-off approach to the technology in an effort to encourage growth. On several occasions, the FCC has ruled that VoIP is not a telecommunications technology and is not a factor in the telecommunications industry.

As long as this differentiation between VoIP and telecommunications remains, VoIP services are not subject to the same taxes and regulatory charges that POTS is subject to. The average consumer pays $10–$15 each month in taxes, 911 fees, and regulator charges. If that alone were the only savings that VoIP offered, it would still equal $120–$180 per year. And those aren't the only savings that VoIP offers.

The second reason that VoIP is cheaper is because it requires fewer resources to carry more calls. For example, when you make a call using POTS, your call must be carried on a dedicated telephone line. This is called *circuit switching*, and is shown in Figure 3.1. No other information can travel on that line during the time you're using it. But with VoIP, your call is broken into packets of information that are sent via the Internet, in a format called packet switching. Millions of these packets of information are traveling across the Web at any given time. The result is that more calls can travel along the same space, making VoIP more efficient and cost effective than POTS.

Note

There's an excellent demonstration of packet switching on the PBS Web site. To view the demonstration, go to http://www.pbs.org/opb/nerds2.0.1/geek_glossary/packet_switching_flash.html.

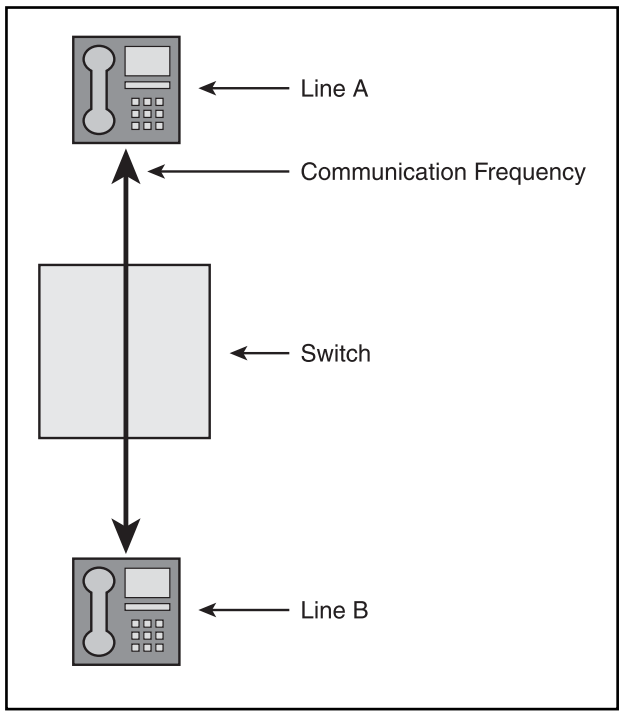

FIGURE 3.1

In circuit switching, each line is dedicated to transporting only one type of information at any given time.

VoIP also doesn't require copper telephone wires to deliver calls from one location to another and this translates into lower equipment and maintenance costs. In addition, because more than one type of information or data can travel over the same network (the Internet), fewer resources are needed to accomplish more tasks. This results in lowering the cost of doing business for communications companies. That savings is then passed on to the consumer in the form of lower long-distance fees and smaller recurring monthly service charges.

International calls, especially, are far less expensive with VoIP. The average charge for an international call made from a regular phone line is about $0.12 to $0.14 per minute or higher. Using VoIP, the same call costs about $0.02 to $0.07 per minute. The difference in pricing is the result of transporting multiple calls and other types of data over the Internet simultaneously. If you make a lot of long-distance or international calls, those savings add up very quickly.

Note

What's really frustrating about international calls these days is that most of them are already carried using VoIP technology. It's cheaper for the carrier and the technology is advanced enough to be very reliable. However, these savings that the traditional phone company receive aren't passed on to the consumer, so you're still paying a higher price for a call that costs those service providers less today than it did a few years ago.

In addition to the savings that VoIP offers, enhanced features, such as voice mail-to-e-mail and call hunting, sweeten the deal. Both standard features and advanced VoIP features are much richer than the standard and advanced features of traditional telephone service because the technology used for VoIP opens up far more possibilities. The very fact that VoIP is about telephone calls that are carried over data networks makes it possible to put more data to work for you.

Telephone companies charge for every added feature that you want included with your monthly service. VoIP service providers offer a package of the most common features, such as caller ID and voice mail, bundled with the service at no additional charge. To add to the "bundle" experience, many VoIP service providers also deal in other types of telecommunications services such as television broadcasting and Internet service, so it's a natural advancement for them to bundle those services with VoIP telephone service to offer even greater savings on the whole package.

So, if you're considering VoIP, think about the features you want or need to have. Take the time to find out how much you're paying for those features. Then look at the types of communications services that you subscribe to. It's possible that you will find a service provider that can meet all of your needs in one place. With all of that in mind, look for a VoIP service provider that can meet as many of your communications needs as possible, then look at pricing to see where you can save the most money.

Just remember, with VoIP it's not all about the money. Yes, saving money on your communications services is a benefit, but finding a service that

works for you in as many ways as possible is equally important. It's also a step toward the future of communications.

The Future of Communications

It's true that most people begin to consider VoIP for the savings that it offers. However, once you start looking at VoIP you find that there's more to it than just saving a nice chunk of change every month. VoIP is an indicator of where communications are headed in the future.

Think about it. Combining your broadband Internet connection with your telephone service simplifies communications. It reduces the amount of resources necessary for you to communicate in multiple ways, and in the future that reduction could be increased if VoWiFi becomes a reality. What VoIP is leading us toward is the convergence of communications.

Converged communications, in an ideal world, will put all of your communications methods into one device. That device will be small, lightweight, and intuitively built so that it integrates into your lifestyle without requiring that you change the way you currently communicate. It will encompass not only telephone communications of all types but also audio, video, and data conferencing as well as other types of data communications, like e-mail and chat. We may never completely realize that ideal world, but VoIP is the first step in building powerful communications networks that do more than simply carry voice conversations. It's proven that convergence is possible and pointed to the fact that communications are definitely converging. More and more evidence of that will be apparent in the next 12–18 months.

There was a time in the not so distant past when people thought communications convergence was a pipe dream, induced by too many hours of sitting in front of a computer screen. But the truth is communications convergence—the ability to stay in touch using voice, data, and video from a single device—is coming. It might take a little time for it to reach a fully integrated maturity, but as is evidenced by the rapidly growing VoIP market, the infantile stages of convergence are already upon us.

In fact, a few applications that can and do take full advantage of converged communications networks are already being used. Distance learning, telemedicine, and customer contact center applications are some examples. It's certain there will be more in the near future, however, and they will encompass all types of industries and personal services. The common denominator will be a single, high-speed data network carrying voice, data, and video.

The cellular phone that you carry is probably a good example of how far convergence has already come. Chances are that your cell phone does more than just connect you to another person via a phone call. Most cellular phones today also have short messaging services (SMS) that allow you to send and receive text messages. You probably also have a wireless Internet connection that allows you to surf the Web while you're waiting in line, stuck in traffic, or riding on the train. You might even have an instant messaging program that lets you "chat" with others via text or multimedia messaging capabilities that act as video conferencing. Some cell phones even have fax capabilities.

These are all different types of communications that have converged into one device. Now, add to that the VoWiFi capabilities that you learned about in the previous chapter and you can see how communications are moving toward a platform where one device is all you need to get a call, read or send e-mail, or chat with someone while you surf your local Barnes & Noble bookstore online. It's all part of communications convergence.

How Convergence Affects You

The problem with communications convergence is that although it's an idea ripe with possibilities, the technology isn't exactly there yet. Major steps have been taken in upgrading the technology, however.

One stumbling block for convergence was call quality when multiple types of data were being transported over the same network. For example, if you were having a conversation conducted over VoIP at the same time you were downloading files or surfing the Internet, the packets of voice data were mixed with other types of data packets. The result was voice data packets that were delivered slowly, and that was manifested as sound delays and choppy, low-quality calls.

If you tried early VoIP that leveraged dial-up Internet access, you know exactly what these calls sound like. Small delays in the delivery of data packets go unnoticed in other IP applications, such as chat or e-mail, but those same delays in VoIP make calls unbearably low-quality. Today, however, advances in technology have yielded prioritizing schemes that rate the priority of data packets and place voice packets ahead of all others.

These prioritizing schemes act like a crossing guard, stopping the flow of traffic so that children can cross the street. It's the same concept for VoIP packets. All other traffic is secondary to those that are coded as VoIP packets. This increases call quality even when other types of data are being moved across the same network at the same time.

There's also a lack of usable applications that take full advantage of converged communications and point to a driving need for converged communications from a consumer point of view. Yes, there is a driving need from a business perspective. After all, if a business can combine all of the avenues it has for communications into one, centrally located and centrally controlled avenue, wouldn't it make sense that the organization could save tremendous amounts of money and conduct business more efficiently?

The examples used earlier—telemedicine, distance learning, and contact center applications—all take advantage of converged communications, allowing workers to communicate in multiple ways over a single network. And many other converged applications exist in the pipeline for businesses.

For consumers, however, the idea of converging all of these methods of communication really has appeal only where portability is concerned. It's much easier to carry only one device, which you can use to communicate with anyone in any format. But is it really necessary? Not yet. And truthfully, it's not really that much more convenient at this time unless you happen to be one of the elite group of people that is both technologically inclined and constantly somewhere besides where you're needed.

Still, communications convergence is happening, and as it does, more and more benefits to consumers will be realized. Even today, existing traditional telephone service providers are forced to examine the structure and future of their businesses. VoIP is a serious threat to their customer bases, and therefore to their viability.

In response to this threat, many existing companies are scrambling to build next-generation networks that make use of multiple transport technologies to move data from one place to the next. The result, which is already apparent in some areas, is unrestricted access to many different service providers that can not only provide the communications services that you need, but that can also provide generalized mobility and the provisioning of service to users that supports technologies such as data collaboration, movies on demand, and Internet radio. And that's just the tip of the iceberg.

Communications convergence isn't the main reason to switch to VoIP today. Cost savings, enhanced features, and freedom of choice are the drivers that make VoIP attractive at this stage in the game. However, keeping an eye to the future never hurts, and VoIP is just the first step in communications convergence, which is a very bright spot in the future of telecommunications.

4

CHAPTER

Understanding the VoIP Industry

If you listen to all of the media hype, VoIP is the next killer application for broadband. In fact, people are turning to VoIP at an incredible rate. So what's the biggest driver in this movement to VoIP? Price. VoIP technology has managed to do what deregulation of the telecommunications industry could not—it's created competition between telecommunications companies and other players in the industry.

Early predictions that VoIP would completely undermine the $200 billion traditional telephone industry were a little ambitious. Those early predications called for VoIP to be a major means of communications by 2005. The VoIP industry is growing, but it hasn't overtaken other means of communications, yet. Even if those predictions were ambitious and overly optimistic, they appear to be only a few years off track. More recent predictions combined with the current growth rate of VoIP indicate that by 2010 VoIP will be a major factor in the telecommunications industry, and one of the main ways that people communicate.

These updated predictions are much more likely to be accurate, even if no one knows for sure what the ultimate outcome of current shifts in the landscape of the telecommunications industry will be. And no one can know for sure. Far too many factors influence the industry at this time.

For example, the number of service providers in the VoIP industry will most certainly change. The large telecommunications companies are getting involved now, and it's likely they will consume all but the strongest of the smaller companies.

Note

Currently there are about 2000 VoIP companies in the market. Most of those companies are very small with a limited number of subscribers. It's likely that over the next few years the majority of those companies will either fail or be absorbed by larger companies.

What is certain is that VoIP is here to stay. And it will forever alter the landscape of the telecommunications industry. Already telecommunications companies—traditional phone companies, cable companies, and Internet service providers—are feeling the pressure of the VoIP industry. Those that offer VoIP services are seeing growth, those that do not have stagnated. The companies will need to adapt to the new technology or they will find themselves alone in the dust of the Information Age.

One of the first elements of the industry that will change is standards. Numerous standards are currently used within the VoIP industry. But with time, all of those standards will begin to combine and eventually a single set of standards will become the foundation of the industry. There's more to come on standards later in this chapter.

Another factor that will affect the VoIP industry is politics. The current political climate is very favorable for the VoIP industry. However, as the popularity and adoption of VoIP increases, that too will change—and the industry is already beginning to feel some of that change.

The one clear fact about the VoIP industry at this time is that it's here to stay. The VoIP fad of the early '90s has been replaced by the more mature and reliable VoIP of today. Advances in the industry have finally pulled VoIP to the forefront, putting it right in front of consumers whose interest is peaked by the savings, advanced features, and freedom of choice that VoIP

offers. The hype surrounding the technology is quickly turning to fact and as reality sets in, the VoIP industry will continue to grow and replace traditional telephone services.

What Industry Standards Mean

Industry standards present one of the toughest challenges for any industry and VoIP is no exception. Industry standards are the benchmark by which companies measure the viability of their service. In the VoIP industry, standards haven't become standardized. In other words, there is no single set of standards that all of the service providers in the industry must adhere to.

Industry standards give an industry or market, like VoIP, a solid foundation upon which all services are built, making it possible for all consumers to access the service being offered without really thinking about it. For example, in the telephone industry, standards are what makes it possible for you to plug a phone into a jack and make a call without considering how the call is initiated, routed, or terminated, or whether the phone will work with the service that you have. Standards also drive some functionality such as 911 or Enhanced 911 services and wiretap capabilities. Unfortunately, the VoIP industry doesn't have a single set of standards, so consumers must know what standards are governing the industry and how those standards affect services.

The lack of cross-industry standards reduces the interoperability of VoIP equipment and services. In other words, some equipment works with some VoIP services, but not with others. This is especially evident in PC-to-PC VoIP and in some instances of VoIP services provided by one of the many VoIP service providers.

In the case of the VoIP industry, standards start with a standard protocol or set of guidelines for how the technology of VoIP should behave. These protocols point to how voice should be converted to digital data; how it should be transported across the network, which in the case of VoIP is usually the Internet; and how the digital data should be converted back to voice. And those are just a few of the elements of the process that are covered by standards.

However, without a single set of standards that every VoIP service provider can rely on, many of the major service providers in the VoIP industry are scrambling to bring the "best" set of standards to the table first. As a leader in industry standard, whichever of these companies succeeds stands to gain the highest number of customers the fastest. So you can see, players in the industry are vying for the frontrunner position by pursing industry standard protocols.

Consumers are pushing standards, too. You want to have VoIP service, but at the same time you want it work like the traditional telephone service that you're accustomed to. Without standards, that's not possible.

In addition, there's unofficial pressure from government agencies, such as the Federal Bureau of Investigations (FBI), for VoIP companies to standardize on specific issues—the wiretap issue being the FBI concern. It's this pressure in combination with inter-industry pressure that is driving the standards that you'll see in the future. And it all starts with the protocols.

VoIP Protocols

The pressure to develop industry standards does have one benefit. It means that service providers are continually working to improve their services to meet expectations and to set the bar for expected service higher than all the other companies providing the same service. The result is a fierce competition that drives a set of protocols that govern how your VoIP service is provided in five areas:

- **Integration:** At least for now, VoIP must integrate with existing telephone service (which is called the *Public Switched Telephone Network*, or PSTN). VoIP calls are transported via the Internet; however, unless the call is conducted from VoIP subscriber to VoIP subscriber, the call is delivered using the PSTN. The integration of VoIP and PSTN is essential to growth in the VoIP industry. Protocols govern how calls are handed from VoIP networks to PSTN and vice versa.

- **Interoperability:** You'd think integration and interoperability are the same. They're not. Each company that offers VoIP service also offers different types of equipment. Without some guidelines for how that equipment should interact with the equipment that other vendors provide, you could be stuck using only one vendor without the possibility of calling someone else who uses equipment from another vendor. This interoperability of equipment makes it possible for the VoIP industry to expand and will eventually lead to a single device that all manufacturers and service providers rely on. It's like the telephone that you use today. It works regardless of who made it or who provides your phone service. Protocols and standards will ensure that VoIP phones and equipment will eventually reach that point.
- **Scalability:** Scalability is the ability of an application or network to grow and shrink according to the amount of traffic using that application or traveling over that network. Some protocols are designed to govern the scalability of VoIP services. Past predictions of how fast the VoIP industry will grow were overly enthusiastic, calling for growth to happen much faster than it has. Even though the industry and public adoption of VoIP hasn't developed as quickly as those early estimates, it's still happening much faster than the adoption of telephone service did. Revised estimates call for 75 percent of the population to be using VoIP by 2010, a much more realistic view of how quickly VoIP will catch on. Still, without some guidelines governing scalability, the VoIP industry would falter under that kind of growth. These protocols help to ensure that VoIP infrastructure will continue to grow and meet the demands that consumers place on it.
- **Quality:** Quality has been the biggest sticking point for the VoIP industry. Early VoIP services were plagued with poor quality. However, the protocols that govern VoIP quality have come a long way since those first services. It is these protocols that provide guidelines for how voice should be carried over the Internet, which was originally designed to carry data. Protocols that address quality provide guidance for turning voice to digital data and then back to voice, as well as guidance for how that data is transported from one place to another once the change has been made.

- **Security:** The Internet is plagued with security risks. And voice conversations that travel over the Internet are not exempt from that challenge even though VoIP services have not been hard hit by security threats as of yet. It's only a matter of time before it is and VoIP is as easy a target as any other type of information technology service. Once converted to packets that are transported via the Internet, your conversation is subject to the same security threats that any other data that travels over the Internet is subject to. Hackers that capture other types of information can (and do) capture voice data, and viruses that target cell phones or e-mail can (and do) target VoIP. Even denial of service (DoS) attacks are conducted against VoIP services. Without security protocols to govern how VoIP is protected, your security risks could be much higher. Currently there's no consensus on what the best method of security is for VoIP—secure socket layers (SSL), authentication, encryption, tunneling—all of these types of security play a role, and security protocols ensure that some form of security is protecting your conversation.

In the simplest terms these standards have to work together because they dictate how computers find each other on the Internet and how information is exchanged between the computers to allow VoIP packets to flow between destinations. In addition there has to be an agreed-upon payload format so that the contents of the VoIP packet are recognized and properly decoded on both ends of the conversation. This is no easy process. It requires that the technologies surrounding VoIP be flexible enough to serve the many needs of many companies and many consumers.

As you can see, VoIP protocols and standards are needed for numerous reasons. It's not necessary for you to understand the inner workings of VoIP to be aware of some of the most frequently used protocols. You do, however, need to know what those protocols govern and how they affect you because over time they will mature and change, and as they change, your service will change as well.

Two types of protocols affect the VoIP industry: call signaling protocols and device control protocols. Call signaling protocols set up communications

between two endpoints or an endpoint and gateway. Device control protocols control the functions of the device itself. Following are some of the most common call signaling and device control protocols in use in the industry.

H.323

One of the oldest of the sets of VoIP protocols in use, H.323 is a call signaling protocol that was recommended by the International Telecommunications Union (ITU) and originally adopted for use in 1996. H.323 is really a set of protocols that provides guidelines for any type of audio-visual packet communications. For example, if you attend a Web conference or video conference, chances are H.323 guides how the conference is delivered to you. The set includes protocols for VoIP, video conferencing, and other methods of data sharing.

The H.323 standard was originally developed to govern video conferencing, but it has been extended to include VoIP. The current version of H.323 came into effect in early 1998, and it governs both point-to-point communications, such as telephone calls, and multipoint communications, such as video or Web conferences.

This standard ensures interoperability between vendors by governing the endpoints of communications—terminals, gateways, gatekeepers, and multipoint control units:

- **Terminals:** The terminal is the endpoint that provides two-way, real-time communications—it's the ATA in VoIP. Under this protocol, all H.323-compliant terminals must support the use of channels, call signaling, real-time transport protocol (RTP), and registration administration status (RAS).
- **Gateways:** The gateway is the interface between the PSTN and the Internet. At the gateway, data is converted from analog to digital or vice versa and then delivered to the receiver, and the H.323 protocol governs how that conversion takes place.

- **Gatekeepers:** The gatekeeper is like the administrator for the gateway. It controls authorizations, addresses, signaling, and bandwidth management, among other things. H.323 outlines the parameters under which all of this administration takes place. Each gatekeeper has numerous endpoints registered with it and it performs these administrative tasks for all of those endpoints in what is called a zone.
- **Multipoint Control Units:** A multipoint control unit (MPU) is an endpoint that allows three or more terminals and gateways to participate in a multipoint conference. Using other elements of H.323, the MPU determines the common capabilities of the endpoints.

H.323 also works in conjunction with numerous other protocols, such as H.225, which describes call signaling and packetization; H.235, which provides guidelines for security; and H.245, which governs opening and closing logical channels for data control and exchange. This type of multi-protocol governance is called stacking. Protocols are stacked together to address numerous issues.

SIP

Sessions Initiation Protocol (SIP) is also a call signaling protocol that operates at the application layer for creating, modifying, and terminating VoIP connections. It was first introduced about the same time that H.323 was introduced, but wasn't recognized as a standard until 1999. Since that time it's gone through several revisions and was republished in its current form in 2002.

SIP establishes a common ground on which two separate connections can meet. So, for example, if you make a call using VoIP to someone who does not have VoIP, SIP is the protocol that finds the middle ground, or compatibilities between your equipment and connection and the receiver's equipment and connection.

SIP helps create a connection by directing the following activities:

- Determines the connection point that will be used for communication
- Determines how calls will be transferred and terminated

- Determines call parameters at both ends of the call and rings the receiver
- Determines the availability of the user receiving the call
- Determines the capabilities of both the caller and the receiver

The protocol achieves these standards by using two components: user agents and network systems. The user agents are end systems along the network that receive requests and return responses for the user. So, for example, if you're making a call to someone, the user agent gets a small piece of information that tells it you would like to place a call. The agent then processes that information and sends it out across the Internet. It then gets a response that tells you if the phone you're calling is available. If it is, the agent puts the call through. If the phone is not available, the agent returns a response that the call cannot be completed—that response could be a busy signal or a recording of some type that tells you the number is not available.

The second part of SIP is the network systems. SIP determines the communication between each of the three types of servers that make up a network system. Those servers are a registration server that logs a user's current location, a proxy server that forwards requests to the next server down the line, and the redirect server that sends information about the next server in line to the proxy server. Together, these three types of servers make up the path through which data travels from one location to another. Although there are only three types of servers, dozens of those servers might be involved in the transport of your call from your location to the receiver's location. SIP ensures that the call is routed properly and arrives at the destination.

In a lot of ways, H.323 and SIP are similar in function. In fact, fundamentally the two protocols do the same thing. Where they differ is in nature. H.323 was designed for use on a single local area network (LAN) for video conferencing, whereas SIP was designed for use on the Internet for VoIP. H.323 borrows from legacy communication systems and SIP does not. Also, H.323 is a binary protocol whereas SIP is ASCII-based. Because of these differences, H.323 works, but can be cumbersome. SIP, which is built much

like the HTTP protocol that is the foundation of the Internet, is much simpler and designed to work with the attributes of the Internet.

Like H.323, SIP works in conjunction with a number of other protocols:

- Real-time Transport Protocol (RTP)
- Real-time Streaming Protocol (RTSP)
- Session Announcement Protocol (SAP)
- Resource Reservation Protocol (RSVP)

Others exist as well. And it's not necessary for you to know that RTP is for transporting real-time data and virtually every device uses RTP for transmitting audio and video packets, or that SAP is for advertising multimedia sessions. What's important for you to understand is that SIP is a protocol that was designed with VoIP and the Internet in mind. That makes it more effective and efficient for guiding VoIP services.

Note

RTP is one of the protocols that addresses issues like packet order so that when your voice arrives at its destination it is replayed to the receiver just as it was sent, rather than in whatever order the packets were received (which would result in a strange, garbled conversation, indeed). RTP also provides mechanisms that help address packet delay and *jitter*, which is the result of that delay.

Many debates exist over which of the call signaling protocols is better. The results of those debates are mixed, and depending on who you speak with you'll hear varying opinions on the matter. Both protocols are endpoint protocols, which means they both provide all the information necessary to locate a remote endpoint and to establish media streams between the sending and receiving devices.

H.323 is superior in some ways—it provides for better interoperability with the public telephone network, it provides better support for video, and allows better interoperability with legacy video systems. SIP, on the other

hand, isn't designed to address the problems that can be encountered in legacy communications systems. However, SIP is easier to develop and troubleshoot. SIP also seems to be more efficient for VoIP, and many equipment manufacturers seem to be turning to SIP over H.323.

Of course, the fact that SIP is more popular doesn't mean that all service providers use SIP. Nor does it mean that all equipment will work with SIP. To be sure that your equipment works with the protocol that your service provider supports, ask your service provider about compatibility. Even better, get your equipment from your chosen service provider instead of a third-party vendor.

Other Protocols

Dozens of other protocols affect VoIP, but they're parts of the larger picture. For example, the Media Gateway Controller (MEGACO), which is also called H.248, is a device control protocol; the Media Gateway Control Protocol (MGCP) is also a device control protocol; and the Skinny Client Control Protocol (SCCP) is a proprietary VoIP protocol that was developed by Selsius Corporation.

Each of these different protocols is used in concert with other protocols, each of them directing one aspect or facet of VoIP. Currently, no single protocol directs all VoIP activity. H.323 and SIP are the two most broad-reaching protocols, and in truth it would be more accurate to call them protocol stacks.

As mentioned earlier, H.323 stacks H.225, H.235, and H.245 (among others) together to address VoIP as a whole. If you were to envision the protocol stack, it would look like what's shown in Figure 4.1.

The same is true for SIP. Because it combines numerous other, more specific protocols, it's a stack and would look very much like Figure 4.2 if you envisioned it.

Even companies that develop and use proprietary VoIP protocols use more than one. What's more, those companies may use one proprietary protocol and several other common protocols to achieve the best-quality VoIP service. There's still no single "best practice," but the intent to find one is there.

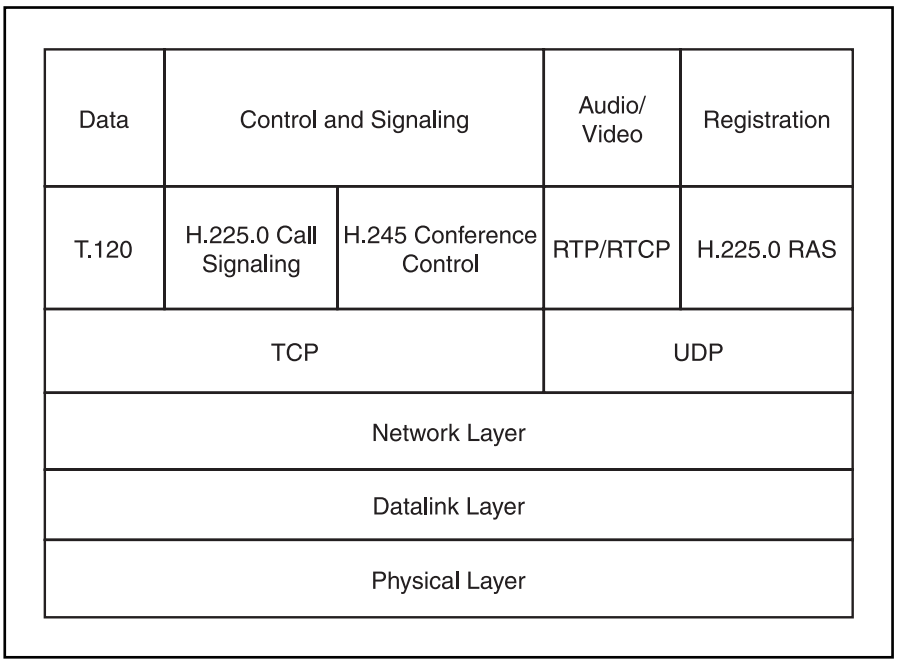

Figure 4.1

The H.323 protocol stack.

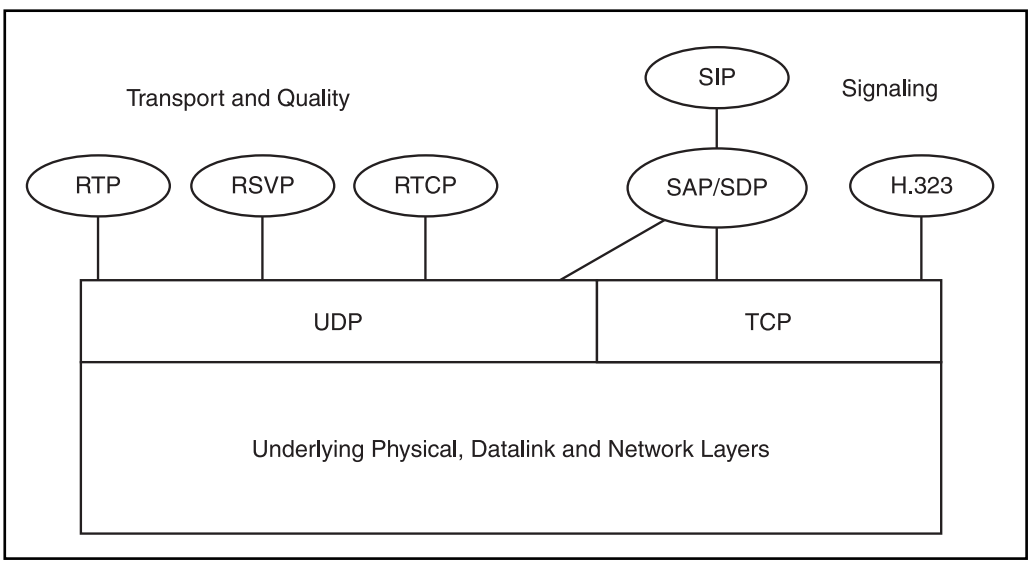

Figure 4.2

The SIP stack of protocols.

The race to be the discoverer is what makes these different protocols interesting. It's also what's pushing the VoIP industry to continually improve the quality of VoIP services and equipment.

Are Protocols Really Necessary?

So, why all this technical mumbo-jumbo about protocols? In truth, if you're just using VoIP from a service provider that provides the equipment needed to use the service, you may never encounter these protocols and you may never need to understand what each one does. Even if you get your equipment from a third-party vendor it may not be completely necessary to understand the protocols that are used in VoIP service.

However, the current state of protocols and standards in the VoIP industry is an indication of the changing climate of the industry. The simple fact that there currently is no de facto standard means that changes will take place—services will change, the way in which services are delivered will change, and the equipment used to provide and use VoIP will change.

No, it's not necessary for you to completely understand the protocols and standards that make VoIP possible. But be aware that there is no single solution building the foundation of the VoIP industry, and that means that change is certain. The depth of that change is undetermined at this time. Only time will tell exactly how VoIP will ultimately be delivered.

The Politics Behind the Science

You might be wondering why the government doesn't provide regulations or legislation to govern the VoIP industry and at the very least decrease the growing pains. Actually, it has. Until recently, the government looked at VoIP as an information service and under the guise of encouraging the growth of information technology, decided to take a hands-off approach to VoIP.

As an alternative, the government in general and the Federal Communications Commission (FCC) in particular declared VoIP a no-regulation zone and decided to leave it to the states to govern VoIP, if they so desired. The theory was that if the FCC and the rest of the government stayed out of it, VoIP would grow, reducing the cost of telecommunications and increasing

the competition in the industry. The theory proved accurate—VoIP has grown at a steady rate, and is predicted to continue to grow at an ever-increasing pace largely because of its price appeal. But the FCC's hands-off policy has opened a whole new debate.

VoIP is the most disruptive technology to hit the telecommunications industry in more than a century. Now, established telecommunications companies are up in arms because the decision by the FCC to make VoIP an information service means that it's exempt from the regulatory guidelines and federal taxes that other telecommunications companies must pay. Those telecommunications companies are screaming mad. Not only are they paying these taxes, but they also must allow VoIP companies to access (for a fee) certain pieces of the public switched telephone network.

For example, if you use VoIP to make a call to your aunt in Poughkeepsie who still uses a rotary phone and wouldn't know VoIP if it smacked her on the forehead, your call is transported via the Internet to a switch where it's converted to analog and delivered to your technologically challenged aunt. From the switch to your aunt's old-fashioned phone, the lines that are used are part of the PSTN; in other words, they're copper wire, and one of the four major telecommunications companies in the U.S. owns those lines. But the VoIP service provider you use is given rights to access those lines to complete the delivery of calls, regardless of who owns them. Yes, the VoIP service provider has to pay a fee, but the fee is only a fraction of what it costs to maintain those lines and telecommunications companies aren't one bit happy about the situation.

The whole debate seems to have no logical answer. If the government were to include VoIP as a telecommunications company rather than an information services company, then VoIP companies could move offshore, freeing themselves of the regulatory constraints of being stateside while still maintaining their customer bases because VoIP has no walls and physical location is of no consequence.

The technology doesn't make the determination any easier. VoIP is a technology that rides on or is hidden inside another technology and that makes it hard to monitor, much less regulate. It's nearly impossible to determine where a call is going or where a user is, and this makes all VoIP traffic

interstate by nature. When you add international call routing to the mix, it simply muddies the waters further.

All of this adds up to an atmosphere of animosity. Telecommunications companies are furious because it appears that VoIP companies are getting special treatment. And to some extent, they are. VoIP companies have it easy by comparison and it strikes chords of unfair competition. In fact, telecommunications companies are pushing for legislation that makes it clear that those telecommunications companies feel as if they're being unfairly penalized. In the end, it's likely that VoIP will be subject to all of the same legislation and regulations that other telecommunications companies are subject to, but when that's going to happen isn't clear. It's likely to be sooner rather than later, however.

Current Legislation and Regulations

What really throws a monkey wrench in the whole legislation and regulation machinery is that little piece about states being allowed to legislate and regulate VoIP service providers. Some states have taken that ability to legislate and regulate VoIP companies to heart and use it fully. For example, in August 2003, Minnesota ruled that Vonage had to apply for a telephone operator's license. And in 2004, the California Public Utility Commission granted itself jurisdiction over any Internet phone call that terminated on traditional phone networks. New York made the same ruling, also in 2004.

Other states that are considering regulating VoIP services include the following:

- Alabama
- Colorado
- Illinois
- Michigan
- North Carolina
- Ohio
- Pennsylvania
- Virginia

As these states get involved in legislating and regulating VoIP, more and more restrictions and fees are imposed on VoIP companies. Every new restriction or regulation increases the cost of VoIP and brings VoIP one step closer to being determined a telecommunications service. Once that happens, VoIP will have no more special protections based on its status as an information technology.

So, evidently, allowing states to make the determination as to how much legislation and regulation should face the VoIP industry is not turning out like the government planned.

Taxation is another issue that the VoIP industry faces. One taxation issue is the billions of dollars that help low-income families and individuals have telephone service. This money is generated by the *universal service fund* and VoIP companies are not required to pay into that fund. State governments also benefit from that fund and are proving quick to want to tap into the VoIP market for the taxes that those companies are currently not liable to pay.

Since the FCC opted to stay hands-off the VoIP industry to encourage growth, it seems counterproductive that state governments would be allowed to institute the same taxation that applies to telecommunications companies. To help alleviate the confusion of the whole mess, the U.S. Senate has been conducting hearings since July 2004 to determine the extent to which states should be allowed to regulate the VoIP industry.

Additionally, in March 2005, some telecommunications companies were blocking VoIP service because of the competition VoIP services provide to their own telecommunications services. At least one of those companies has been fined by the FCC for blocking the technology, and that ruling sets a precedent for future cases of a similar nature.

In an effort to regain control of a system that seems to be getting out of control, one piece of legislation, the VoIP Regulatory Freedom Act, was introduced in 2004 to make regulation of the VoIP industry an activity that belongs solely to the FCC and the federal government. The bill would also establish the FCC as the regulatory agency for VoIP and would remove the right for state governments to tax VoIP services. The impetus behind the bill is the same as the FCC's original stance—a hands-off approach will encourage growth and improvement in the VoIP industry.

The bill was passed in Congress in July 2004, but not without some amendments. In general, the federal government has the sole right to regulate and tax the VoIP industry; however, where emergency services taxes are concerned, the decision to hold the VoIP industry responsible for those taxes is left up to each state. Also, some regulatory freedoms were granted to state governments. For example, states can step in and apply their own regulations if a VoIP service provider is found to be conducting unfair or deceptive trade practices or if the regulation of that VoIP service is considered a consumer protection method.

It's that piece of legislation that has states scrambling to institute regulations and legislation against VoIP companies. Many states have filed lawsuits that claim VoIP companies are conducting business in an unfair way. Emergency services is one area where such claims carry a lot of weight, so VoIP companies are finding themselves in a position to change the way they offer emergency services. To that extent the states do have some control and are facilitating some changes in the VoIP industry.

A similar piece of legislation, the Advanced Internet Communications Services Act, was introduced in early 2005. This bill would grant the FCC sole governance of all Advanced Internet Communication Services (AICS), which include video, voice, and data, or any combination of the three. If passed, the bill will classify VoIP as an information service, rather than a telecommunications service, thus keeping the price of those VoIP services low because the FCC would regulate the taxation of those services. How this act will affect how states regulate and legislate VoIP remains to be seen.

Both of these pieces of legislation work to separate VoIP from the classification of telecommunications services. The Telecommunications Act of 1996 regulated telephone, cable, and media business and attempted to make these services available to a broad base of customers by making moves to allow more competition. Unfortunately, because the act was not enforced well, it failed miserably. And VoIP supporters don't want VoIP to suffer the same consequences, which analysts think it will if the technology is deemed to fall into the category of telecommunications, rather than advanced information services.

Currently there is a push, through bills like the VoIP Regulatory Freedom Act and the Advanced Internet Communications Services Act, to rewrite and adjust the Telecommunications Act of 1996 or to do away with it completely. Which method of revision, if either, will work depends on who you speak with. What's certain is that the current legislative climate creates a couple of expectations for the VoIP industry:

- The FCC has and will continue to limit states' rights to regulate and tax VoIP services, for as long as possible. That length of time, however, is likely to be relatively short—a few years at most—because telecommunications companies will push to have VoIP declared a telecommunications service to even the playing field.
- The FCC will continue to consider the types of federal regulations that are the most appropriate for the VoIP industry. However, even the FCC will feel pressure from telecommunications companies as those companies try to prove their point that protecting VoIP creates an unfair advantage for VoIP companies.

Does this mean that the FCC knows what's best for the VoIP industry? Hardly. But it took more than eight years for the Telecommunications Act of 1996 to be created and passed. It's not likely that any specific legislation that governs VoIP and its role in communications is going to be written and approved overnight. A more realistic expectation is that legislation that governs VoIP will develop over the next three to five years, and eventually VoIP services will be classified in the same manner that other telecommunications services are classified and will be subject to the same legislation and regulations as those telecommunications companies.

Beyond the issue of classification, there are other regulatory issues to consider. For example, how does VoIP affect law enforcement agencies? That's of particular concern because it does, in fact, affect law enforcement in a huge way. For example, law enforcement agencies are hampered by VoIP because there is no wiretap regulation that governs VoIP.

The Communications Assistance for Law Enforcement Act of 1994 (CALEA) requires that all telecommunications companies provide wiretap access to law enforcement agencies. However, that law doesn't apply to VoIP companies

because under the guidelines provided by the FCC, VoIP companies are not considered telecommunications companies. Even if they were, the technology makes it very difficult for law enforcement agencies to obtain the information that they need.

One of the technological issues that law enforcement agencies face is that VoIP service providers never touch the data packets that are transported using the service. The company simply provides a database that lists the IP addresses and subscribers that are present online at any given time.

The software within VoIP terminals arrange and send streams of data packets to one another, but the packets don't need to be routed through the database owner, which means that all the VoIP service provider could supply the law enforcement agency is the IP address for the subject of the wiretap. The law enforcement agency would then need to go to the Internet service provider with a subpoena to gain access to the data packets.

Another issue that law enforcement agencies face is that CALEA covers intercepted communication and that includes the content of the call as well as any identifying information about the call. Identifying information can include the origination and termination numbers of any call routed through a specific number, and because that's easier (and less prying) information to obtain, it's much easier for a law enforcement agency to get a warrant that allows for capturing that information. However, the devices used to capture this information are designed to work in the telephone company's central office.

On an IP network, like VoIP using the Internet, identifying call information can be included in a number of different possible locations in the data packets that are sent over the network. It's not possible to extract that specific information without recording the whole call.

It's these types of issues that keep constant pressure on the VoIP industry to adhere to current standards or to create new standards that set a precedent for the future. What this all boils down to is that the VoIP industry is currently in a constant state of flux. So although price, features, and freedom of choice might be the biggest drivers for the industry at the moment, prices will change as state and federal regulations and legislation change.

It's not likely that VoIP costs will ever be as high as the cost of other telecommunications services, because VoIP bundles well with other services such as broadband Internet access, but the prices may increase over time, especially when the industry becomes subject to FCC regulatory fees and communications taxes.

In the meantime, industry standards are changing and maturing. Ultimately, as the price for VoIP changes, it will be the quality and convenience (and additional features) that keep customers interested in the service.

5

CHAPTER

Planning Your VoIP

Now that you understand more about the VoIP industry, it's time to get serious about VoIP services. Because price and features are probably two of the main reasons that you want to switch to VoIP, it's important to examine the cost of the service and features that you want.

In general, VoIP is much less expensive than POTS. For example, the average POTS line costs about $50 per month. About one-fifth of that is taxes and regulatory fees. And that's before you even add the cost of long distance or other features into the equation.

VoIP, on the other hand, costs in the neighborhood of about $25 per month on average with few, if any, regulatory fees or taxes included.

Note

A Federal Excise Tax is included in most monthly VoIP plans. That fee is three percent of your total monthly bill. With the average $25–$30 VoIP service package, that means you're paying $0.75–$0.90 a month in taxes on your VoIP service.

Most VoIP service providers also include unlimited long distance in their monthly service fee. These cost reductions are before you take into consideration the increased number of standard features that are attached to VoIP. If you add the savings from those features, your savings could put as much as 70 percent of your telephone bill back into your pocket.

Price alone is enough to draw most users to VoIP. Even if you've tried VoIP in the past and found it lacking, it's no stretch to figure out that VoIP is worth trying again. One argument is that broadband Internet access is so much more expensive than dial-up Internet access that VoIP can't be worth it.

If you don't already have high-speed Internet access, switching to VoIP at least evens the costs of both Internet access and phone service. The deal-sealer is the extra features that come with both services. If you take it one step further and choose a VoIP service provider that offers a triple-play plan, then you not only save on your telephone service, but also on Internet access and cable television plans, as well.

Available Service Plans

The easiest way to get a good, clear understanding of what VoIP service providers have to offer for the money you pay is to look at a side-by-side comparison of some of the companies. The following table lists some of the top VoIP service providers and what they have to offer. It's by no means an all-inclusive list of the available service providers and features, but it should give you a good idea of how each of the services compare.

	Vonage	BroadVoice	Packet8 CallVantage	AT&T	VoicePulse
Monthly Cost	$24.99 Unlimited	$19.95 Unlimited	$19.95 Unlimited	$29.99 Unlimited	$24.99 Unlimited
E911	Yes	No	Yes	Yes	No
Equipment	Company Provided ATA	Most SIP-Capable Devices	Company Provided ATA	Company Provided ATA	Company Provided ATA
Activation Fee	$30.00	$40.00	$29.95	$29.99	None
Regulatory Fees	$1.50	$1.50	None	None	None

	Vonage	BroadVoice	Packet8 CallVantage	AT&T	VoicePulse
Termination Fee	$39.99 Refunded with ATA Return	None	$59.00	None	None
Money Back Guarantee	14 Days	30 Days	14 Days	None	30 Days

Additional VoIP service providers are listed in Appendix A if you want to compare other companies.

Despite the fact that VoIP service providers seem to be very similar, they are not all the same. And the services that you receive from each provider will be different. To ensure that you get the best possible service from whichever service provider you choose, here are some important factors to consider:

- **Cost:** How much is the calling plan from the service provider that you are considering? Does the plan meet all of your needs? Service providers offer monthly plans that start at a few hundred minutes per month for local and long-distance calling, to plans that offer unlimited local and a low per-minute rate for long distance or plans that offer both unlimited local and unlimited long distance.
- **Features:** VoIP is a much richer technology than POTS, but not all VoIP service providers offer the same features. What features do you need? What features aren't essential but are features you would like to have? What features are deal-breakers? The next section of this chapter outlines some of the standard and advanced features of VoIP.
- **Emergency services:** Does your chosen service provider offer E911 services or even just 911 services? Be sure to check this out because not all providers offer emergency services and those that do often have a special activation process that you must go through to set up your 911 service. What's more, even though VoIP companies don't pay into the emergency services fund, some charge a monthly fee for emergency services availability. Emergency services are covered in more detail in Chapter 8, but it's important for you to know that 911 is *not* a standard feature in VoIP.

Note

E911 is not the same as a standard 911 service. E911, or Enhanced 911, is a feature that enables emergency services dispatchers to see where you're located as soon as they connect your call, even when you can't speak to them. If your VoIP service provider offers either E911 or standard 911, you'll have to register your location once your service is active. Then, if you take your ATA to a different location or use a softphone, the emergency services operator won't know where you are physically located and could send emergency services to the wrong location.

- **Hardware costs:** Every company has different hardware requirements. What does the service provider you're considering require and what will it cost you? Another consideration where equipment is concerned is what if you decide you don't like VoIP and want to return the equipment? Are there certain requirements for the return (such as returning the equipment in the original packaging or returning the equipment before the end of the money-back guarantee period if the company offers one) and will you be charged if you don't meet those requirements? Equipment is one of the places where you should be exceptionally careful, because this is where hidden costs can sometimes catch you off guard. Always read the fine print of your service contract before you sign on the dotted line.
- **Activation fee:** What's the activation fee for the company you're considering? Activation fees vary widely by company and service type and can cost you from nothing to around $70. Some companies also have a *deactivation fee* should you decide you don't want the service. Check these details carefully before you place an order for VoIP service.

Note

Be sure to save your shipping boxes if you decide to try a VoIP service provider that sends you the equipment you'll need. Most of those providers require that the equipment be returned in its original packaging if you decide not to use the service. Some even charge extra if the equipment isn't returned in the original packaging.

- **Ease of use:** How difficult or easy it is to use the VoIP service you're looking at should be a consideration as well. Some services are as simple as picking up a telephone, others are more difficult and require that you connect a multimedia headset to your computer or use a microphone and the computer's speakers to operate the service. Decide what's most convenient for you before you make a final decision on your service provider.

VoIP service is much less expensive than traditional phone service, but that doesn't mean you should jump into it blindly. All VoIP service plans are not created equally. Do your homework and make sure you get the plan that's right for you, and that you don't get any unexpected surprises if you change your mind about VoIP service.

Standard VoIP Features

One of the most attractive things about VoIP is the number of features available as part of a standard service package. Many of the features that you pay extra for with traditional phone service are free with your VoIP package. What's more, because of the additional capabilities enabled by the Internet, some of those features are much richer and more useful than the same features offered by traditional phone companies.

The following sections look at some of the standard features you can expect to have access to with your VoIP service.

Alternate Area Codes

Some VoIP companies offer alternate area codes. You can select any area you want from the service provider's list of available area codes, even if you don't live there. For example, if you live in New York but have family in California, you can have a California number.

Many people find this feature useful when combined with an advanced feature called a *virtual number*. This combination enables you to have more than one local number in different cities. You learn more about virtual numbers in the "Advanced VoIP Features" section later in this chapter.

Caller ID

Caller ID is a feature that displays the telephone number of an incoming caller. If your VoIP provider offers this feature, you need to have a caller ID box or telephone equipment that supports caller ID. The caller ID provided by VoIP service providers is about the same as the caller ID offered by traditional phone companies. If the number is not private or blocked, it shows up on your display along with the caller's name. The neat feature of caller ID with VoIP is that some service providers use the information to create *call logs* online that you can view anytime by going into your VoIP account.

Call Waiting

Call waiting notifies you when another call is coming in by playing a brief tone or beep. With this feature you can answer the incoming call without hanging up on the original call. Some VoIP service providers allow you to turn caller ID and call waiting on or off as it suits you from your account page online.

Call Return

Call return is what's known as *69 or automatic call back by traditional phone companies. This feature allows you to automatically dial the last incoming call to your phone line simply by dialing a code, usually *69. This feature is useful if you miss an incoming call and you want to call that person back without dialing a full number (or if you can't remember or don't know the full number). Some VoIP companies include call return in their monthly service offerings free of charge. When used with traditional telephone service, call return is usually billed on a per-call basis at about $0.99 per call.

Three-Way Calling

Three-way calling is a feature that enables you to add a third party on the line of an existing two-party call and enables you to speak with all three parties. VoIP service takes three-way calling to the next level by making it possible to conference together three, four, or more (up to 10) calls at one

time. Some service providers offer this service, others do not. With most service providers, three-way calling is a free service for up to three lines—you and two others. However, some service providers charge additional fees for any conferenced line over the third one.

Voice Mail

Voice mail is a feature that provides you with an electronic mailbox that can answer and store incoming voice messages either while you are away or on the phone. You can then retrieve your messages from any location. VoIP makes voice mail even more valuable by adding capabilities that just aren't possible with traditional telephone service. Some of the additional capabilities are as follows:

- Play back your messages online and by e-mail. You don't even have to pick up your phone to check your voice mails. You can also request an e-mail notifying you every time you receive voice mail. Some service providers even attach the actual message to the e-mail so you don't even have to log on to the company's Web site to hear the message. There's also the added ability to forward voice mails to others as an e-mail attachment or save them to your PC's hard drive for archiving. Most service providers support the top popular media player formats for playing your voice messages back to you.
- Customize your voice mail controls. Some VoIP service providers give you access to a control panel, which is Internet-based software that lets you turn features on or off anytime you want. You can activate e-mail notification at the touch of a button, and record different greetings for different hours of the day and different days of the year. You can also manage your access controls, such as passwords and PINs, from anywhere, at any time.
- Have your voice mail forwarded to your cell phone. Isn't it convenient when you don't have to call a number or look up a Web site to get your voice mail? VoIP makes it possible to set guidelines for forwarding your voice mail messages directly to another number, which is a useful feature to have if you're traveling or otherwise disconnected from your home.

Real-Time Billing

Online billing has so many advantages. For example, with online, real-time billing you have complete control with instant, secure access to your billing information. You can access your account 24/7 to check your bill, review your complete call history, and change your credit card information. Because it's available in real time, you have the most accurate and up-to-date information whenever you log on.

Additionally, real-time billing lets you track how many minutes you've used if you have a limited-access plan. Or, it lets you see who you've called and who has called you with detailed call logs. Detailed call logs show all incoming and outgoing calls as well as any caller ID information that is available.

Again, not all VoIP service providers are created equally. Some offer more standard features than others and some have more advanced capabilities than others. The price of all of those features varies, too. Think about the features you need, use the worksheets provided in Appendix D to determine the type of service that suits you best, and then compare the service offerings from several companies to find the one that offers what you need.

Network Availability Management

One of the top concerns with VoIP is what happens when the network (your Internet connection) is unavailable. When there's no network connection, there is no VoIP service. To help alleviate that worry, some VoIP service providers offer network availability management, which is a feature that lets you decide how you want your calls handled if your network is down.

Exactly how you control those calls is limited by your service provider, but some allow you to forward calls directly to your voice mail or to another number that you use as a standby. For example, if Vonage is your VoIP service provider, you can specify a phone number that your calls will be forwarded to if your network is down. You can choose to make that number your cell phone number or a friend or family member's phone number. Whatever works best in your world.

Advanced VoIP Features

Advanced VoIP features are those features that your VoIP service provider offers that are outside the norm. Usually, these features add to your monthly bill. Some features may cost only a few dollars a month; others can be fairly expensive. But a few advanced features are also free. How and how much you are charged for any advanced features is determined by the service provider that you choose.

These are features that you usually have to request because they aren't part of the standard feature package that most service providers offer. If you need one of these advanced features, discuss it with your VoIP service provider when you call to set up the service. But don't worry. If you find out later that you don't have a feature you want, it's usually very easy to add or subtract features once your service is set up.

The following sections discuss some of the advanced features that may be available to you.

Call Blocking

Call blocking enables you to stop annoying phone calls by placing the number of the unwanted call on a blocked call list. Then, when someone you don't want to hear from tries to call you, the call won't even ring through, so you aren't bothered by it.

For example, if a particular telemarketer or bill collector keeps calling you although you've asked them to stop, you can use the call blocking feature to stop the calls. When unwanted callers try to ring through, they receive a message telling them the number is unavailable or that you've chosen to block their call. The best part is that some service providers let you choose which message you want the caller to hear. After all, if you're ignoring the ex, don't you want them to know you're ignoring them?

Call Filtering

Call filtering enables you to determine how incoming calls are handled. This feature uses your caller ID information to route calls in one of four ways:

- Forward the call to another number
- Send the call directly to voice mail
- Give the caller a busy signal
- Play an "out-of-service" message

Call filtering is an especially useful tool if you commonly screen your calls. It's like having someone prescreen them for you. You might say that call filtering is call blocking on steroids.

Call Transfer

Call transfer enables you to direct calls to a number other than your own. Some VoIP service providers even allow you to direct those calls to anywhere in the U.S. or Canada. After you answer a call, you can have your call transferred to a phone number of your choosing by simply dialing a few numbers. So if you're expecting a call at home but will be at your office all day and don't want to miss the call, you're protected. When the call comes in, whoever answers the phone can transfer it to your office or mobile number in a few simple steps.

Call transfer is an easy way to ensure you're not left sitting by the phone. Some service providers include this feature in their standard service package, but for some people it's worth a few extra dollars each month if they don't.

Toll-Free Numbers

Toll-free numbers, also known as 1-800 numbers, allow those who use the number to call you without being charged for the call. These numbers are useful for people who have family and friends with limited budgets or who run a business out of their home.

The caller can call you for free, but you'll pay for the call. Much like a traditional telephone service provider that offers 800 numbers, most VoIP service providers allot a predetermined number of minutes for 800 numbers and then charge you on a per-minute basis when those minutes have been used up. What differs with a VoIP service is that the average charge for those extra minutes is about $0.06 per minute. Traditional telephone service providers charge standard long-distance fees for their 800 numbers; usually around $0.10 per minute. The exact number of included minutes and the per-minute cost for 800 numbers over VoIP varies by service provider.

Repeat Dialing

Repeat dialing, which you may know as *66 or busy redial, automatically redials a busy number for you, for up to 30 minutes or until the call is successfully initiated. When the call goes through, you receive an alert to let you know. Repeat dialing eliminates the frustration of hearing a busy signal over and over again.

It's easy to use, too. When you try to make a call and get a busy signal, you simply press *66 (or whatever code your service provider has designated for repeat dialing) and the service will keep trying the number until the call is connected or the time limit expires, whichever comes first. If the call never connects, you're alerted that the call could not be completed.

Speed Dialing

Speed dialing enables you to store numbers on your telephone for quick dialing using two digits rather than ten digits. How many stored numbers you are allowed to have is determined by your VoIP service provider.

Note

Most of today's phones also have built-in speed dialing capabilities, and they usually support 10 to 100 speed dial numbers. If you're using a phone that has speed dialing built in, speed dialing capabilities from your VoIP service provider may just be an added bonus for you.

Do Not Disturb

Have you ever wished you could turn off your phone without having to unplug every handset in the house? For example, when is the last time you sat down to watch a movie without the phone ringing? The do not disturb that some VoIP service providers offer is a feature that prevents your phone from ringing and automatically forwards all calls directly to voice mail. To the caller it seems like you're not home, and you don't have to be interrupted by unwanted calls.

Note

Some telephones on the market today have this feature available independent of the service provider, and it's simple to use. In most phones with this feature, you simply push a button when you want to use the do not disturb feature and then push the same button again when you want to turn do not disturb off. If this is a feature that you want, check your equipment before you pay extra for the service.

Call Forking

Call forking enables you to receive calls to your phone number at more than one geographical location, simultaneously. This is useful if you don't know for sure that someone will be available to take an incoming call. If you know where you'll be, or if you carry a cell phone, you can have both your home phone and an additional phone ring at the same time. Either phone can then be used to connect the call.

Call forking is also useful if you won't be available but you don't want a call to roll into your voice mail. Even when you're not available you can fork the call to another number or group of numbers where someone else can answer the call. Your callers never have to speak to your voice mail again.

Call Forwarding

Call forwarding is a feature that enables you to have important calls automatically redirected to another telephone number or straight to voice mail

when you are away from your phone. Most VoIP service providers offer call forwarding free of charge, although some charge an additional fee on a monthly or per-call basis when you use it.

Virtual Numbers

Virtual numbers are one of the most exciting VoIP features. Some VoIP service providers can assign you a phone number in any supported city that connects directly to your actual telephone number. Then, when anyone in that city wants to call you, they dial the virtual number (which is a local call for them) and your phone rings. For them it's a free call and the only additional charge to you is the cost of the virtual number, which usually runs about $5 to $10 per month.

You're not limited to any certain number of incoming calls or minutes on a virtual number, and you can have as many virtual numbers as you'd like in as many different cities as are available from your service provider. Of course, you'll pay a fee for each virtual number that you have.

Note

Not all cities are supported with virtual numbers because some states do not allow VoIP companies to do business in their state. Check with your VoIP service provider to see what area codes are available.

For example, if you live in Tampa, your mother lives in New York City, and your sister lives in Saginaw, you can have two virtual numbers if those area codes are supported by your VoIP provider—one in New York City and one in Saginaw. Then your mother and your sister can call you whenever they want without having to pay for a long-distance call.

Some VoIP service providers even offer virtual numbers in countries other than the United States. Check with your service provider for full details about available virtual numbers.

Fax Capabilities

One of the strange conundrums of VoIP is that you can't send faxes via a VoIP phone service unless you purchase an additional fax service from your service provider. However, most VoIP service providers offer fax services as a second, dedicated line, and they allow unlimited incoming faxes.

Outgoing faxes are usually limited to a predefined number of minutes that can be used for either local or long-distance faxing. Additional minutes or international faxes can cost anywhere from about $0.03 per minute to about $0.10 per minute. And because the fax line is dedicated, it has its own number and doesn't interfere with incoming or outgoing telephone calls.

Some VoIP service providers also offer detailed logs of incoming and outgoing faxes.

Ring Lists

Ring lists enable you to direct your phone calls to any number of other telephone numbers. Those other numbers will ring when you have an incoming call in sequential order, random order, or all at once. You can specify the order of numbers called as well as the numbers to be called.

It's even possible to ring a group of other numbers all at once. This feature is very useful if you're planning a group event or if you work in a group and it doesn't matter which group member answers the call.

International Call Blocks

International call blocks enable you to block and unblock international calls as you choose to. Most VoIP service providers do not charge for international call blocks, although you may encounter some that do.

An international call block is a useful feature to have in this day of telephone scams and pay-per-minute telecommunications services. Many people have been surprised by huge phone bills because their child or a friend uses their phone to call a number that connects internationally. Those calls can be extremely expensive.

Business-Oriented Features

In addition to the standard and advanced features of VoIP, if you run a business out of your home, some service providers offer additional virtual office features that might be of interest to you. These features are designed more for businesses, and as such usually only come with the business package provided by the VoIP service provider that you choose. However, as with everything in the VoIP industry right now, there's an exception to every rule. Some service providers offer some or all of these features with consumer VoIP packages as well.

Auto Attendant

You're probably familiar with auto attendants. These are the *interactive voice response* (IVR) software programs that you encounter any time you call a business phone number and get a recorded message that directs you to press 1 for this service or 2 for that person. The same type of feature is offered by some VoIP service providers for use with a VoIP line that supports your home-based business.

VoIP-based auto attendants are a natural for the technology, because it is digital. The service providers that offer auto attendants usually also offer the flexibility of using your own voice or prerecorded messages to set up your IVR system. And it's available 24 hours a day, so if someone calls your number when you're not available, you're covered.

As for features included with auto attendant packages, you can expect them to vary by provider, but in general auto attendants can transfer calls to an extension or voice mail, and it's customizable by name, extension, or call group. The price varies, too. Some service providers offer auto attendants free as part of their home or virtual office package, whereas others charge additional monthly fees for the service.

Call Parking

If you have an office in your home, chances are that you also have a dedicated phone line for that office. Whether you run a business or just work from home as a teleworker, a separate telephone line allows you the freedom to

ignore calls to your home during your business hours, or calls to your office during your off-time. Occasionally, however, something comes up and it would be nice to transfer a call from one of those lines to another, wouldn't it? That's what call parking allows you to do.

Basically, call parking is like putting a call on hold. However, instead of being placed in a hold box where it's only accessible by one extension, the call is parked on a floating extension. In a setup where there are multiple extensions, once a call is parked, it's possible to pick up that call from any extension in the telephone system. So, if you're in the office at the end of the day but you want to transfer a call to your home extension, you simply park the call, pick up the home extension, and then pick up the call from it's parked position. It's a useful feature if you have multiple extensions in your home and home office.

Hunt Group

The ability to receive an incoming call, even if you're on your extension when it comes in, is a competitive strategy that has helped many businesses make it in their chosen market. Hunt group is the feature that makes that possible. For example, if someone calls into your business but you're using your extension, rather than getting a busy signal, the caller is rolled to another extension. If it happens that that extension is busy, they are rolled to yet another extension.

This is the same type of incoming call system that many calling centers use to ensure that customers reach a representative as quickly as possible. With VoIP service, the transfer order of a hunt group is determined by you, meaning that you can choose which extension is tried and in what order if an incoming call reaches a busy extension.

Pricing for the hunt group feature is like pricing for all of the other business-oriented features of VoIP—some service providers make these features available for free while others charge a set monthly fee for the service. If you're setting up VoIP in your home office, look at the various features available through your chosen service provider and compare those features with other service providers before you make a final decision.

The same is true for residential service. The cost for various advanced features of VoIP fluctuates widely between service providers. Some, you'll find, are very inexpensive, whereas others could be considered expensive. All have one thing in common, however—without the Internet, they may be possible but they wouldn't be nearly as rich.

The capabilities of the Web make it possible to add many new facets to the standard features of POTS and enable many new ones. Over time, as the cost of VoIP rises due to increased taxes and regulatory fees, the richness of these features will be what makes VoIP valuable to you. You'll become accustomed to the better services and you won't want to go back.

What to Expect from Your Service Provider

Once you decide on a VoIP service provider, it's time to begin the game in earnest. From the moment that you order VoIP service, which you can do over the phone or via the Internet, you'll be entering a whole new world of communication. If your equipment and connection are of high quality, the world you enter will be one of improved communication.

If the service provider that you've chosen is sending you the necessary equipment, it could take a few days to about two weeks for you to get the equipment and get started using VoIP. The good news is, setting it up is usually easy and straightforward. In fact, it's frequently been said that if you can connect a DVD player, you can connect your VoIP service. Chapters 9 and 10 cover more about getting connected to VoIP service.

After you've connected your equipment, it's just a matter of making a few phone calls to familiarize yourself with the service. You might also want to log on to your account, if your service provider gives you Internet access to a control panel (and most do), to adjust the controls and familiarize yourself with the features that are available to you online.

In your administrative control panel you should have access to all of the various features that are standard to your VoIP service and any additional features that you might have ordered. The cumbersome Web interfaces of the past are gone, and sleeker, more user-friendly interfaces have replaced

them in today's VoIP. It should be easy to navigate your control panel and to change the settings that control your features.

It's possible that you'll need technical assistance or other customer service when you're connecting your service. If your service provider is going to remain in the game, you'll probably get through to tech support or customer service in an acceptable amount of time. But be aware that if you call during peak hours or the company is understaffed, getting the service that you desire could be tough, especially if you've chosen to go with a smaller VoIP service provider. There are numerous reports on Internet forums of hour-long wait times to get through to a tech support or customer service rep, especially among smaller companies, though some of the larger companies are guilty, too.

Many VoIP service providers offer self-service online help through a tech support database, message boards, or live chat with a tech service representative. Where possible, take advantage of these features because they could speed the time it takes to get your help. Self-service help features are much more advanced than they have been in the past, and it's not unusual to find the answer you need without ever having to speak to a company representative.

Quality of Service

When your service is active and operating properly, you might encounter a few glitches or growing pains from time to time. These can take the form of fast busy signals no matter who you try to call, occasional interference with your call, or trouble accessing voice mail. Of course, these aren't the only challenges you could face from time to time, but they represent a good cross-section.

These growing pains are temporary and can last from a few minutes to a few hours. It's rare that they last more than a day. Because many VoIP service providers are small, growing companies, it's not unusual for them to experience these types of glitches. But even if you choose to secure service with a large company like AT&T or Comcast, the VoIP industry is still young in relative terms, so you may still encounter issues from time to time no matter who provides your service.

In some cases, if your service provider is experiencing a problem they'll post a notice on their Web site. Check there before you try to call tech support. It could save you a lot of time waiting on hold only to learn the company is experiencing technical difficulties.

For some of the issues that you face, such as garbled calls, the fix might be as simple as adjusting the quality control settings on your administration panel if your service provider offers one. Vonage is one company that does, and when service with Vonage is not as good as users would like, they can adjust bandwidth and other settings to improve the service by logging in to their administrative control panel, or as Vonage terms it, the *dashboard*.

Some service issues do not relate to your VoIP service provider. Electrical outages are one issue that many users face from time to time. When the power goes out there's nothing you or your VoIP service provider can do about it unless you're using a battery backup. You just have to wait until the electric company gets it fixed.

You could also face quality issues if your broadband connection suffers from technical difficulties. For example, it's not unusual for some broadband providers to have intermittent service during bad weather. Unfortunately, once the weather clears up and the service is steady again, there might still be problems with your VoIP connection. VoIP service is much more sensitive to all of the small stutters and delays in broadband Internet service, and once the connection is steady again, any static still in the line creates poor-quality service. Resetting your cable modem and ATA is the fastest way to clear up this problem.

Note

Resetting your cable modem and ATA is easy. Simply disconnect all of the wires from both boxes, including the power source. Wait three to five minutes and then reconnect the boxes, plugging the power source in last. It could take as much as five minutes for both boxes to fully reboot once reconnected, so give it some time before you try to make a call.

Chapters 10 and 11 include much more detail about quality and connections. You'll also find information about specific actions that help to improve some of those problems. In all, however, the quality of VoIP service is far improved over what it was a few years ago. The improvement in technologies and the proliferation of fat broadband connections have created an entirely new service in VoIP that has far fewer problems today than in earlier generations of the technology. Those quality and service issues that do arise are usually minor and very easy to repair.

Reliability

Reliability is the other area of major concern for most users. In the past, calls placed using VoIP services were very unreliable. It was not at all unusual for a call to just drop off without warning. As you learned previously, that unreliability was due in part to the capabilities of the equipment and the Internet connection that was popular at the time.

Today's equipment and Internet connections are far more advanced. Of course, that doesn't rule out the occasional problem with dropped calls and other reliability issues. Technology doesn't always cooperate. However, most of the issues that you'll encounter today are issues that can be addressed by changing a setting. For those few that are not, VoIP service providers are usually very good at repairing problems in a timely manner.

It's like the issues that Comcast Cable has with the television and Internet services that it provides. Occasionally, problems occur with old cable lines, static in the line, or faulty switches that create problems for Comcast's customers. The instant the issue is brought to light, however, Comcast gets a team out to fix the problem.

VoIP is the same. As soon as a technical glitch with VoIP service is brought to a service provider's attention, that service provider gets started fixing the problem. It's essential for these companies to stay on top of any quality or reliability issue that might come up. If they don't, customers will go to another service provider that can offer a better-quality experience.

At a time when every company is scrambling to establish its place in the industry, all of them are working toward a better experience. If that means overtime for service technicians, VoIP service providers don't have a problem letting those service technicians have overtime. What's important to the service provider is gaining marketshare, and right now marketshare is gained by providing a high-quality service and excellent customer care.

As a whole, VoIP is, and always has been, an exciting technology. The improvements to the technology and availability of VoIP make it that much more exciting. Even taking the reduced communications cost out of the picture, VoIP offers great features and service that is improving every day. With all the enhancements and improvements, it's no wonder that so many users are turning to VoIP and leaving traditional telephone service behind.

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6

CHAPTER

Getting the Right Equipment

One of the biggest downfalls with VoIP in the past was that the equipment used to make VoIP calls wasn't advanced enough to ensure that the quality of the call was acceptable. There was no ATA (remember, that stands for analog telephone adapter), and the modems used to create the Internet connection were usually dial-up modems.

Today, new and improved equipment makes the VoIP connection better, faster, and of higher quality. In fact, VoIP works so well now that you may be using VoIP and not even know it. Many of the large telephone companies that offer traditional phone service use VoIP to transport long-distance calls from one location to another, especially international calls.

It work likes this: You're in New Jersey and you pick up your phone to make a long-distance call to your friend in California. You dial the call just like you would dial any long-distance call and you wait for your friend to pick up on the other end of the line.

In the meantime, what's happening behind the scenes is that your call is routed over telephone lines, first to a switch or hub. When it reaches that switch or hub, it's converted to digital data packets and switched to a VoIP connection. Then the call is carried over the Internet to the switch nearest

to the termination point. At that switch, the call is converted back to analog data, routed back to copper wire, and then terminated at your friend's phone. And you never even know you're using VoIP because the Internet connection and equipment that the telephone company uses is advanced enough to switch between analog and digital seamlessly.

It's no wonder that even telephone companies use VoIP to transport long-distance calls. VoIP is far less expensive, even for them, than using traditional phone routing equipment and services. With the right equipment, VoIP is as good as or better than traditional phone service.

The following section looks at some of the equipment that you'll need to make calls using VoIP.

Telephone Adapters

The analog telephone adapter, or ATA, is the one piece of equipment that makes VoIP better today than it was a few years ago. The ATA enables you to make calls from your regular home telephone, without changing anything but the way the phone is connected—instead of plugging into the wall, in order to use VoIP, your phone plugs into the ATA via a regular telephone line and then the ATA connects to your broadband Internet connection by plugging into an available *Ethernet port*.

So your phone's connected to the ATA, which is hooked into your Internet connection. When you pick up your phone to make a call, the ATA produces a dial-tone, just like you would hear if you were using traditional telephone service. As you dial out, the ATA translates the words that you speak into small pieces of digital data that are coded to indicate where those small bits of data should go and how the pieces of digital data should be reassembled and converted back to voice when they arrive at their final destination.

It's not necessary for the person receiving the call to have an ATA. Your voice is converted to digital data, coded, and transmitted from the single ATA at your end. When it reaches the final switch along the route to its destination, all of the details have already been addressed and the call becomes just another telephone call traveling from one place to another, and it's handled just as if you were still connected to a POTS line.

As shown in Figure 6.1, the ATA looks a lot like a broadband router. Where you'll see the most difference is in the connections on the back of the box (shown in Figure 6.2). Most broadband routers don't have telephone connections, whereas the ATA does. Of course, the inner workings of the ATA are different as well, because the ATA converts analog voice data to digital voice data and codes that data for transport over the Internet and reassembly at its destination.

Figure 6.1

The analog telephone adapter (ATA).

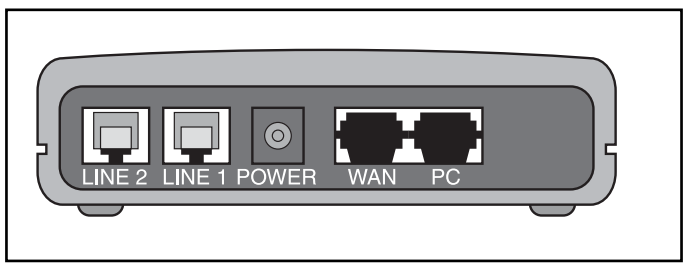

Figure 6.2

The connection ports on the analog telephone adapter (ATA).

Do You Need an Adapter?

So, do you really need a telephone adapter? That depends on the type of VoIP service that you're using. If you plan to use your regular telephone to conduct VoIP calls, you need to convert an analog signal to digital and then

back to analog. In that case, yes, you'll need an ATA. However, some types of VoIP don't require an ATA.

For example, if you have a PC-to-PC VoIP service like Packet8, you wouldn't need an adapter because there is no analog signal to convert first to digital data and then back to analog signal. IP phones also are available that have the ATA built into them so there's no need to have a separate adapter. These phones are frequently used by corporations with in-house VoIP or between people who call others who also have an IP phone, but beyond that, IP phones haven't really adapted to the consumer market yet. A few people now use IP phones, so it's likely that they will eventually become more commonplace than they are today. It's a matter of time before buying an IP phone is as simple as buying a regular telephone. You won't even think about the VoIP factor. Instead you'll be worried about some other feature of the phone that probably hasn't even been conceived of as of yet.

If you plan to replace your telephone service with a monthly VoIP plan offered by one of the many service providers on the market, you will need an ATA. The ATA is the piece of the puzzle that was missing in the past. Many VoIP service providers today send the equipment to you when you sign up for the service. However, it's possible to buy an ATA before you even decide on a VoIP service provider. And if you're not into waiting for the equipment to arrive in the mail, some VoIP service providers sell their ATAs along with the first month of service in retail outlets such as Sam's Club, Best Buy, or Circuit City.

ATA Versus Router

What's really confusing for many people is how an ATA differs from a router. It would seem that you could simply plug your Internet connection and telephone connection into the same box and be done with it. In fact, some Internet routers have telephone connections in the back of them. However, it's really not that simple.

The ATA operates differently than the router. The router is your connection to the Internet. Whether it's cable or DSL, Figure 6.3 illustrates how your

Internet connection comes into the router, the router connects to the computer, and you have Internet access. The router forwards packets of data from your computer to other routers on the Internet, and it serves as the connection to your high-speed Internet access.

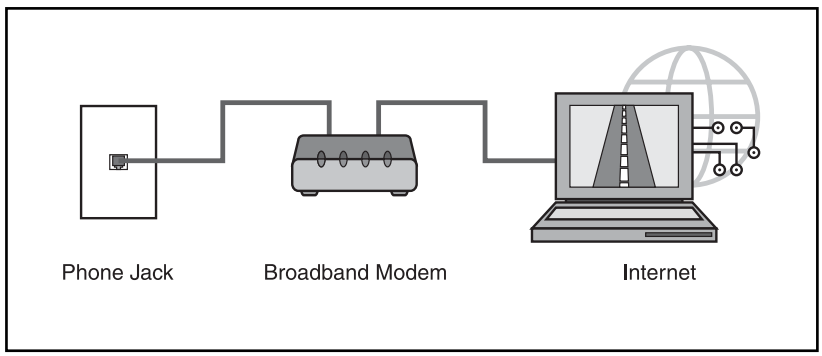

Figure 6.3

Your Internet connection.

Some would argue that a router is a different piece of equipment than a cable or DSL modem. In truth, it is, but the term "router" is used interchangeably with Internet router these days among all but the most technically savvy of people. It's important to understand that different types of routers exist. For the purposes of this book, a router, as shown in Figure 6.4, is the box that connects your computer to the Internet and translates and routes data between your computer and the Internet.

Figure 6.4

The cable router.

The ATA, on the other hand, is nothing more than an ATA—in other words, it doesn't provide Internet access to you. It translates voice data into digital data and then packetizes and codes that digital data for transmitting over the Internet. The coding that the ATA includes in the packet acts as a roadmap for where the data is to be delivered. It tells the routers that make up the Internet where the packet should go next and that the packet contains voice data that takes priority over other types of data. At the end of the line, the code tells the receiving router or ATA how the digital data should be decoded and reassembled as voice data.

Some hybrid devices that operate as both an Internet router and an ATA will probably also be available to the general public in the near future. There may even be devices that act as wireless network hubs, Internet routers, and ATAs, but those devices are not generally available yet. And even if they were, in many cases, you can't use an ATA to translate calls unless it is provided by the VoIP service provider that controls your VoIP service. This trend toward vendor-specific equipment is one of the problems that will solve itself over time. Until it does, however, make sure you have equipment that works with the VoIP service provider that you choose.

Vendor-provided Equipment

Much like the early days of telephone service, VoIP service providers usually provide the equipment needed to use their service. The problem with this equipment is that it's often proprietary and cannot be used with another provider's VoIP service. So, for example, if you go to an electronics store and purchase an ATA, it will probably be labeled for a specific service provider. If, when you get the ATA home you decide you want to use a different service provider, you'll need to return the ATA and get a different one because the ATA probably won't work with the other service provider.

It would seem that all of the equipment should work together, regardless of the service provider that you choose. And some equipment does work with multiple vendors, but most vendors lock their equipment so that it can't be used with another company's service. Those that don't may not use the same protocols and standards that other service providers use, and the equipment is usually designed to work with specific protocols and standards.

That's one of the reasons that the standards and protocols that were discussed previously are so desperately needed within the VoIP industry. Currently, equipment might or might not work across a variety of service providers. But as standards and standard protocols are established and adopted, more and more ATAs will become standard and usable across all service providers. It's also likely that those same pieces of equipment will become multi-functional, giving you more than just VoIP telephone service.

So, if you're planning to use a VoIP service that is provided by a service provider and allows you to call anyone, anywhere, using your own analog telephone, you most definitely need an ATA and a router. The router will provide your Internet access (which should always be high-speed if you're planning to use VoIP). The ATA is a separate box that connects to the Internet router and handles the phone calls.

Telephones

The next piece of equipment to consider is the telephone that you'll use to make calls. The simplest solution is to use the telephone that you already have, connected to an ATA that's connected to the Internet router. That makes it very simple to make a call. Simply pick up the phone and dial. But other options exist where telephones are concerned. This section explains the different types of phones and how they're used.

Existing Phones

Your existing telephone is the easiest way to use VoIP. To use your existing phone, you contract for VoIP service from one of the dozens of VoIP service providers. They send you an ATA, you connect it your broadband router, you connect your telephone to the ATA, and you have phone service that uses the Internet instead of copper wire to transport calls. It sounds pretty simple, but there are a couple of things to be aware of.

With POTS your phone connects to a jack in the wall, which is connected to wiring that runs through your house, outside to a telephone pole, and then off to a switch somewhere in the vicinity of your neighborhood. If you have telephone service, it's turned on at a box that's usually located on the telephone pole outside your house or up the street nearby.

In addition to the dial tone that runs through that phone line, a small amount of electricity also travels through that line. What that means is that if the power to your house goes out, unless you're using a telephone that requires an additional power source, you can still use the phone. That small amount of electricity that runs through those lines is enough to ensure your calls go through. But that's not the case with VoIP.

To use VoIP, your standard telephone connects to the ATA, and no additional electricity runs through that connection to power the call when the electricity fails. Furthermore, the ATA requires power and without it calls can't be converted from analog to digital and vice versa.

Another issue that arises with the ATA is the number of connections available on it. With POTS you can have a phone in every room of the house if you like, because once phone service is turned on at your house, as long as all of the phone jacks are wired properly, every phone jack in the house can carry a telephone call. With VoIP, there's usually a single phone jack on the unit, meaning that you can plug one phone into the ATA and have service on that phone only. Some ATAs allow you to plug in more than one phone line, but your VoIP service provider will usually charge you extra for both the equipment and the service.

Ways exist to overcome that challenge, however. One of the best ways is to use a multi-handset telephone. The multi-handset telephone has a base unit that connects to your telephone, but in addition to that base unit there are multiple other telephone units that don't require a direct line connection to have service. One such multi-handset telephone system is shown in Figure 6.5.

This multi-handset telephone system is the easiest answer to having more than one phone in your house or apartment. They cost from $49 to $150, depending on the brand and number of handsets you want to have.

If the multi-handset phone system is something that doesn't interest you, there is another way to have multiple phones working off the same, single VoIP connection. It requires cutting the telephone connection that comes into your house at the junction box. It's essential that you cut this connection;

Figure 6.5

A multi-handset phone system has a single phone connection to operate all connected handsets.

otherwise, the small amount of electricity that travels through the telephone wires will short-circuit your ATA and you won't have any phone service at all. You'll also find yourself replacing the ATA at a cost of about $70 or more.

To have VoIP service available in all the phone jacks in your house, cut the incoming telephone wire at the junction box and then plug your ATA into any existing phone jack in the house. Connect it to the broadband router and you should have phone service through all of the active phone jacks.

Note

Another option is to direct-wire your ATA into your phone jack. This ensures that all of the phone jacks in your house have a dial tone. However, it's not a simple process. If this sounds like the solution that you've been looking for, you can learn more about it on Jake Ludington's MediaBlab at http://www.jakeludington.com/ask_jake/20050206_voip_over_phone_wiring.html.

The problem with connecting VoIP this way is that most specialized services, such as TiVo, satellite television connections, and alarm systems won't work with VoIP. These services usually require a landline telephone connection,

and if you cut the wire coming into your house, that service won't be available. Check with your VoIP service provider or the provider of the specialized service before you install your VoIP service to find out if there's some way that the two services will work together.

Note

Some companies are teaming up to provide the phone-based services that you're accustomed to having. For example, Vonage has partnered with Alarm.com to provide alarm systems that work with VoIP service. Alarm.com also offers alarm monitoring services that work with other VoIP service providers, as well. To learn more about this service go to http://www.alarm.com.

Of course, there's also the apartment conundrum. If you live in an apartment, it's not possible to cut the incoming phone line without creating problems with the apartment management. So, again, the multi-handset phone system seems to be the easiest and most effective way to have more than one phone on the same connection.

Using your existing phone is not only possible, but it's probably the best way to have VoIP if you plan to replace your existing phone service. It might require that you change your wiring or that you buy an expandable phone system, but ultimately it will allow you to use the equipment that you're most comfortable with, in the manner that you're most comfortable using it.

Note

One problem with using existing phones is that some operate on the same frequency that VoIP operates on. This is especially true if you also have a wireless network within your home or home office. There's more about this in a later chapter, but for now you should understand that some phones don't work well with VoIP service.

Specialized Phones

Specialized phones are also available that you can use to make your VoIP calls. The VoIP phone, which might also be referred to as a SIP phone, is one option (see Figure 6.6). As you can see, these specialized phones look just like regular phones. The difference is in how they are made on the inside and how they work. This type of phone has an ATA onboard that makes data conversion an afterthought. The problem with VoIP phones is that they're very expensive. Currently they cost around $150 per unit, and in most cases, only corporations that have in-house VoIP service use them.

Figure 6.6

A specialized VoIP, or SIP, phone.

That's likely to change in the future, however. As VoIP reaches the mainstream over the next couple of years, telephone manufacturers will jump on the bandwagon and begin making VoIP-capable phones that will eventually be affordable enough for anyone who wants to use them. Of course,

the technology will have to become standardized before this can happen. But it's only a matter of time before that happens, as well.

IP handsets are also available, like the one shown in Figure 6.7, that connect to your computer via a USB port and work with PC-to-PC VoIP. These are very specialized phones, and like the VoIP or SIP phone mentioned before, they are about 25 percent more expensive than a standard phone.

Figure 6.7

The USB VoIP phone.

One other type of specialized phone is the softphone, as shown in Figure 6.8. Strictly a piece of computer software that enables you to turn your desktop, laptop, or handheld computer into a VoIP phone, this type of phone is already proving valuable to people with wireless access who are on the go all the time. Being able to use the computer to make calls from a free wireless hotspot is a benefit that many VoIP users treasure, especially those who travel a lot and find themselves running up ridiculously high cell phone bills.

Figure 6.8

A softphone interface.

The softphone is available through many VoIP service providers as an addition to a recurring monthly service plan. But some VoIP service providers also allow users to have access to softphone software on a pay-as-you-go plan. Skype is one of those providers, and with the SkypeOut program you can call any landline telephone from your softphone. The company offers a softphone that you can charge with a predefined dollar amount that allows you to call anyone, anywhere, regardless of whether they use any form of Skype service. When you've used up your prepaid time, you just purchase more time or don't use the service. It's similar to prepaid cell phone service, using your multimedia-enabled computer instead of a cell phone.

Cable and Network Connections

Probably the most important piece of VoIP is the cable or network connection that you use. The VoIP of the past relied on dial-up Internet service and failed miserably. But broadband capabilities have improved the quality of VoIP tremendously and by the end of 2005, it's expected there will be more than 39 million broadband subscribers in the United States.

That growth in broadband Internet users will be reflected in the VoIP industry as people look for ways to cut communication costs and take advantage of broadband capabilities. Once users have tried VoIP services, the improved quality and reliability of the service will keep them there.

Bundled services are also likely to keep you from switching back to traditional service once you go VoIP. Cable companies are best suited for a triple service bundle, often called a *triple play*. With this bundle of service, one service provider carries your television cable service, your broadband Internet service, and your VoIP service.

Both cable and DSL work well with VoIP, but cable has inherently more advantages because DSL is usually offered by traditional telephone companies. However, some service providers, like Qwest, offer what is called a *naked DSL* line. This type of DSL service has no telephone number associated with it, making it a better choice if you prefer to have DSL rather than cable high-speed Internet service. Unfortunately, Qwest doesn't offer other telecommunications services, so there's none of the pricing advantage associated with bundled services.

What matters more than what type of high-speed Internet service you have or who provides it is the quality of the service. As long as the quality is high, the rest is personal choice. However, if your broadband provider doesn't offer a clean, fast, high-speed connection, then you should consider finding a new service provider before you install VoIP. Your broadband service will make or break your VoIP service.

Broadband Versus Dial-up Internet Connections

One of the major downfalls with early VoIP services was the connection speed over which the service was used. Dial-up Internet connections are slow. If you've ever had dial-up and then used broadband, you probably noticed the difference immediately. With a dial-up connection, lags between the time a command is sent and the time the action is performed are extremely noticeable.

Another issue with dial-up Internet service was (and probably still is) the reliability of the service. A few years ago, it was not at all uncommon to be

"kicked off" the Internet while surfing or using an Internet-based application. At the time, Internet service providers (ISPs) weren't prepared for the amount of traffic they had to support. Even today some service providers suffer recurring issues with network traffic rates and the quality of their services.

America Online (AOL) is an excellent example of how ill-prepared Internet service providers were. Although AOL offers a good service, the infrastructure for the service wasn't sufficient to handle the volume of customers that used it as an entranceway to the Information Superhighway. This was especially true during the first few months right after AOL introduced its unlimited monthly service plan.

As a result, tens of thousands of users found themselves in a frustrating pattern of being kicked offline during the middle of an Internet session, or worse, of being unable to log on to the Internet. Unfortunately, the unreliable nature of this type of service lasted for a few years, as ISPs suffered through growing pains trying to meet demand.

It was during this time frame that the first VoIP services made their appearance on the market, and sadly, the infrastructure of the Internet was just not as advanced as VoIP technology. The result was poor service, dropped and garbled calls, and frustrated users.

The widespread adoption of broadband Internet services has made tremendous strides in alleviating that problem. Although some broadband Internet connections are still not sufficient to support VoIP service, most have the speed and resources available to make VoIP seem just like POTS.

Of course, there is more than one type of broadband Internet connection. The two most frequently used broadband services are DSL and cable Internet. There's also a T-1 connection, but that type of broadband connection is more common in a business environment or in other countries. In the average U.S. home, broadband is most likely to be either DSL or cable.

DSL technology is a huge improvement over dial-up technology. The concept behind DSL is to make use of underutilized resources in existing telephone lines. Think of it like this: Your telephone line can be divided into two

parts—the high band and the low band. Telephone conversations are transported using only the low-band portion of the line. That leaves the high-band portion of the line completely unused.

That's where DSL comes in. DSL uses the high band of the line to deliver an always-on Internet connection. This makes use of all of the resources available in a telephone line. Unfortunately, although DSL is considerably faster than dial-up Internet service, it is still subject to some of the same issues that dial-up is subject to, specifically some latency issues.

Those latency issues make DSL less desirable for VoIP than a cable Internet connection. But in addition to the latency issues, most DSL providers require that you have an active telephone connection in order to have DSL service. If you still have to have a POTS line, what's the point in using VoIP? Some people do keep their incoming telephone line, especially when they first switch to VoIP in case they are unhappy with the service, but for most people, it just doesn't make sense to have two telephone bills.

A cable Internet connection provides the best access to high-quality, reliable VoIP service. Cable Internet is provided by the same companies that provide the cable television that most Americans subscribe to. It even uses the same wire that carries cable television into your house.

What makes cable so much more optimal for VoIP is the speed with which it carries data. The average cable connection is 1 to 3 Mbps downstream (carrying information away from the modem), but only 90 to 383 Kbps upstream (carrying information back to the modem).

The average VoIP service requires 50 to 90 Kbps, both downstream and upstream, which leaves very little room for additional bandwidth requirements. Yet, overhead for a broadband connection—the amount of bandwidth it takes to actually operate the connection—will eat more of your available bandwidth.

So, the smallest connection you'll need to have in order to get the most effective VoIP service is 128 Kbps, both upstream and downstream. And if you want to use the Internet while you talk on the phone over your VoIP connection, you should increase that connection to 256 Kbps.

However, you should know that some cable Internet providers tier their service speeds. This means those companies offer different speeds of Internet service at different price points. The lower the price point, the lower the speed, with the lowest being about the same speed as a DSL connection. The highest is about the same speed as a T-1 line. Check with your ISP if you think you have a slower connection to find out what the additional cost for a more appropriate connection is.

Your Existing Network Connection

Your connection to the Internet is a network connection, because after all, what's the Internet except one giant network of interconnected computers? But having a high-speed or broadband Internet connection isn't an automatic guarantee that the speed and resource availability of that connection will support quality VoIP.

Notice that phrase: quality VoIP. Dial-up and DSL will allow you to use VoIP. But the quality of that VoIP will be frustrating. The issues that arise start at the moment you dial the first call, and they'll continue until you give up in frustration or switch to a broadband Internet service. Quality is determined by speed and available resources.

If you have broadband Internet service, but you're not sure what your connection speed is, lots of free resources are available on the Internet that will clock your connection speed. Some of them, including the free bandwidth test from PC PitStop (http://www.pcpitstop.com/internet/Bandwidth.asp) will specifically tell you if your connection will work well with VoIP services.

Because your existing network connection is the most essential ingredient to quality VoIP service, take some time to make sure you have what it takes before you jump off into VoIP Land. Clock your speed, check your resources, and if necessary, call your ISP and speak to them about your concerns with VoIP. Chances are your cable company will offer a VoIP service designed specifically for its existing cable service packages.

Note

In the recent past, some cable companies that offered their own VoIP service blocked other VoIP providers from their network. In a series of recent lawsuits, this practice was deemed to be illegal in some states. However, the practice is still allowed in other states. If you live in one of those states, you may find your VoIP choices limited by your ISP.

Wireless Network Connections

Finally, if you connect via a wireless network, that connection could have an impact on your VoIP connection. VoWiFi (Voice over Wi-Fi) is where VoIP is heading, but the technology is still not completely ready for the additional capabilities and challenges of wireless networking. For example, in some instances, the frequency of a wireless network router interferes with telephones that are set to the same frequency. If you're using VoIP it might seem that the problem is with your service when in fact, it's a hardware issue.

If you're connecting using a wireless network, you'll probably need to connect your VoIP equipment differently. The wireless network router makes a difference in how everything comes together, but you learn more about that in Chapter 9.

The equipment used for VoIP makes all the difference in how good or bad your VoIP connection is. Fortunately, most VoIP service providers provide the equipment that you'll need to use their service—for a fee. Your next challenge will be getting all of that equipment connected and working properly. It's really not that hard. But before you even get that far you need to make a few decisions about things like porting your number or keeping it, and that's addressed in the next chapter. Read on.

7

CHAPTER

Porting or Changing? What About the Number?

In late November 2003, the FCC mandated a small piece of legislation designed to increase competition among communication providers that allows you to change telephone service but still keep your existing phone number. Called *Local Number Portability*, this legislation was required of all landline and wireless service providers. It's a small convenience that makes a lot of people happy. It means more freedom to change phone service providers without huge amounts of hassle.

Before the legislation, if you wanted to change service providers, you had to get a new telephone number. Many people found that very inconvenient because it meant if they changed telephone service providers they had to give everyone a new phone number. In some cases, it was a matter of having a great, easy-to-remember phone number. For other people, the issue was that they had a particular phone number for years and the thought of changing it was almost overwhelming.

Regardless of the motivation, having the ability to keep your existing phone number is a nice perk for a lot of people. So, the thought of switching to VoIP and not being able to take your existing telephone number now might seem a little confining.

The good news is that a lot of VoIP service providers now allow their customers to port over an existing phone number. It's not a feature that all service providers have, and some that do have it charge a one-time fee for the service. But some service providers do allow number porting.

Now for the bad news. Number portability is available in ever-increasing numbers; however, it might be a real headache to get your existing number ported over. Of course, it's also possible that you'll be one of the lucky few whose number is ported quickly and easily, with a minimum of frustration. In today's portability environment, anything can happen.

Understanding Number Portability

Number portability, or the ability to take your phone number with you from one service provider to another, was a move by the FCC to make the telecommunications industry more competitive. The legislation driving number portability applies to landline phone companies and wireless phone companies. It provides regulations and guidelines that require phone companies to allow users to take their phone number with them should they decide to change service providers either from landline to landline, landline to wireless, wireless to wireless, or wireless to landline.

The most important feature of number portability to understand is that the owner of record for a telephone number is the person who can port that number from one provider to another. So, for example, if you have a landline phone that you intend to disconnect and you want to take the phone to a wireless service provider, in order to port your existing number from one service provider to another, both companies must have the same name and address listed on the account. Your name and address establish you as the owner of the number.

The service provider that you are using before the switch or the service provider that you're switching to—whether they are landline service providers or wireless service providers—is legally entitled to charge you for porting your number. That charge can be in the form of a one-time payment or a monthly fee to cover the costs of porting your existing number.

The exception to the legislation is that number portability regulations and requirements don't apply to VoIP service providers. Those companies are not required to provide the service because technically they are not viewed as telephone service providers but instead are viewed as data service providers. VoIP service providers still fall under the category of *information service providers*, so they are not subject to the same regulations and legislation as communications companies.

However, some VoIP service providers do offer number portability. Those VoIP service providers that do may charge an additional fee for the service, just like wireless service providers and traditional phone service providers. But if your VoIP service provider doesn't offer number portability, there's no legal remedy because they aren't required by law to do so. If your number is that important to you, look for a service provider that offers this feature.

Portability Issues

If you do find a VoIP service provider that offers number portability, it's possible that you'll encounter problems along the way to getting your existing number transferred over. For example, some numbers cannot be ported for various reasons:

- Some service providers just can't support porting numbers from every area within a region. In most cases, this is the result of growth structure, and at some point in the near future your chosen service provider will offer the number portability service. That may not help you at the moment, but if you can hang on for a few more months, you can take your existing number with you.
- Your 800 number is not supported. Number portability doesn't apply to 800 numbers. If you have one, you won't be able to take it with you to your new service provider.

- You've put a freeze on your account to prevent *slamming*. Slamming is the process that some unscrupulous companies use to switch you from one service to another without your knowledge or permission. To prevent slamming from happening to you, you can put a freeze on your account so that your identity must be verified before you are switched from one service to another. If you have this freeze on your account, your new service provider won't be able to port your number over.
- Your number is not in service. If you disconnect your existing phone service before you initiate your new phone service, the number that you used previously cannot be ported over. In order for a number to be moved from one service provider to another it must still be in service. The service provider will request that the number is transferred, and when it is, your old service will automatically be disconnected.
- You have special services attached to your phone line. Two services that prevent portability are Distinctive Ring and DSL. If either of these services is attached to your phone number, you'll have to have the service disconnected before you begin the porting process.

Note

In some cases it is possible to port over a number that has Distinctive Ring attached to it. However, you must first tell your new VoIP service provider about the service *and* you must have both associated numbers ported at the same time. You may be charged an additional fee for porting more than one number.

In addition to these issues, challenges that are completely out of your hands could drastically impact your porting experience. For example, because traditional telephone companies don't want to lose their customers to VoIP service providers, they find all kinds of creative ways to slow-walk the porting process. One way is by ignoring the request completely.

According to the regulations that make number portability a law, VoIP service providers are not considered telecommunications companies, so technically, traditional phone companies don't have to port an existing number to one of those companies. Given the competitive nature of the telecommunications industry, it's not a stretch to believe that many traditional telephone companies simply ignore porting requests that come in from VoIP service providers.

To combat this, some VoIP service providers use a third-party vendor to process number portability requests. As a new customer, when you sign up to port your existing phone number into your VoIP account, a request form must be filled out and it, along with a copy of your most recent telephone bill, are forwarded to the third-party vendor for processing. The vendor processes the request and forwards it to the telephone company that currently provides your service.

In an effort to avoid portability issues, the third party that processes the request is probably a telecommunications company that does legally have the right to request and expect compliance with number portability. However, the third-party vendor itself might be a problem in the process.

Your VoIP service provider has little, if any, control over how the third-party vendor does business. This means that the third-party vendor can hold your porting request until there are 10, 15, or more of them before forwarding them to the traditional telephone number. In concept, this practice of holding porting requests saves all involved parties a nice chunk of change.

In reality, however, the practice holds some major flaws. For example, many users have discovered, after waiting for months for their porting to take place, that the third-party vendor lost or misplaced the request. The result is a frustrating experience for users when they find out that after all this time they have to start the process all over again.

Number portability is great in theory, and it works well with the more mature traditional and cellular telephone providers. VoIP adds a new facet to portability, however, that leaves users completely disgusted with the experience. Just listen in on some of the message boards on the Internet

about VoIP and you'll find that many people who try to port their existing number end up frustrated or angry and the number is either lost in the system or has not been ported at all.

So the question becomes, "Will number portability ever work itself out?" There's no easy answer to that question. In some cases number portability happens smoothly without any additional issues at all. It's the other cases—the ones where people request that their number be ported over and five months later they're still waiting for this magical event—that are the most frustrating part of trying to port your existing number to your new VoIP service provider.

How Portable Is Your Number, Really?

You could also encounter other issues with porting your POTS number to VoIP. For example, some VoIP companies have a policy *not* to port numbers once they are assigned VoIP service. You may encounter a company that will allow you to port in your existing number, but if you decide to change service providers in the future they won't allow you to port out your number. This practice isn't entirely legal. However, most consumers aren't aware of that, so they end up losing their existing number.

According to the laws that govern number portability, the owner of the number—that is the person to whom the number is registered—has the right to move it with them when they choose another service provider. Two issues apply here. First, those laws don't apply to VoIP service providers. As mentioned previously, VoIP service providers are not considered telecommunications companies so they don't fall under the service providers covered by the porting legislation.

The second issue is that if you move to an area that isn't local to your VoIP service provider, they may not be able to port your number out for you. And what defines local area for you and local area for your VoIP service provider might be two different things.

The best way to handle the situation is to check with your VoIP service provider *before* you port your existing number to them. Be sure to ask the questions such as, "Can I port my number to you?" and "Can I take my number

with me if I decide to cancel your service?" Then make sure you read all supporting documentation from your VoIP service provider.

One other issue to be aware of when porting a number away from a VoIP service provider is that if you decide to start your VoIP service with a new number, when you leave the service provider you may not be able to take that number with you. This is because those numbers technically belong to the VoIP service provider.

Your VoIP service provider must lease the number from a telecommunications company, because that telecommunications company controls the switches that are used to move a call from the Internet to an analog line. Therefore, if you use a number provided by the VoIP service provider, they own the number. It is registered to them. And according to the laws governing number portability, the only way you can port your number is if the name and address attached to the number matches the name and address that shows on the service bill.

Have Patience, It Could Take a While

The most often heard complaint about porting your telephone number from a traditional service provider or from a wireless service provider is that it takes forever. If you're porting your number from your landline phone to a wireless phone, existing guidelines make the port happen relatively quickly. The same is true if you're porting numbers landline to landline or wireless to wireless. But throw VoIP into the mix and you could be headed for some serious frustration.

One Packet8 customer reported having to wait more than six weeks just to be told that his number could not be ported. And then he wasn't even given an explanation. He was simply told that the port request had been declined. Vonage has customers that have waited for months to have their number transferred only to find out that the paperwork has been lost or misplaced, so they have to start all over again.

That happens far more often than not. You put in a porting request with your new VoIP service provider and they tell you that it should take about 20 to 30 days for the port to be complete, but you wait weeks and weeks

only to learn that your porting request has been lost or denied. What's really frustrating is that in many cases you're never told why your porting request was denied. Even if you do call the company to ask why your port was denied, often the person you speak with won't be able to tell you.

Note

Your request might be denied because you have an outstanding bill or because the name and address listed on the porting request doesn't match the name and address listed on your traditional telephone account. Before you begin the porting process, make sure that your account information is accurate and up to date.

When number portability first became available in late 2003 and early 2004, many issues surrounded the porting of numbers to and from VoIP. Today, most of those issues have still not been resolved. So, it's not unbelievable that you could request the porting of a perfectly good number that has no issues attached to it at all and still be denied the ability to port your number.

If it happens, there isn't much you can do about it. VoIP service providers are not subject to the same regulations that other telecommunications companies are subject to. They may deny number porting for any number of reasons and they don't have to explain them to you. Of course, it's less likely that they don't want to share the reason for denial with you and more likely that the person in customer service that you've managed to get in touch with just doesn't know. In some cases, it might be that no one in your chosen VoIP company has an explanation. Because VoIP companies often use third-party vendors, they aren't always informed of the reasons a port has been denied.

On the other hand, your VoIP service provider might take weeks, but the number actually is ported over. Because VoIP service providers aren't subject to the same regulations as traditional telephone companies and wireless phone companies, there's nothing you can do to speed the process. What's more, many more hands are involved in porting a number to a VoIP service provider.

VoIP service providers lease numbers from larger phone companies, so when you want to port your number into their service, your port request follows a line of communication. Your request goes to the VoIP service provider. They then have to request the port from their leasing company, which then requests the port from the larger telephone company. In some cases, your VoIP company sends a request to a third-party vendor who requests the number.

Once the requests are complete, a confirmation must go back down the same line of communication that the request went up. All of this is time-consuming and in many cases, VoIP service providers will gather number porting requests until they have a significant number before requesting the ports. It saves all of the companies involved time and money, but leaves you hanging, waiting for your number to be ported, for four to eight weeks.

In the meantime, your VoIP service provider will issue you a temporary phone number. The frustrating part is that you still have to let everyone know your new phone number while you're waiting for the port to be approved or you have to use call forwarding from your old number. You also have to maintain service on the line that has the number you're porting until the port is complete. So, you end up paying two bills. For most people, the frustration just isn't worth the payoff.

Number portability is an excellent service, in theory. Unfortunately, the one distinction that VoIP companies have going for them—that a VoIP company is considered an information service provider not a telecommunications service provider—is the same thing those companies have going against them for number portability. That distinction means those companies aren't subject to the same rules and regulations as other telecommunications service providers. It also means that other companies don't have to recognize VoIP companies' requests. For them, it's an annoyance. For you it might mean you can't port over your existing number.

Should You Port Your Existing Number?

So should you port your existing phone number? That's really a question that only you can answer. If your number is really valuable to you, you most

definitely will want to. However, if you're not attached to your number and it has no value, why go through the hassle?

If you do decide to port your existing number, here are some things you should consider:

- Does the VoIP service provider offer number portability?
- What policies does the VoIP service provider have in place governing number portability?
- How much will you be charged for porting your number?

Note

There is no average cost for number portability. Some service providers don't charge anything; others recoup their costs either through a single service charge or through a charge built into your monthly bill. Be sure you find out how much you'll be charged before you make the decision to take your number with you.

- How long will the porting process take?
- Are there any special services attached to your current phone service that might affect the porting process?
- Does your billing name and address match the service name and address?

Porting your number is a very personal choice. For Steven, porting his existing number to his new VoIP service was one of the deciding factors. He'd had the number for nearly 10 years and it was an integral part of the daily operations for his home office. When he learned that he could port the number to Vonage, he opted to try their service. Fortunately for Steven, the porting process went smoothly and there were no problems with the switch. Other people have not been so lucky.

If you can't live without your existing number, then by all means, check with your potential VoIP service provider about porting. But beware that you could be setting yourself up for headaches and frustration. If you can live without the number...Do! Why subject yourself to uncertainty and frustration unless you have a very good reason?

How to Port Your Existing Number

If you've decided to port your existing number over to your new (or potential) VoIP service provider, you need to complete a few steps to initiate the transfer. They're easy steps, but pay particular attention to detail, because the company you're currently using doesn't want to lose your business and they will likely be very particular about the details of the port.

For example, your service name and address *must* match the billing name and address on both your old telephone service account and your new VoIP account. If they don't match *exactly* your existing service provider will either delay or deny your porting request. So before you even begin the process, check with your existing service provider to ensure that all of their records are updated and in order.

Once you're certain that all of your records are correct with your existing service provider, here are the steps you must take to port your existing number to your new VoIP service provider:

1. Check the portability of your existing phone number. Some companies do not have the ability to allow you to port your existing number to another service provider. For example, if you are currently with a VoIP service provider that issued a phone number to you, you don't own that number, they do. Therefore, you would not be allowed to port that number to your new service provider. To check your number portability, call your current service provider.
2. Create a VoIP service account. *Do not disconnect your existing phone service*. If you disconnect your existing phone service, your number cannot be ported over to your new VoIP service provider. Your new VoIP service account must be activated before you can begin the number porting process.

3. Fill out a port authorization form. This form is different for each service provider. Generally you will be asked to complete your name and address as well as agreeing to switch service from your existing provider to your new provider and authorizing the new provider to port your existing number to their service. This form may be available electronically, though some service providers require that you fill out the form and fax or mail it to their offices.
4. Include your exact service and billing address on the authorization form. The billing and service address must match the billing and service address on your current bill exactly. If it does not, your current service provider may refuse to port your number to your new service provider. At the very least they will send the paperwork back, and ask you to correct the issue and resubmit. Because porting a number to a VoIP service provider can take two to eight weeks or longer, the extra delay could be costly.
5. Make sure any outstanding bills or service issues with your current service provider are cleared up *before* your port request is filed. If you have an outstanding balance on your current service account or if there are pending service changes such as disconnect or adding services to your existing line, your current service provider won't grant your number port.
6. Have the most recent copy of the bill for your existing telephone service available. In most cases you are required to provide a copy of this bill to your VoIP service provider before the porting process begins.

Porting your existing number to your new VoIP service provider should be as easy as filling out a form and waiting. But some service providers will require you to provide them with a *porting authorization code* (PAC) before they will begin the porting process. The porting authorization code is a nine-digit number that consists of three letters and six numbers that you must obtain from your existing service provider. The porting authorization code verifies for the new service provider that there are no outstanding bills or service orders that will prevent the number from being ported.

Once you start the porting process, be patient! It's probably going to take some time to complete the port. Of course, it's also possible that you'll be one of the lucky few whose number is ported in a matter of days with no problems or issues at all. However, if you expect the worst, when you get the best you're pleasantly surprised.

How Porting Affects Emergency Services

One of the worries that you might have is how porting your existing number—especially if it takes two to eight weeks to complete—will affect emergency services availability. Be prepared. You will probably still have emergency services and can place emergency calls, but if that is necessary be sure to stay on the line with the emergency services operator until help arrives because if you are disconnected, the operator cannot call you back.

Additionally, you should let the emergency services operator know as soon as possible that you're calling from a number that is in the porting process. The operator will likely verify your address during the call.

Getting a New Number

If you decide to get a new number from your VoIP service provider, you won't need to do anything other than sign up for VoIP service through the provider of your choice. However, you should be aware of a few issues.

First, when you switch to VoIP without porting your existing phone number, you essentially fall off the face of the earth where your old telephone service provider is concerned. There will be no recording placed on your old account that tells callers of your new number, and you will have no listing in the telephone book.

For some people, this isn't a problem. There are benefits to not having a new number recording or a listing in the white pages. For example, if you don't want those annoying telephone solicitors to call you, switching to VoIP without porting your existing telephone number is one way to keep those calls at bay at least for a while. However, if you want to have a white pages listing in your local phone book, you'll need to port your existing phone number. When you port a number, you don't lose your listing.

Note

If you port your existing number to your new VoIP service provider, your traditional telephone service will automatically be disconnected when the port is complete. However, if you contract a long-distance company to provide long-distance calling services to you, they will not get the disconnect notice, so you need to call them separately to have that service discontinued. Otherwise, you may continue to receive monthly bills from the long-distance service provider.

Taking your telephone number with you when you change service providers is one of those issues that just doesn't have a clear-cut answer. For some people, the idea of changing service providers and getting a new number is overwhelming because they are attached to that telephone number in some way. Other people find it refreshing. You have to weigh your options and decide if keeping that great number you've had for the past 10 years is really worth the hassle and aggravation that you may face—and it's almost certain to be a hassle—or if getting a new number might be easier.

8

CHAPTER

Planning Frustration-Free VoIP

If you're one of those people who love technology, try out all the new gadgets, and in general "get it" when it comes to technology, VoIP is probably the equivalent of another notch in your belt. For the rest of us, VoIP is a little more mystical. After all, we've been using a regular telephone line that carries a call over wires stretched around the world for most, if not all, of our lives. Taking that into consideration, getting our minds around telephone service that uses the Internet to deliver calls takes some work.

Making the switch to VoIP is intimidating and the thought of actually having to set up VoIP might make you cringe. And for good reason! Setting up VoIP improperly can result in bad service or no service at all. Fortunately, setting up VoIP is pretty simple. If you can plug in a DVD player, you can probably get your VoIP set up and working wonderfully with no problems at all. However, glitches do happen.

So many factors play a role in the quality and reliability of your VoIP service—how it's connected, your Internet wiring, the quality of your Internet service, even the service provider that you choose. All of these factors make planning your VoIP important because if you don't have a well-thought-out plan, you could end up with nothing more than frustration.

Putting the Elements Together

Although it seems pretty complicated, VoIP really isn't. Once you understand how the technology works, all that's left is putting the different elements together to achieve the service that you want and the quality that you're accustomed to. And you probably already have a good idea of what you're looking for in a VoIP service, so combining that with the right service provider should be easy.

Dozens of service providers are out there that have all of the basic features that you have come to expect. So, what it really comes down to is the advanced features that you want that only a handful of service providers offer. Number portability is a good example. Only a few service providers currently offer you the ability to take your existing phone number with you. Of course, if you aren't concerned about taking your number with you when you switch to VoIP, that won't be a consideration for you. Still, other features will be important to you.

One of the other issues that you want to take to heart is the reputation of the company that you're considering for your VoIP service. Currently more than 2,000 VoIP vendors exist in the marketplace. Appendix A lists just a few dozen of those companies for you to choose from, and if none of them appeal to you, it's easy to find hundreds of others on the Web. However, just because those companies exist in the market today doesn't mean they will exist in the market tomorrow. And if they don't it will either be because they couldn't keep up with the larger players in the industry or they didn't offer a high-quality service that would draw and retain customers. It's not at all unusual for a small company to come onto the market and be gone within just a few months. It's part of the growth of an industry. Unfortunately, when that happens the company's customers are left without a service provider and with a bad impression of the industry.

Take some time before you make the final decision about which VoIP service provider you choose. Research what other customers are saying about them. The Internet is a good place to do that. Message boards and forums are available all over the Internet where people who are actually using VoIP service discuss the issues, problems, and successes they've had with VoIP. Search

out those forums and spend a couple of hours reading about the service provider that you're considering before you make a final decision.

Note

If you want to see just how many VoIP service providers there are in the market, or if you want to learn more about what current users think of a specific VoIP company, use Google (http://www.google.com) to search for VoIP or for the specific company name. If it's out there, Google will find it.

You can also go directly to the service provider's Web site, because all VoIP service providers have Web presences. Or you can take a free training course about VoIP. Web companies such as CNET.com frequently offer these courses for free and there are usually participants who often have experience with the technology that are willing to share their experiences with you and the other participants.

In addition to your service provider, there are other considerations to look at before you make a decision about your VoIP service. For example, how do you plan to use VoIP service? Different service providers meet different needs. If you want to replace your traditional phone line with VoIP service, you'll choose a different service provider than if you just want to complement your existing POTS. There are also features to take into consideration in addition to the viability of the company.

How Do You Plan to Use Your Service?

How you use VoIP depends on a lot of different factors. For example, if you're comfortable with technology, you might jump right into VoIP without a second thought about the issues that might arise. On the other hand, if you're a person who is cautious with technology, jumping straight into a full-blown VoIP solution probably won't be the right decision for you. Your caution combined with the VoIP industry's relative newness gets you off on the wrong foot, and even minor problems might seem like so much more.

The success of your VoIP service will depend largely on VoIP meeting your needs, and how you plan to use your service is probably one of the biggest decisions that you need to make. You'll choose a different service provider if you want to replace your existing service than you will if you just want to supplement it. And if you just want to sample VoIP you need an entirely different service. Your needs (or desires, for those techno-junkies among us) guide which service works best for you.

When you replace your traditional phone service with VoIP, use caution about disconnecting your POTS line too quickly. You may begin using VoIP only to find that you aren't happy with the service, and going back to traditional telephone service might be harder than you think. Many VoIP service providers offer a money-back guarantee. If the service provider that you're considering does, keep your existing service in place until you've set up the VoIP connection and tried it on a few phone calls just to be sure that you'll be happy with the service and the quality.

Note

Read the fine print on your VoIP service provider's money-back guarantee. The guarantee is only valid for a limited amount of time and if you don't make a decision before the time period expires, you could be responsible for an early termination fee that could be as much as $250. That guarantee may also have certain requirements that you have to meet to be eligible, such as returning the equipment in the original box.

If you maintain your POTS line during the time that you're trying out VoIP, you'll be paying two bills—one for the POTS line and one for the VoIP line. The extra expense is worth it if you're not convinced that the quality and reliability of VoIP will be what you expect. If you do maintain your traditional telephone line, you still have phone service if you decide that VoIP isn't for you just yet. Some people might even choose to keep a stripped down POTS line if they do like the VoIP service so they know they always have a backup if something happens to their broadband connection or if the electricity goes out. A bare-bones POTS line will cost you around $15–$25 per month, depending on your location and your telephone service provider.

Note

If you decide to keep your POTS line while you're trying out VoIP, you won't be able to have your existing number ported over to your VoIP service provider. When you port a number from one service provider to another, your original service is automatically disconnected when the port is complete. If you think that you will be happy with VoIP, then go ahead and port your number, but if you're not sure, keep your traditional phone service with your original phone number and try a VoIP service that gives you a money-back guarantee period.

Another option is to just use VoIP to supplement the service you're already receiving from your traditional phone company. Many people step into VoIP in this manner, using PC-to-PC VoIP or a softphone to reduce their current phone bill without relying on the service for all of their telephone needs. This allows you to keep the phone service that you trust for local calls but you can use the VoIP for all of your long-distance and international calls.

As you can see, how you will use the service determines which type of VoIP service provider works best for you. Whichever way you decide to use VoIP, you have some other things to consider. The following sections discuss some things that you should keep in mind as you're planning your VoIP service.

Try It Before You Buy It

One of the best ways to get your feet wet with VoIP is to try it before you buy it. As you learned in an earlier chapter, dozens of VoIP service providers offer PC-to-PC VoIP or softphone service you can use for free or for a small fee without having to buy additional equipment or make an investment in a service contract. Service providers that offer these services are listed in Appendix A.

If you're unsure of VoIP, it's easy to try it before you buy it. For example, on a broadband Internet connection it takes just minutes to download a service (shown in Figure 8.1). Then you can use that software with your computer to call other people who have the same software installed. If you don't know anyone who has the same software installed, some companies

allow you to pay a small per-minute fee—usually $0.01 to $0.03 per minute—to call anyone that has a regular telephone.

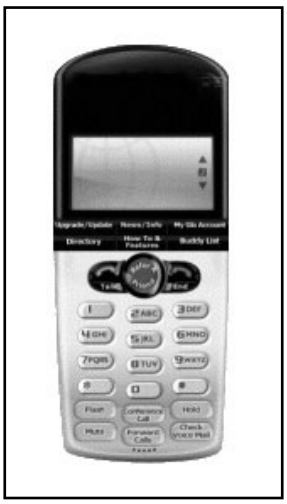

Figure 8.1

A softphone interface.

These free and pay-as-you-go services differ slightly from a VoIP service provider, mostly in the features that are offered and in the way you control the calls. But they make it possible for you to at least get an understanding of how VoIP will work before you sign up for a long-term commitment with a VoIP service provider. And if you try one of these services and decide you like VoIP, you can switch to a more complete VoIP service with more confidence.

VoIP Features Checklist

If you know that you're ready to make the switch to a more full-service VoIP application, you might want a checklist to compare service providers. The checklist in Table 8.1 gives you some of the most frequently used features and considerations that you should look at and it lets you compare the service providers that you're considering side-by-side. It also helps you to stay on track when you make the decision to go VoIP.

Table 8.1 VoIP Features Checklist

Feature	Service Provider 1	Service Provider 2	Service Provider 3
Activation Fee?	☐	☐	☐
Termination Fee?	☐	☐	☐
Contract?	☐	☐	☐
Contract Terms?	☐	☐	☐
Limited or Unlimited Plan?	☐	☐	☐
Equipment Needed?	☐	☐	☐
Money Back Guarantee? Length?	☐	☐	☐
Number Portability?	☐	☐	☐
911 Service Available? Additional Charge?	☐	☐	☐
Multiple Numbers?	☐	☐	☐
Virtual Numbers?	☐	☐	☐
International Calling? Rate?	☐	☐	☐
Toll-Free Numbers?	☐	☐	☐
Fax Services?	☐	☐	☐
Voice Mail?	☐	☐	☐
Caller ID?	☐	☐	☐
Call Forwarding?	☐	☐	☐
Call Waiting?	☐	☐	☐
Call Transfer?	☐	☐	☐
Call Logs?	☐	☐	☐
Three-Way Calling?	☐	☐	☐
Additional Features	☐	☐	☐

With this checklist in hand, you can compare your potential VoIP service providers to find one that offers all of the features that you want or need to have. The checklist also gives you a point of reference as you're comparing service providers and trying to determine the features you need in a VoIP service. Once you've made the determination of what service you want to use, all that's left for you to consider is the hardware and connection status necessary to have high-quality VoIP.

Equipment and Connection Status

The quality of the equipment and connection that you use to achieve your VoIP service will determine the quality of VoIP calls. For example, if you're using an older model computer with a PC-to-PC VoIP connection, the computer's resources might not be sufficient to support the VoIP call. The result is dropped or garbled calls.

However, if you're using a VoIP service provider that provides an ATA, the capabilities of your computer have nothing to do with the quality of your calls because the ATA connects to your Internet access point, not your computer. Instead, your Internet bandwidth and connection status will be the most important issues.

One other thing to consider is the wiring of all of the various pieces of equipment and how that affects the quality and reliability of your service. For example, if you have a weak broadband connection, when you start making VoIP calls you may experience difficulties. Weak connections could be the result of numerous issues.

One problem could be in the number of times your broadband connection is split between the source of the broadband connection and your VoIP connection. So if you're using a cable Internet connection that splits more than once from where the cable comes into your house to where it connects to your broadband router, the signal could be too weak to properly support VoIP services. Consider wiring the broadband router directly to the incoming cable connection. With the direct wiring, if you have multiple televisions they won't draw away from the signal and create service issues for your VoIP.

Intermittent interruption in your broadband connection could also be an issue. It might or might not be apparent as you're surfing the Internet or watching cable television (assuming your broadband connection is cable). Those services don't require as strong a signal as VoIP, but when you begin using that same service to make phone calls, you'll notice any service issues you might have. Interruptions such as static in the lines or a short in the wire will translate into garbled conversations or dropped calls. VoIP is far more sensitive to these small glitches in your broadband connection than any other type of service that operates off that connection.

That's why it's often said that the quality and reliability of your equipment and connection determine the quality and reliability of your VoIP service. Take the steps necessary to ensure that you have equipment that works properly and a good strong Internet service connection.

One more note—dial-up Internet service is not acceptable for VoIP. Yes, many services out there now claim to have speeds equal to broadband Internet service, but even a dial-up service that offers an acceleration technology that is supposed to help you surf the Web faster will provide you with less than acceptable quality for VoIP calls. The problem is in the amount of data that can be transferred over the connection. Broadband is referred to as a "fat" connection because more information travels along the same space. So, it stands to reason that if you're using dial-up, even with an acceleration service, the size of the pipe (or line) is the same, and the amount of information transferred is limited to the size of the pipe.

If you don't have broadband Internet access, get it before you try to use VoIP. The decrease in the quality of VoIP calls from broadband access to dial-up access is so dramatic that most VoIP service providers that offer monthly service plans will only provide their services to users that have broadband Internet access.

Equipment Checklist

VoIP equipment is relatively simple to understand. The type of equipment that you need is determined by the type of VoIP that you're using. For PC-to-PC or

PC-to-Phone VoIP, you simply need a computer, a broadband Internet connection, and a microphone and speakers or a multimedia headset. However, if you want to replace your existing landline telephone with VoIP, you need to have an ATA, a broadband Internet connection, and in some cases, a home network router.

It also helps to have an expandable telephone system if you plan to replace your existing landline phone with VoIP. Most ATAs will support only one phone connection, so having an expandable telephone system that requires only one telephone connection to operate more than one phone makes having extensions throughout your house easy to do. There is a way to run a single VoIP connection to feed your entire house and all of the phone jacks in the house, and you'll learn more about that later in this chapter.

So, if you're planning your VoIP service, there are certain pieces of equipment that you need. For PC-to-PC VoIP and VoIP that works using a softphone, the minimum requirements are

- 386 or higher PC (the more up-to-date the PC, the better)
- Sound card (the best quality can be expected from a *full duplex capable* sound card)
- Broadband Internet connection
- Speakers and a microphone or a multimedia headset

If you choose to use VoIP service that replaces your traditional telephone line, you need a telephone instead of speakers and a microphone or a multimedia headset.

These are just the most basic requirements. The checklist in Table 8.2 will help you define the equipment you need. In many cases, the VoIP service provider that you choose will tell you exactly what equipment you need, and if you don't have it or they don't provide it, they can tell you where to purchase the right equipment. Keep this checklist handy as you compare your VoIP service providers so that when you make a decision you'll already know where you stand with your equipment needs.

Table 8.2 VoIP Equipment Checklist

Equipment	PC-to-PC	PC-to-Phone	VoIP Service
Broadband Connection	☐	☐	☐
Home Networking Router	☐	☐	☐
Analog Telephone Adapter	☐	☐	☐
Telephone/Telephone System	☐	☐	☐

There is one more thing to note about the equipment needed for VoIP. Some VoIP (or SIP) phones are available on the market now; these are the IP phones that were discussed in Chapter 2. And it's likely that these phones will grow in popularity as VoIP becomes more mainstream. The phone has an ATA built in so that it's not necessary to have a separate ATA. As these phones gain popularity in the consumer market, they will make connecting VoIP service almost as simple as plugging a telephone into a phone jack in the wall. The difference will be that you plug your telephone into your broadband router rather than into the wall.

Note

An issue that is covered in more depth in Chapter 12 is the potential for your telephone to create problems with your VoIP connection. Newer model, 2.4- and 5.8-GHz phones occasionally cause interference with VoIP service, resulting in garbled conversation. So if you experience quality issues with your VoIP service and you can't determine the cause, try a different phone to see if that solves the problem.

Connection Status

Once you have your equipment, the only factor left to consider is your connection status. The connection status is often the stumbling block where VoIP is concerned. VoIP requires a very specific amount of broadband resources for the best quality, and what some companies call broadband Internet access doesn't always provide the necessary resources.

For example, a dial-up Internet service that offers a Web accelerator or compression technology that the service provider claims will help you surf the Web faster might be referred to as high-speed Internet. But that's not the same as high-bandwidth Internet. The difference is in the amount of information that can be transported over the line, and because high-speed is not the same as high-bandwidth, the connection won't support quality VoIP.

It's important to note that VoIP calls *can* take place over a dial-up Internet connection. However, because they *can* happen doesn't mean that they *should*. VoIP calls that are transported over dial-up are choppy, garbled, and very often dropped completely. The frustration of trying to make a call using VoIP over a dial-up connection just isn't worth it. The quality is tremendously improved when you use a high-bandwidth, broadband connection.

True broadband Internet access is the connection it takes to achieve the best-quality VoIP, and even broadband Internet access can vary in speeds and quality. Your broadband connection is covered in more detail in Chapter 9. For now it's important that you know that your Internet connection is the key to achieving high-quality and reliable VoIP. If you don't have broadband Internet access but you want to use VoIP, now is the time to consider upgrading.

Connection Checklist

Because your Internet connection plays such an important role in the quality and reliability of your VoIP service, you should familiarize yourself with the features and capabilities of that service. The checklist in Table 8.3 will help you become more familiar with the resources that your ISP provides. You'll use this checklist in Chapter 9 as you're installing and connecting your VoIP equipment and software.

Table 8.3 Your Connection Checklist

Requirement	Answer
What are your VoIP service provider's bandwidth requirements?	_____
What is your ISP's upload speed?	_____
What is your ISP's download speed?	_____
Have you tested your connection speed?	_____
What were the results of that test?	_____

Note

Some service providers tier the upload and download speeds of broadband in a multi-level service that costs more for higher speeds. If you're not sure what the speed of your connection is, check with your service provider (the technical support staff should be able to answer your questions about connection speeds) or use a clocking tool like the one at http://www.dslreports.com to find out.

As you're planning your VoIP service, take your connection into consideration because this one aspect of the service is likely to have the most impact on your call quality. If you find that your current ISP doesn't offer enough bandwidth for you to conduct a VoIP call, ask them if they offer better plans. If they do, upgrading to better quality Internet access is easy. Otherwise, you should change service providers before you activate your VoIP service.

Special Considerations

You want your VoIP service to be the highest quality possible. But as you're planning for your service there are special considerations that you may want to pay attention to. For example, do you need more than one phone line?

These special considerations won't make much difference in the quality of your VoIP service. However, if you need any of these additional services, it's best to know whether you have access to these features before you get into a relationship with a service provider. The following sections take a brief look at some of the special considerations that you should check into or at least consider before you choose a VoIP service provider.

Multiple Lines

Many people today rely on more than one phone line. Whether you have one voice line and one data line or just multiple voice lines, you should check with the VoIP service provider that you're considering before you make the switch. Many VoIP service providers charge extra for multiple lines, even if they all have the same number. If you add a data line for a fax machine, for example, that costs extra, too.

One way to reduce the cost of having multiple lines is to have a single connected line and add virtual numbers if you need other lines. A virtual number is a number that is different from your primary line, but when someone calls that line it rings on the primary line. Unfortunately, most virtual lines don't feature differing ring tones, so you can't tell which number is ringing in. Virtual numbers are useful if you simply need an additional phone number for appearances' sake (if you have an in-home business, for example), or if you want to provide a number that is local for someone who lives outside your area. However, if you need an additional line for data or a line that rings separately from your primary line, virtual numbers won't fill your needs.

If you simply need multiple extensions for the primary line that you have coming into your home, you can overcome that challenge in one of two ways. If you're mechanically inclined, you can run your VoIP through your house wiring. This requires that you cut the incoming POTS line where it enters your house. Then all you need to do is connect your ATA to a phone jack in your house and all of the jacks should be live.

The problem with this method of distributing your VoIP service to all of the phones in your house is that it's not foolproof. First, if the wiring in your

house is old, there could be interference in the phone line that could affect the quality of your call. Second, if you live in an apartment or other rental property it's not advisable to cut the incoming phone line. It's possible that your landlord or the telephone service provider that placed the line or your rental property management will charge you a large fee should you decide to move or go back to POTS and need to have the line reconnected. Additionally, if you have any communications services that are wired through your phone line, like TiVo or an alarm system, disconnecting your traditional telephone service will render them mute, and VoIP doesn't support those services, yet.

You could also purchase a multi-handset telephone system like the ones discussed earlier. Multi-handset systems have a single base unit that connects to your phone service. Additional handsets operate independently of any connection to the phone service, and instead use a wireless connection to the base unit to get a dial tone. Most of these phone systems are available with a base unit and one or two additional handsets. If you need more, however, there are systems that enable you to add up to 10 handsets, and those handsets can usually be purchased separately from the manufacturer.

Fax Capabilities

Fax capabilities are another area where many people find VoIP lacking, or at the very least surprising. It would seem that fax would be a natural extension of VoIP, but in truth, converting printed data to fax is a complicated process that is very different from converting voice to digital format.

A fax machine converts printed data to audio signals and those audio signals must be converted to digital data before they can be transported via the Internet with VoIP. Because of this, VoIP service providers usually charge an additional fee for fax capabilities. If a fax machine is an integral part of your daily life, check with your VoIP service provider to find out what additional fees you'll be charged for this service.

The one plus to having fax capabilities from a VoIP service provider is that the service is always provided on a separate line. What that means for you is that you'll have a dedicated fax line that won't interfere with your voice

calls. The cost for this service is usually around $10 per month, making it far more affordable than having a second, dedicated line installed for fax service with a traditional phone company.

911 Services

Dialing 911 during an emergency seems to be second nature these days. In fact, the very first telephone call ever placed was a call for help. Alexander Graham Bell and his associate Thomas Watson were testing experimental telephone equipment when Bell spilled battery acid on his clothing and used the equipment to call Watson for help. Even so, the first call using the 911 emergency services system wasn't placed until February of 1968 in Haleyville, Alabama.

Since then, the use of 911 has grown and an expectation has developed. Today, when you call 911, you expect an emergency services operator to answer your call no matter what time of day or night you place the call. You also expect that the operator will know where you're located no matter whether or not you can speak. And you expect the appropriate emergency service provider, whether it's police, medical, or fire, to be dispatched immediately. But with VoIP, calling 911 might not have the results that you've come to expect.

Since the death of an infant in Florida in March 2005, there's been a lot of discussion about the availability and reliability of 911 services with VoIP services. The infant's mother found the baby was not breathing and tried to call 911 using a telephone connected to a VoIP service. Supposedly the line had 911 capabilities that had been activated, but the call would not go through to the emergency services dispatcher. Instead the caller was directed to administrative offices for emergency services. The call was placed after normal business hours, so there was no one there to take the call and as a result, after trying to call numerous times, the infant's mother had to resort to sending someone down the street to make the call. Because of the delay, emergency personnel weren't able to reach the baby in time to save her life.

Most VoIP service providers now offer 911 services, though a few do not. Recent legislation is set to change that, maybe as soon as the end of 2005.

But there are still issues you need to be aware of where 911 services are concerned. The first is that emergency services on a VoIP line are much different than the emergency services that you have with your traditional phone line.

For example, in order to have 911 services with your VoIP service provider, first they must have that capability. Once you find a service provider that offers the capability, you must register your phone number and location with emergency services. The registration is usually a simple process of filling out a form that your VoIP service provider uses to have emergency services activated on your line. After you register your line, it takes several days for emergency services capabilities to be activated.

Once the 911 service is activated on your line, you can call 911 whenever you have an emergency, but you won't be connected to the same 911 service that you have come to expect. 911 on VoIP connects you with a general emergency services dispatcher instead of your local emergency response system. What this means is that your emergency services operator won't automatically know where you are located.

The difference is that VoIP uses emergency services, not the more advanced Enhanced 911, also referred to as E911. E911 is an emergency response system that provides information about the number from which you are calling—who it belongs to, where you are located, and the phone number—to the emergency services operator who takes your call. The enhanced service also has selective routing and transfer capabilities that ensure your call to 911 is received by the appropriate, and closest, local emergency response agencies.

Emergency calls made over VoIP don't have these capabilities. They're routed to a general regional emergency response line where you have to provide your location and the nature of your emergency before your call is routed to the correct agency. It slows response time and, as was the case in Florida, it's possible that your emergency call will be routed to a number that is not manned 24 hours a day. Instead, the Florida mother received a recording stating she should hang up and dial 911.

The 911 infrastructure is owned by the four major telecommunications companies in the U.S. The companies, known as "the Bells," are responsible for the maintenance and upkeep of that infrastructure. And they are required

by law to provide Enhanced 911 service. However, VoIP service providers are not considered telecommunications companies, so until recently they weren't required to provide any type of 911 services.

However, that's changing, and as VoIP service providers are required to provide 911 services, they'll have to lease this infrastructure from the Bells. The likely outcome will be additional charges to you to cover the additional expense of providing the service. If legislation can be put off long enough, though, VoIP companies will probably arrive at a solution that's better than today's emergency response system. The problem is being addressed and VoIP companies have the technical abilities to provide a better system than we've ever had. But until one or the other happens, the reliability of a 911 call over VoIP isn't to be trusted.

Note

Although most VoIP companies that offer emergency services are currently using the older, simpler 911 services, some companies are making strides to put E911 in place. Vonage, for example, announced during the summer of 2005 that they would begin rolling out E911 services. They also posted more detailed information about how emergency services calls are routed over their VoIP service.

Finally, if you are switching to VoIP for the convenience of being able to take the service with you when you travel, you should be aware that 911 services won't work properly when you're out of town. If you find it necessary to call emergency services when you're at a location other than your home, you should tell them immediately that you are not at the location registered to the phone number and if possible stay on the line until help arrives. Otherwise, if your home location is visible to the emergency services operator he or she might send help to the wrong place.

Emergency services have been a sticking point for many users who are considering switching to VoIP. Fortunately, recent incidents and legal proceedings have pushed many VoIP service providers to realize that people are just

not comfortable without emergency services available to them, and those companies have gone to work on correcting the issues with calling emergency services. It's just a matter of time before calling 911 using VoIP service is as easy and effective as calling 911 with your traditional landline telephone.

Power Outages

The last major consideration that you face is the whole issue of electricity. Because VoIP operates using an analog telephone adapter and a broadband Internet connection, it is subject to power failures. Traditional phone service will still work when the power goes out—assuming that you have a telephone that doesn't require electricity to operate. However, VoIP service will not.

To overcome this challenge, many people choose to install a battery backup system like the one shown in Figure 8.2 when they have VoIP service activated. Once your ATA, broadband router, and telephone system are connected to the battery backup system, if you lose electricity, you'll still be able to use your telephone for a short while. This is an especially useful method of ensuring service if you live in an area where scheduled and unscheduled power outages are common.

Figure 8.2

A battery backup system used to power computers and peripherals during power outages.

There's a lot to think about when you're planning VoIP. To help you with that, Appendix D contains worksheets and checklists that you can use in addition to the information included in this chapter.

Don't let all of the considerations scare you away from VoIP, however. Think about what you need, from the features that you want or need to have to the electricity that keeps your service available to you, even in times when there's no power available to any other piece of equipment.

Some challenges and differences with VoIP might make you think twice before activating the service. Fortunately, solutions exist for most of the issues that you might face with VoIP service, and it's just a matter of time before service providers have any remaining issues cleared up. The important thing is to know what you need before you activate VoIP service. Then it's easy to ensure that all of your issues are addressed before you find yourself in a bad situation.

9

CHAPTER

Installing VoIP Hardware

If you choose a VoIP service that allows you to use a standard telephone to make calls, you'll have some installation to do. You can install VoIP for two purposes: to add a line to supplement your existing telephone service or to replace the line that is your existing telephone service.

If you're installing a supplemental VoIP phone line, you won't want to disconnect the traditional telephone wiring that comes into your house. Instead you will probably want to run your VoIP through your high-speed Internet connection and keep the single phone line. Just remember that you're not tied to a single telephone with either line. Expandable telephone systems work with both traditional phone service and with VoIP service.

If you're replacing the existing line you have through a traditional telephone service, you may want to run your VoIP through your house wiring so that you can have telephones connected to all of the jacks in your house without having to pay for additional VoIP lines. Remember from your earlier reading that running VoIP through your house wiring requires that you cut your incoming telephone lines at the junction box so that the electrical impulses in the copper wiring don't fry your ATA.

Note

In addition to the resource mentioned earlier, there is another Web site where you can find additional information on running VoIP through your house wiring. This Web site, http://michigantelephone.mi.org/distribute.html, offers great information on wiring your home for VoIP service.

Don't let installing VoIP intimidate you. It's really just a matter of connecting a few boxes together and plugging in a telephone, and you're in business. This chapter walks you through the different connection methods for VoIP, and includes diagrams that illustrate how easy it is to get your VoIP equipment installed and operational.

Your Internet Connection Makes All the Difference

If you ever used dial-up Internet service and then switched to broadband Internet service, you probably noticed the difference immediately. Dial-up Internet service is sluggish and might even be described as jerky, whereas broadband Internet service moves quickly and much more smoothly. The difference is caused by the speed of the Internet connection, and it's that difference that affects the quality of VoIP.

VoIP uses the Internet to carry your phone conversation from one place to the next. Early versions of VoIP relied on dial-up Internet access, and the results were disastrous. If there is a disturbance in your Internet service, or if it's slow, the quality of your VoIP call is terrible. Calls are garbled or dropped completely, and early VoIP calls were subject to every issue because they were usually carried over dial-up Internet connections.

More people today have broadband Internet access than ever before, and it's estimated that about 72 million households, or 41 percent of the households in the U.S., will be broadband Internet users by the end of 2010. Already it's being said that the Internet has had a broader impact on the user than television, radio, and telephones combined. As more and more people switch to broadband Internet access and then to VoIP, that impact will be even more obvious.

It's because the Internet is changing the way we do things that VoIP has become a viable technology. But it's important that you understand that although VoIP will work on a dial-up connection, the quality and reliability of that connection is so poor that it's obvious in the quality and reliability of VoIP. VoIP over a dial-up Internet connection is not recommended, and that's why most VoIP service providers require that new users have a broadband Internet connection.

Speed Affects Quality

It's necessary to understand a little about broadband and how it works to understand how it affects VoIP. Broadband is a term used to refer to high-speed Internet access. But not all high-speed Internet access is created equally—high-speed Internet is not the same as broadband Internet. Broadband has more *bandwidth*, and different levels of bandwidth are available in broadband Internet services. Bandwidth is the ability to transfer data from one point to another in a predefined amount of time. The faster the data transfers, the higher the bandwidth is said to be.

Broadband is Internet service that has high bandwidth. In fact, dial-up Internet access usually tops out at about 36 Kbps (kilobytes per second), although it can have transfer speeds up to about 56 Kbps. DSL access starts at around 128 Kbps and cable Internet starts at around 600 Kbps. But these bandwidth measurements are only for download, which is also called downstream, meaning this is how quickly information—such as a navigation command—is downloaded *from* the Internet. The upload, or upstream, speed should also be considered. Upstream is how fast information is uploaded *to* the Internet.

DSL upstream speeds start at around 64 Kbps and cable upstream speeds start around 200 Kbps.

The key to good VoIP quality is bandwidth. The average VoIP call requires 90 Kbps both upstream and downstream. But you also have to take *bandwidth overhead* into consideration. Bandwidth overhead is the amount of bandwidth required by the Internet connection itself to operate. That bandwidth will vary some from Internet service provider (ISP) to ISP.

Note

DSL usually provides enough bandwidth to operate an acceptable VoIP service; however, most DSL providers require that you maintain an active telephone line in order to have the service. If this is a requirement of your DSL service provider, and you want to replace your existing phone service with VoIP, consider changing to a DSL provider that offers "naked" DSL, or a DSL line that doesn't have a telephone number attached to it. If a naked DSL provider isn't available to you, consider switching to cable Internet access.

Note

Some service providers offer a choice of quality settings, usually high, medium, and low. The highest quality setting uses 90 Kbps or higher, with the medium quality being 60 Kbps or higher and the lowest setting being 30 Kbps or higher. These settings, and the amount of bandwidth required for each, will vary by service provider, but if bandwidth is a concern for you, these settings are usually accessible through your account page online and may allow you to adjust the quality of your calls according to your needs and your available bandwidth.

Additional applications that might be using some portion of your available bandwidth should also be taken into consideration. For example, if you're surfing the Internet, downloading e-mail, and using VoIP to make a call all at the same time, the amount of bandwidth that you have available will greatly impact the quality of each of those activities but it will have the most apparent impact on your VoIP application. A lack of resources will manifest in VoIP as garbled words, a strange echo in the line, or dropped call segments.

For VoIP to be functional, it's really necessary to have at least 128 Kbps both upstream and downstream. So, as you can see, even if you're using DSL and you're on the high end of the DSL service, you would barely have enough resources available to have an acceptable VoIP connection. Because at times there are so many more demands on bandwidth, it's usually best to have at least 256 Kbps available both upstream and downstream, and obviously the more resources you have available beyond that, the better your service quality will be.

Note

Some VoIP service providers require a much higher bandwidth than 128 Kbps. For example, Verizon's VoiceWing service requires at least a 512-Kbps upstream and a 96-Kbps downstream capability. Be sure to check with your VoIP service provider to see what their minimum requirements are, and then compare those requirements with the capabilities of your Internet connection.

Clocking Your Connection Speed

So, how do you know what the speed of your broadband Internet connection is? Well, you can call your ISP and ask them. If you're lucky the customer service representative that you reach will know. But in many cases, even they won't be able to tell you. If that's the case, you might want to find a free *broadband clocker*. A broadband clocker is a piece of software that simulates an upload/download on your system and then reports to you at what speed your Internet connection is functioning. Figure 9.1 illustrates how the results of a speed test might appear if you're using cable Internet.

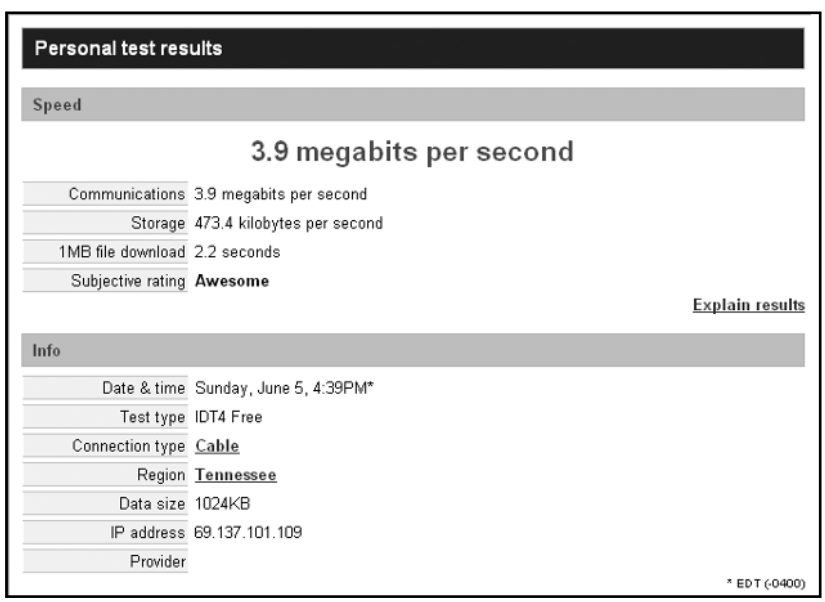

Figure 9.1

The results of a broadband speed test on a cable Internet connection.

One good bandwidth tester can be accessed for free at http://www.bandwidthplace. com/speedtest/. Another good place to try is http://www.dslreports.com. Finally, if you prefer to test your ability to conduct a VoIP call, there's a free testing resource that simulates a VoIP call on your system at http://www.testyourvoip.com. This test does require the download of a Java applet, but the test measures simulated VoIP call quality to a number of different locations and shows you how your call compares to other types of communications. Figure 9.2 shows what your results might look like if you choose to use the test at Brix Network's testyourvoip.com.

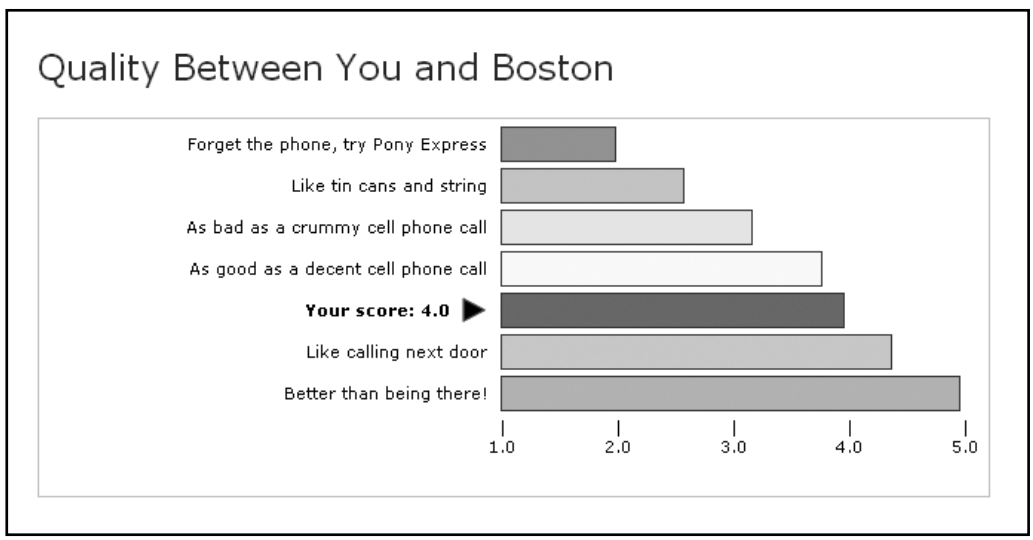

FIGURE 9.2

The results of a VoIP call test for VoIP over cable Internet.

Your broadband connection has a direct effect on the quality of your VoIP service. Check your bandwidth to ensure that you have sufficient resources to ensure quality VoIP calls before you have your VoIP service connected.

Quality of Connection

Another issue that you might encounter as you're installing and starting to use your VoIP is the actual quality of your Internet connection. Having

great speed is not enough. The Internet connection itself must be of high quality without any electrical interference or other issues.

For example, if your broadband ISP is known for having frequent service outages, that might signal a problem with the quality of the service the company provides. One company in the South had frequent service outages in the past. When a VoIP user tried to connect his phone service, he found that there was a lot of static in the Internet connection. In order to repair the problem, new wiring had to be run from the broadband connection through the house.

It's these types of problems that give people terrible headaches when it comes to VoIP. Old wiring, whether telephone wiring or cable wiring, can have issues. If dampness gets into the lines it creates static, which affects service quality. Any number of other problems can affect the quality of service, and sometimes you'll notice it in your Internet connection, sometimes you won't.

You will most certainly notice it in your VoIP connection, however. Even the most minor disturbances will create problems with VoIP and the result will be poor call quality. So, before you install VoIP, check the Internet wiring at your location. If you are using DSL, check and update the phone wiring if it's warranted. If you're using cable Internet, check the cable that runs from the box to your cable modem and replace it if it appears to be damaged in any way.

Networking Considerations

Home networking is becoming an ever more popular technology. Although most homes today have only a single computer in use, the number of multi-computer families is rapidly growing. And as more and more families add additional computers to their homes, they are putting home networks into place.

A home network is a connection between all of the computers in a home that allows those computers to share resources such as printers, Internet connections, and even the folders stored on all of the computers that are connected together. Figure 9.3 shows how simple a home network might look.

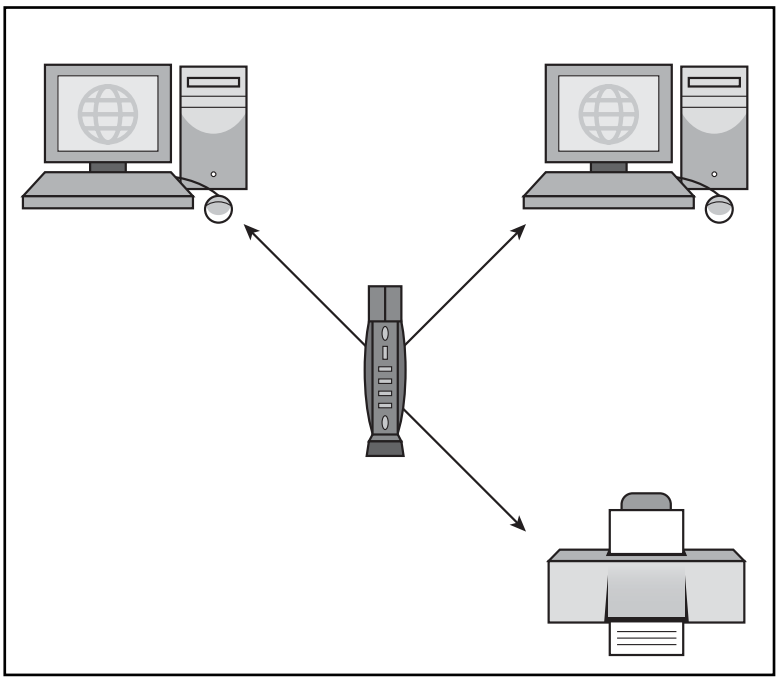

Figure 9.3

A basic home network.

Working Within a Home Network

Home networking has very little effect on how VoIP is connected. In fact, unless you have a network hub connected, the setup for VoIP over a home network is generally the same as the setup for VoIP on a single computer.

Connecting VoIP on a single computer is a matter of connecting the ATA to the cable modem and to a telephone, as shown in Figure 9.4. Once those connections are established, your VoIP should be functional.

However, if you have a home network that you want to add VoIP into, the setup isn't much different. Figure 9.5 illustrates how the router still connects multiple computers together via the Internet connection and then connects to the VoIP service. It's really not much different than connecting a single computer.

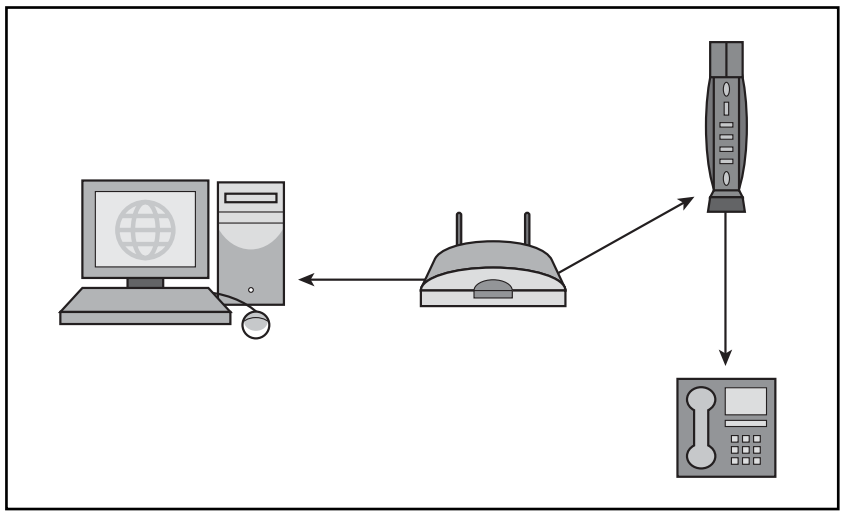

Figure 9.4

A VoIP connection for a single computer.

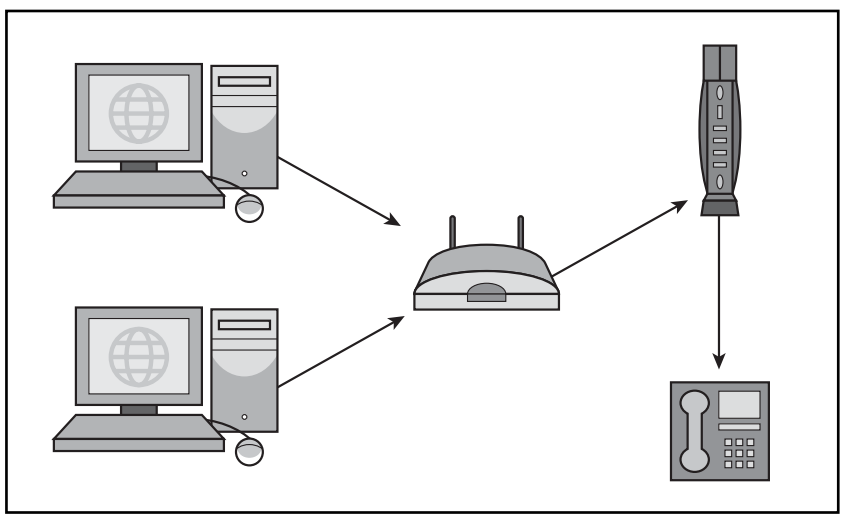

Figure 9.5

A VoIP connection on a network with more than one computer.

The steps for connecting an ATA to enable VoIP on a home network are as follows:

1. Connect your broadband router to your broadband Internet service.
2. Connect the broadband router to the computer(s) in the network.
3. Connect the ATA to the broadband router.
4. Connect a telephone to the ATA.

Once you connect the ATA to the broadband router and power it up, it might take five minutes or longer to boot up completely and to establish a connection. Be patient. It will get through this process and then you can start making VoIP calls.

It really is that simple. Connecting your VoIP equipment requires no more knowledge than how to plug cables into an Internet router and an ATA (see Figure 9.6). It generally takes less than 10 minutes to connect the equipment necessary for VoIP. The more time-consuming part of the process is configuring the software and setting up the service, which you learn more about in the next chapter.

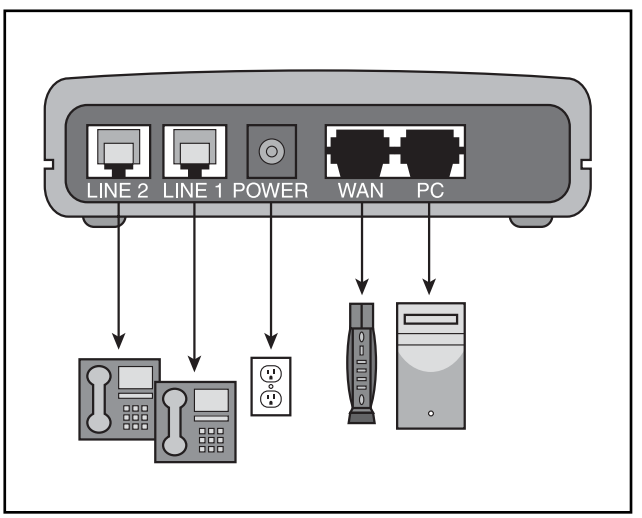

Figure 9.6

Connecting your ATA is as simple as plugging in a few cords.

Working Within a Wireless Network

A wireless network isn't much different from a wired network. The real difference is in the type of broadband router that you're connecting to. Whereas a single computer or a wired network uses a simple broadband router, a wireless network uses a wireless broadband router.

So, if you're connecting your ATA to the wireless network, Figure 9.7 illustrates how your VoIP connection should look.

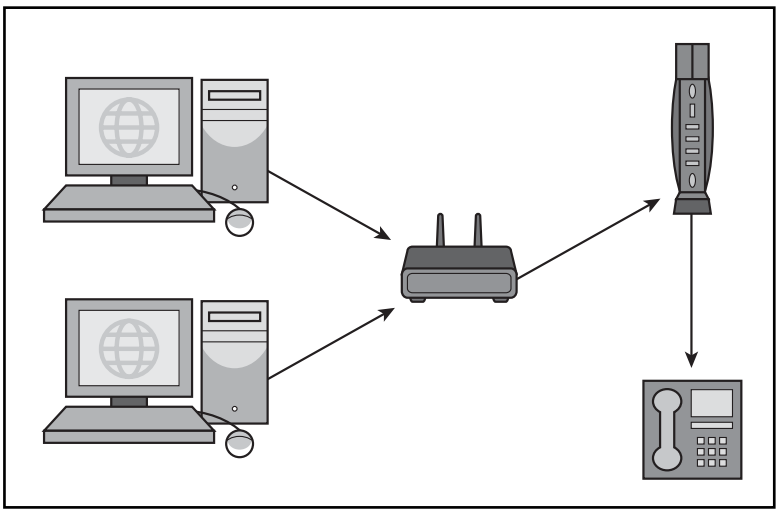

Figure 9.7

A VoIP connection on a wireless network.

So, even when you're using a wireless network, getting your VoIP equipment connected and operational is an easy process that takes only minutes to complete. The steps for setting up VoIP on a wireless network are the same as the steps for setting up VoIP on a regular network.

1. Connect your wireless broadband router to your broadband Internet service.
2. Connect the wireless broadband router to the computer(s) in the network.
3. Connect the ATA to the wireless broadband router.
4. Connect a telephone to the ATA.

Installing your VoIP should be a quick and easy process. The more time-consuming part (though it's really not harder) is getting the appropriate software installed on your computer, if there is any, and setting up the controls for the VoIP service. Most service providers usually have these controls available to you through a dashboard utility on the Internet.

The software is equally as easy to install as the hardware, although you could encounter minor difficulties along the way. All of those issues are addressed in the next chapter.

10

CHAPTER

Installing VoIP Software

VoIP hardware and software aren't any real mystery. Both are very much like the hardware and software that you pick up for any other purpose. The hardware is plug-and-play in many cases, and the software installs using an installation wizard if you're using a Windows-based PC. Still, there are some things you need to know when you're installing your VoIP software and this chapter fills you in on those things.

Installing the Software

VoIP software installation is pretty straightforward. For most VoIP applications you simply insert a disk or download a file and install just as you would with any other software application. However, where VoIP is concerned, it's possible to run into some issues with the software.

For example, VoIP software should usually be installed before your hardware is connected to the computer. So, for example, if you're installing VoIP service through Vonage, when you install the software that operates the ATA, the ATA should not be connected to the computer. Only after you've completed the software installation should you connect your ATA to the computer and turn on the power.

Plugging in the hardware prior to software installation could lead to device conflicts that would require uninstalling and reinstalling the software again.

So before you even power on that new ATA, take the time to download the software necessary to operate it. Here are some simple steps to get you through that process:

1. Insert the disk included with your ATA into your CD drive.
2. If the disk doesn't autorun, from the Start menu, click Run.
3. The Run dialog box appears, as shown in Figure 10.1. Click Browse and locate the drive that the installation CD is in.
4. Follow the prompts on the installation wizard.

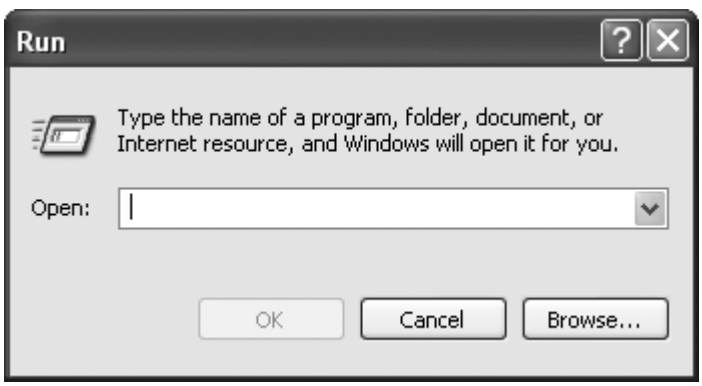

Figure 10.1

The Run dialog box.

In no time, your software is installed and you're ready to connect your ATA and power it up.

Another thing to know about VoIP software is that if you're using a service provider that sets you up with an ATA, you probably won't have any actual service software to install. Your installation will likely consist only of installing the software and drivers that operate the ATA. For issues such as account management and service setup, most VoIP companies have online account access, called *dashboards*. Figure 10.2 shows an example.

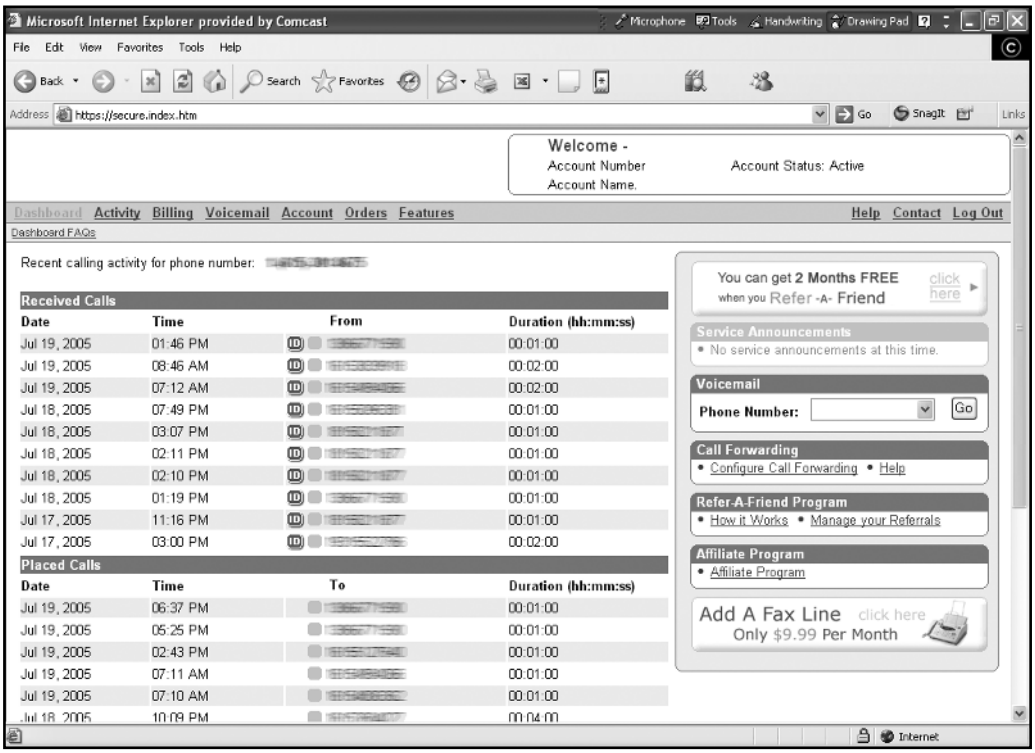

FIGURE 10.2

A dashboard.

Dashboard and Setup Options

A dashboard is your control panel for your VoIP service. If your service provider has a dashboard, and it's likely they do because the cool thing about VoIP is that it's Internet-based, you access it through the provider's Web site. When you sign up for VoIP service the service provider will probably ask you to create a username and password. You use that username and password to log in to your dashboard.

Once you've signed in, you can make plenty of settings and adjustments that will personalize your VoIP to meet your specific needs. Some of the options that you're likely to have access to on your dashboard include that following:

- **Main account page:** Your main account page is your entrance into your account information. Every service provider offers something different on the main account page. Vonage, for example, shows a truncated call list along with links to some of the most frequently used features of the dashboard. Other service providers might list the amount of your bill or advertisements on the main account page.
- **Account activity page:** The account activity page is a detailed listing of the incoming and outgoing calls for your phone number. Depending on the features that your service provider offers, you may even be able to access call information such as who the number (called or calling) belongs to, the date and time the call was made or received, and the duration of the call. Service providers vary on the number of days' worth of calls they show in this activity listing. Some show only one or two days at a time, whereas others show a week or more. Your service provider will also probably archive calls for a month or longer.
- **Billing information page:** Another page most service providers include in their dashboard is a billing information page. On this page you can find information about your billing cycle, the amount of your current bill, possibly a usage summary that shows how many minutes you've used, and a way to make changes to your billing information. Because most VoIP providers require that you set up a recurring monthly charge to your checking or credit account, you probably won't find a way to pay your bill online. But there will most likely be a way to change your billing information.
- **Voicemail box:** One of the greatest features of VoIP is the rich voicemail offerings that are made possible by the Internet. The voicemail box of your dashboard contains options for your voicemail settings. For example, this is where you'll turn your voicemail on and off, change your voicemail settings and greetings, and even access your voicemails. If you have more than one VoIP number on your account, you should be able to access the voicemail for all of the numbers from this one page.

- **Account controls page:** The account controls page is where you manage your address, username, and password. If you need to change your contact information, this is the place to do it. Some companies also have additional account information on this page, such as billing information so that you can change the account to which your recurring monthly bill is charged.
- **Features controls page:** All of the fancy features that VoIP makes possible have to be controlled somewhere. The feature controls page is where all of that is possible. From this page you should be able to activate and control features such as emergency calling with 911, call forwarding and call forking, network availability settings, and managing virtual phone numbers. Of course, what features you can access or how access to features is set up is determined by your service provider. Some service providers might include each feature on an individual page. However your service provider sets it up, you control your features in a way that is unique to you.
- **Help page:** Your dashboard should also have a link to the help pages that your service provider has created. These pages usually include everything from frequently asked questions to very specific technical support topics. Some help pages may also include links to live support agents that you access through IMs or e-mails. These live support agents are there to help you if you have any problems with your service.

Note

These elements of a dashboard are only meant to be a general sampling of what service providers offer. The exact contents of a dashboard will differ from service provider to service provider. Some service providers offer more features on their dashboards, others offer less. Explore your service provider's offerings and become familiar with how the settings work.

Like a car's dashboard, the dashboard that your VoIP service provider offers gives you all of the controls for the account in one place. Some service providers let you rearrange these controls in any manner that suits you, and the offerings from each service provider are different. What will be consistent from one service provider to another is that you will have access to your account controls using the Internet, which means you can control them from anywhere, at any time.

Configuring PC-to-PC Software

PC-to-PC software isn't any more difficult to install and configure than the software necessary to operate an ATA. For example, if you decide to use a service like Skype, you simply download and install the software and then you can begin using it immediately. You might want to tweak the software a bit, but it's easy when you use the control panel. Figure 10.3 illustrates what Skype's control panel looks like.

Figure 10.3

The Skype control panel.

In addition to this control panel, other configuration options are available within the Skype program itself. Figure 10.4 illustrates what other options are available through the Tools menu of the program.

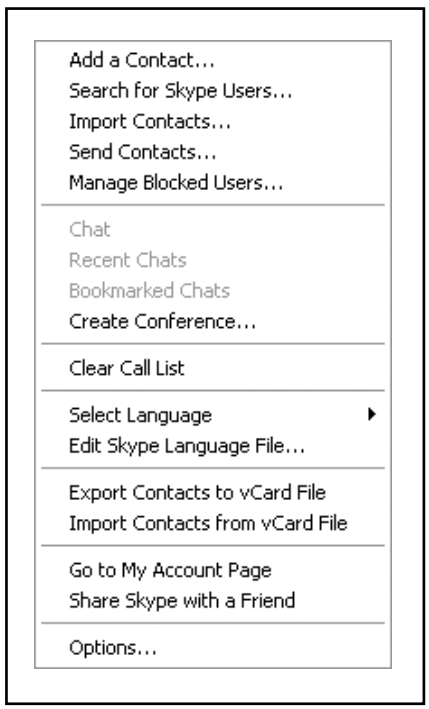

Figure 10.4

Additional control options available through the Tools menu.

Skype isn't the only PC-to-PC VoIP provider that offers these types of controls, however. As you'll see in Chapter 13, any service provider that offers VoIP software also has some options for managing your software. What those options are will vary by provider, but in general you can expect to be able to access your account information, set regional settings such as time zones and locations, and purchase additional, fee-based features.

Unlike connecting an ATA, the equipment that you use with a PC-to-PC VoIP software application can be connected to your computer before you even begin the software installation. The software for PC-to-PC VoIP isn't hardware-specific, meaning that it's not necessary to operate the hardware that you'll use to make your calls.

Instead, the hardware interacts with other applications, and the software is just another application. It doesn't care that the speakers and microphone or multimedia headset are used in other applications. All that software cares about is that the operating system is the right one and there's space on the hard drive for the program. In other words, as long as the necessary hardware is present, there are no special software considerations for that hardware.

Configuring Internet Phone Software

The IP phone is probably the most difficult aspect of VoIP when it comes to configuration. IP phones work by calling the IP address of other devices. So, if you have an IP phone and you want to call your mom, who also has an IP phone, you dial the IP address of that phone in order to place the call.

You may recall that an IP address is like a phone number. It's a numerical designation that tells other machines where that device, whether it's an Internet router or some other type of hardware, is located along the network. So, for example, if your computer is connected to the Internet via a cable Internet router, then your Internet router is assigned a number or IP address that tells other machines in the network where it's "hooked in" to the network. It's not a designation of a physical address, but rather a designation of virtual address.

Unless you're a techie, it's not likely that you know your IP address. But you can find out what it is by going to http://www.whatismyip.com.

The installation for an IP phone is pretty straightforward. Following the same steps that you used earlier, you install the software that came with the phone and then connect the phone. Once connected, using the phone is as simple as dialing the IP address of another SIP phone.

Note

IP phones operate using IP addresses—yours for other IP phones to call in and other IP addresses for you to call out. If you use a firewall, router, or software that changes your IP address frequently or cloaks the address for security reasons, you'll need to change these settings. A permanent IP address is essential or your IP phone won't work properly. Use the manufacturer's documentation to change the IP address attributes before you begin using your IP phone.

Configuring Softphone Software

Softphone software is very much like PC-to-PC software, so configuring it is much the same as configuring PC-to-PC software. You must first download the softphone software and then follow the installation wizard. Usually, once the installation wizard is finished you can start making phone calls.

The one difference with softphone software is that you can call landline telephones with it. That might require a little extra work during configuration. For example, there may be some vendor-specific settings that need to be adjusted, but even those are usually minimal, and even if you don't make any adjustments to the settings, you can still use the software. Adjusting the settings simply increases the quality of your calls.

You may have additional features with a softphone that you don't have with PC-to-PC VoIP. A softphone, after all, is meant as an accompaniment to a VoIP service that works through an ATA. Therefore, some of the features that you have with regular VoIP service will also be available with your softphone service.

To get the best results from your softphone, take some time to familiarize yourself with the different adjustments and changes you can make to the software. Most software providers offer documentation for their product, so read through the documentation as you change and adjust settings to be sure that you're adjusting them properly.

It's been said that installing and configuring VoIP is no harder than installing and configuring a DVD player, and for the most part, that's a correct statement. Sure, you may encounter some problems with the installation and configuration, but that possibility exists with any type of technology or software that you install.

In general, it typically takes less than 15 minutes to install and configure your VoIP service. And once it's installed and configured, you can begin using it immediately. The whole process is easy, and only slightly more difficult than installing any other type of software or hardware. So, expect to be making VoIP calls in less than half an hour once you unpack the hardware or download the software.

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11

CHAPTER

VoIP in the Home Office

There are currently more home offices in the U.S. than there have ever been in the past. In fact, nearly one in four homes in America is the base for a home business, and it's no wonder. We work more hours than our friends in the rest of the world, and just about everyone wants to be loosed from the confines of the daily grind that pays the bills.

Running a home-based business is no easy task, either. In many cases, if you own a business that operates out of your home, you also work a job—at least part-time, but most usually full-time—in addition to the work you do from your house. All of the responsibility of owning a full-time business is there, too, regardless of what size your business is.

You have to make contacts with new clients, keep old clients, juggle appointments, maintain a fully functional office (including services and supplies), and do it all within a set spending limit. The pressure is immense, and that's the reason why many home-based business owners are constantly looking for ways to cut costs.

Through the cost-cutting filter, VoIP looks pretty promising. Just as it can offer consumers a tremendous savings on their home telephone service, it can offer business customers a tremendous savings on their office telephone service. But it can do more for a home business, too. VoIP has the potential to make your business seem much larger than it is, and in a climate where all business is extremely competitive, seeming larger than you are is enough to give you a little edge over the competition.

The question is, is VoIP right for your home-based business? This chapter answers that question for you.

Talk Is Cheap in the Home Office

The same factors that draw consumers to VoIP also draw business owners, and the biggest of those factors is cost. VoIP offers a savings that no traditional telephone company can come close to matching, even under the best of circumstances.

One home business owner, James, will tell you that VoIP is the right service at the right price. James owns a network marketing company that he operates out of his home, and when the much-improved version of VoIP came to his attention, it didn't take much to make him sit up and listen. The traditional telephone company that James was using at the time charged him more than $100 per month to have a business telephone line run into his home. Not only that, but every feature that James wanted to add cost extra, and having a dedicated line for his personal use also cost about $100 per month, so before it was all said and done, his monthly telephone bill was nearly $250 per month.

When a client mentioned to James that he could have better service at a much better price, James began to investigate VoIP for home offices. What he found was that his monthly telephone bill really could be reduced by more than half if he made the switch. Table 11.1 illustrates how much James could potentially save on his business line alone by making the switch to VoIP.

Table 11.1 Service Comparison

	Traditional Telephone Service	VoIP Telephone Service
Basic Monthly Service Cost	$69.99	$44.99
Fax Line	$26.99	Included
Additional Voice Lines	$26.99	$9.99
Additional Services	$21.99	$9.99
Broadband Internet Service	$49.99	$49.99
Totals	$195.95	$114.96

Savings of VoIP versus traditional phone service: 59%

Hidden Costs

Of course, the numbers included in that example are just estimates of the approximate cost of those services, but you get the picture. VoIP is *much* cheaper than traditional telephone service. At an average savings of 30 to 50 percent (and it can be as much as 70 percent) over traditional telephone service, home-based business owners can't afford to ignore the technology.

It's not all just about price, however. As with the consumer VoIP market, VoIP service providers' offerings and the cost of those offerings vary widely. So does the quality of the service and the richness of the features offered. Setup costs also need to be considered.

Some VoIP service providers require that you purchase their equipment in order to use their service. For you that means you may need to buy an ATA or even a specialized VoIP phone, and the cost of those pieces of equipment can be as much as $150 or more.

Most service providers also charge an activation fee for business lines, just as they do for consumer lines. That activation fee is a one-time, non-refundable charge of around $30. On the upside, most VoIP service providers don't require any type of refundable deposit in order to establish service. Some traditional telephone companies do, and that deposit can be $300 or more.

No matter which type of company you choose to establish telephone service with, there are setup fees. The trick is to weigh the setup fees against the monthly bill to see which is a better value. If you're paying higher setup costs and a higher monthly bill, unless there's a feature offered by the service provider that you just can't live without, you should probably look for a different company.

The Separate Line Debate

One question still remains: Is it really necessary to have a separate line for your VoIP telephone service? The problem is, that's a question only you can answer. What it really comes down to is how your business operates and what features you want to have. Some business-class VoIP service providers offer features through their business services that simply are not available through the residential service.

There's also the added advantage of being able to walk away from the business completely when it's time to quit work for the day. If your home phone line and your business phone line are the same, sometimes it's hard to get that separation, because there's nothing to stop clients from calling you at all hours of the night. However, with a separate line, whether it's a traditional phone line or a VoIP phone line, when the workday is over, you can stop answering the phone. And if you're one of those people who can't *not* answer a phone, then you can turn the ringer offer or use the Do Not Disturb function (of the phone or the service provider).

In some ways, the determination of whether to have a VoIP service line for your home-based business is very personal. It's a matter of choice for how separate you want the business to be from your home life. One thing is certain: with VoIP, it's much more affordable to have a separate phone line for business purposes only.

What About Quality?

Another issue that frightens many home business owners is the quality of VoIP service. Just as with consumer service, the stigma established in earlier

generations of VoIP still exists—VoIP isn't of high enough quality to support professional services. Don't let old convictions steer you away from VoIP. If the quality of the service were truly lacking, many of the large organizations around the world that use VoIP today would take their business elsewhere. Even traditional telecommunications companies that provide traditional telephone services use VoIP to transport the calls to some destinations. If the quality is good enough for them, isn't it good enough for your business?

It's understandable how some of the past issues could still haunt the industry. Even some of the current issues with the technology might make you pause before making the decision to switch to VoIP. For example, network traffic affects the quality of VoIP calls. What happens if you end up with a service provider that consistently experiences network traffic issues? The result of these issues is poor quality calls, and on a business line it only takes a few calls to create big business problems.

Most of those issues are solved by choosing a reputable VoIP service provider. Small companies that offer really great pricing plans are probably not the right option for your business telephone service. There's too much of a chance for those companies to be gobbled up by another company or even just disappear from the market completely, leaving you without service and without recourse.

Other quality concerns that used to be issues have mostly been addressed by the industry today. Where business-class VoIP is concerned some service providers even go as far as requiring that you allow one of their technicians to install your VoIP system. This move ensures that the system is properly installed and working as it should. There are fewer chances for issues when the service provider is involved from the very beginning.

In general, the only quality issues that you need to worry about with businessclass VoIP are the same issues that you worry about with consumer VoIP, and even those issues are being addressed so rapidly that there's little room for concern. If you do decide that VoIP is the right solution for your home office, take the same precautions that you would take to protect your personal service.

Do More with Your Broadband Connection

The key to any success in any business is to make the most out of the resources that you have available. VoIP gives you that advantage with your broadband Internet connection. If you already have a broadband Internet connection installed, then you know how it is to want to do more with that connection than simply surf the Web and send and receive e-mail. You are, after all, paying far more for that connection than you would for dial-up Internet service. The problem is that your business won't run as smoothly without it.

That said, wouldn't it be nice to get more from the service that you're already paying for? With VoIP, you can. The truly great aspect of VoIP is the richness of the features that it enables. For example, wouldn't you rather have a video conference with that very important client in Dallas instead of just having a telephone conference? VoIP enables features such as video conferencing and audio conferences as well as *presence technologies* like chat and instant messaging.

VoIP offers you the ability to do more with your broadband Internet connection than you have ever been able to do in the past. Because VoIP is an information technology, it's based on the same principals as other information technology applications and therefore can be easily adapted to meet your needs. Some VoIP service providers even offer VoIP solutions that are specifically tailored to your business needs.

For example, if your home-based business is a consultancy that has partners who also work out of their homes in seven other states, staying in touch with those other offices is essential to the success of your business. VoIP offers features that make it easy and convenient for all of you to stay in touch, and in many cases, you can stay in touch with the touch of a button.

You're already paying for your broadband connection. Why not get the most possible use out of it? VoIP is one way to leverage that connection to reduce costs and increase efficiency in your communications.

Decreased Prices and Increased Services

What draws many businesses to VoIP phone service is the lower cost of a business line that utilizes VoIP technology compared to a traditional telephone line. However, the features available to VoIP service subscribers are a big draw, too.

For example, if you live in California and have a partner who lives in New York, a VoIP system could easily cut the cost for you to communicate with your business partner. But suppose that a call comes in for your partner and you want to transfer it rather than asking the caller to place another call and risking them never following through with it? VoIP makes it possible for you to transfer a call to your partner, with just the touch of a few buttons.

Maybe the issue is that you want to appear larger than you are. It's one way that many small businesses compete with the larger competition. Some VoIP service providers offer business functions such as on-hold music, PBX-like transfer and voice-activated features, and even sophisticated call forwarding features that allow you to have your calls forwarded to any number in many different countries.

A variety of different services are available from the VoIP service providers that offer business-oriented services. Here's a short list of what you might expect to find with your chosen VoIP service provider:

- Enhanced voice mail
- Call waiting
- Call return
- Call forwarding
- Find Me/Follow Me services
- Softphones
- Toll-free numbers
- Virtual numbers
- Fax line
- Automated voice response system

- Call transfers
- On-hold music
- Detailed call logs

That's just a sampling of the different services that are available from your chosen VoIP service provider. Which services your service provider charges you for will vary according to the provider, and maybe even according to where you are located. Service providers in some areas charge more or differently than service providers in another area.

In addition to the advanced features that are available to home businesses that choose a VoIP plan, there are other advantages as well. For example, if your business requires that you stay on the outermost edge of the technology curve, VoIP is there for you. As the technology that enables VoIP grows, matures, and changes, other opportunities for *point of presence* technologies will keep you ahead of your competition.

Point of presence technologies are those technologies that allow you to be "present" in real time. For example, chat and instant messaging are point of presence applications. Over time, these types of technologies will combine with VoIP to give you access to a single application that enables all of the avenues you need to stay in touch with your partners, suppliers, and customers. Imagine being able to check from your desktop to see if your partner is available for you to speak with. When you see that she is, you can click a button on the desktop and be connected with your partner via the telephone. When the connection is made, your line rings first and then your partner's line rings. The VoIP service dials the call and all you have to do is pick up.

It all seems very futuristic, but in truth it's technology that is available now. The difference between now and the future is that the technology is relatively new now. A few years in the future it will be standard technology that occurs on all lines whether they are business or personal. VoIP, as it converges with other technologies and matures to meet the communications needs of today's society, is the first step in convergence, and convergence will reduce your communications costs and increase your productivity in ways that are still in conception stages.

For today, VoIP technology helps you to get ahead of your competition. It's likely that you've seen business columnists who complain about the quality and reliability of VoIP services; however, what you don't hear about in those columns is how great the service is when the connection is done right and the necessary resources are available. Under those conditions, not only can you *not* tell you're using VoIP, but the features that most service providers offer give you tools that you've only dreamed of in the past.

Table 11.2 shows some of the top VoIP service providers that offer business plans, and gives you a brief look at what features and costs you can expect if you plan to use a VoIP-based business service.

Table 11.2 Comparison of VoIP Business Service Plans

Company	Plan Details	Monthly Costs	Additional Fees	Sample Features
Packet8	Unlimited minutes in the U.S. & Canada	$39.95	$99.00 equipment fee, $39.00 activation fee	Auto attendant, Conference bridging, Business class voice mail, Virtual numbers
VOIP.Net	Unlimited minutes in the U.S. & Canada, Free fax line and yellow page listing	$49.95	$39.95 activation fee	Virtual numbers, Do Not Disturb, Voice mail, Call transferring
Lingo	Unlimited minutes in the U.S. & Canada and 17 countries in Western Europe, Free fax line	$49.95, Unlimited International $99.95	$29.95 activation fee	Virtual numbers, Voice mail, Do Not Disturb, Simultaneous ring
Broadvox	Unlimited minutes in the U.S. & Canada, Free fax and yellow page listing	$49.95	It's unclear if the company charges an activation fee but it's likely, given the nature of the industry	Conference calling, Do Not Disturb, Voice mail, Call transfer, Virtual numbers
Vonage	Unlimited minutes in the U.S. & Canada, Free fax line	$49.99	$29.99 activation fee	Virtual phone numbers, Toll-free numbers, Softphone

Table 11.2 Comparison of VoIP Business Service Plans *(continued)*

Company	Plan Details	Monthly Costs	Additional Fees	Sample Features
AT&T CallVantage	Unlimited minutes in the U.S. & Canada, Free fax line	$49.99	$29.99 activation fee	Virtual numbers, Call locating, Voice mail, Do Not Disturb, Conference calling
Qwest	Unlimited minutes in the U.S. & Canada, Free fax number and business white and yellow page listings	Priced on a per-customer basis, determined by your needs	$29.99 activation fee	Voice mail, Call locator, Integrated messaging, MS Outlook integration

Business class VoIP is like consumer class VoIP; the details of service plans differ according to the service provider. Some service providers offer the same basic features that their consumer service plans have, whereas others have considerably richer features included in the basic business class package. Be sure to evaluate several different service providers before you make a choice to partner with one. Consider your needs and the services and costs before making the final decision.

Freedom to Move Around the World

No matter what size your business is—one person or fifteen people scattered around the world—one thing is certain. You are always on the go. Travel is just a fact of life with most businesses, even those that are run out of a home office. And travel is very expensive. From the plane tickets to the hotel rooms and the business center expenses to cell phone bills, a business trip eats away at the bottom line.

Communication costs when you're traveling have always been a fact of life in the past. This isn't your father's business environment. Today options are available to help reduce what it costs you to stay in touch while you're away, whether you're just calling home, checking in with partners, or scheduling meetings with potential clients. VoIP is one of those options.

Many small business owners choose VoIP service over traditional telephone service because it gives them the freedom to move around the world. The ATA that your service provider makes available to you is coded with your phone number, so no matter where you go you can take it with you, and with a high-speed Internet connection you have phone service. Given that some hotels charge as much as $2 per minute to use the in-room phone (even for local calls) but give you high-speed Internet access for free, the ability to call whomever you want without any additional fees is an excellent way to add a little change back to your bottom line.

It's not at all difficult to use your ATA when you're away from home. First, make sure that your hotel has a high-speed Internet connection. Then, simply connect your ATA to the Ethernet cable to bring the connection into your room and connect your laptop computer to the ATA. Figure 11.1 illustrates how your equipment should be connected. Of course, you either need to have a telephone to connect to the ATA or a softphone installed on your laptop computer.

Tip

One shortcut you can take is to install a softphone on your laptop computer that doesn't require you to use the ATA. With the softphone it's really not necessary to carry the ATA, meaning you have that much less equipment to lug around.

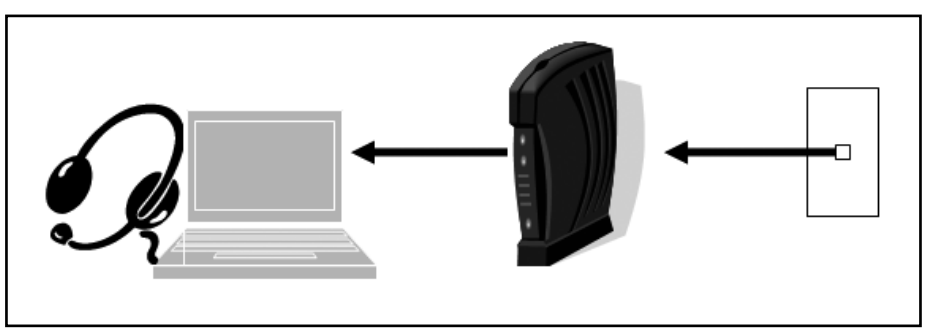

Figure 11.1

The ATA/computer connection in a hotel room equipped with high-speed Internet access.

One neat feature of carrying your ATA with you is that anyone in your local area can call you without paying long-distance fees while you're away. That's because even though you carry the ATA with you, it's coded to your *local* phone number. In effect, you're carrying your area code with you. Unfortunately, that also means that anyone in the area that you're traveling to will have to call long distance to reach you, even though you're in their city.

You might be wondering why you would want to carry your ATA with you or even use a softphone while you're on the road. It's because the VoIP service is much less expensive than cellular phone service, especially if you don't have a nationwide plan and end up paying roaming charges while you travel. Most cellular phone service providers charge both a daily connection fee and long-distance fees for all the calls that you make when you're out of your home service area.

VoIP service makes it possible for you to stay in touch while you're away without paying extra for the privilege. The best part? If you happen to be traveling internationally, all of this still applies. Even if you're in Germany, for example, when you connect your ATA to a broadband Internet connection, you can make and receive calls just as if you were in the U.S. That fact alone is enough for many businesses to switch to VoIP.

Note

International VoIP calls are so effective that many organizations—both VoIP service providers and other non-profit organizations—are now providing the U.S. soldiers in Iraq with free VoIP service so they can call home and stay in touch with friends and family members. One such organization is Freedom Calls Foundation. You can learn more about it at http://www.freedomcalls.org/.

VoIP service offers a lot of benefits to users. If you travel, the ability to take your local phone service with you wherever you go is one of the most significant of those benefits, especially if your travel is concentrated overseas. The savings is tremendous when compared to the cost of making calls from a hotel phone or a cell phone. Why wouldn't you want VoIP to support your business?

Transitioning to VoIP

Home-based businesses are especially sensitive to change, particularly changes that have the potential to disrupt business. That fact alone is enough to keep a lot of home business owners from making the switch to VoIP. It's a legitimate concern. When you have to work hard for every client, contract, or sale, risking even one takes a lot of consideration.

Fortunately, with VoIP there isn't a whole lot of risk. Perhaps the most difficult task you face in switching to VoIP service is getting your existing phone number ported over to your new VoIP service provider. As you've already learned, porting a number to a VoIP service provider can be extremely slow and it's not unusual to run into problems that prevent the port from happening at all. So, what's a business to do?

One choice that you have is to use call forwarding to push calls from your existing phone number to your new VoIP line. It's a solution, albeit not a very good one. A better solution might be to have a new number recording placed on your old number when you switch to VoIP. Ultimately, you'll lose your number, but it's a temporary solution until you're sure that all of your clients have your new number.

Try It, First

One of the most nerve-wracking aspects of switching to VoIP is the uncertainty of it all. Today's VoIP industry is much more mature than in the past, and it's unusual (though not unheard of) to experience severe issues with VoIP. If you do, most of those issues can be solved with a little troubleshooting. But when your livelihood depends on your ability to stay in touch with anyone that needs to reach you, it's best to try a service before you commit to it completely. Fortunately, VoIP offers several options for try-it-before-you-buy-it.

The first of those options is to try a softphone program before you even begin to think of switching to VoIP. This is a great way to get a feel for VoIP service, but it's deceiving in some ways. For example, a softphone works with a computer, not with a regular telephone. So, you get a feel for the

quality of VoIP calls, but that's about where the similarities end. You usually can't even receive incoming calls with VoIP, so all of your experiences are limited to outbound calls only.

Another option is to take advantage of the money-back guarantee that many VoIP service providers offer to new subscribers. Many service providers allow new subscribers to use the service for 30 to 90 days, during which time you can cancel the service without being penalized. Unfortunately, most service providers require you to complete a few steps in order to take advantage of this guarantee:

- Return all equipment in the original shipping boxes
- Return a copy of the original service order
- Call the company before you return anything for a return authorization number
- Provide a reason for your dissatisfaction

Of course, the requirements of the money-back guarantee will differ by service provider; these are just examples of what might be expected of you.

VoIP service makes sense to business owners on many levels. Even so, common sense says that you shouldn't commit to a new technology without taking some time to investigate the service and make sure that it's going to meet your needs. Trying out the service is the fastest and easiest way to see if it's going to work for you. Just make sure when you try it out that you have options for going back to your traditional telephone service if you decide that you don't want to continue using the VoIP service.

Evaluate Your Needs

You still might be wondering if VoIP is really the right service for your business. If you're not sure, the quiz in Table 11.3 can help. Answer all of the questions with yes or no answers. If you answer yes to five or more of the questions, then VoIP service is right for you. If you answer yes to fewer than five of the questions, VoIP might be a technology that you want to try but not completely commit to until you've had time to become comfortable with the technology.

Table 11.3 Is VoIP Right for You?

1. Do you make a lot of long-distance or international telephone calls?
2. Do you need to reduce the cost of your telecommunications capabilities?
3. Do you need business-class voice mail?
4. Do you need a telecommunications system that supports offices in multiple locations?
5. Would an automated voice response system assist in dealing with incoming calls?
6. Do you need a telecommunications system that makes your business seem larger than it actually is?
7. Are you comfortable trying new technologies?
8. Would your business benefit from having a telephone number that is local to a city other than the one that you're in?

VoIP is a personal choice as much as it is a business choice. Before you make the decision, however, take the time to consider what you need from a phone service for your business. Cost savings *is* important. However, it's not the only reason to switch to VoIP. VoIP offers numerous features and advantages beyond the simple fact that it will save you a lot of money. Carefully consider what you have to gain by switching to VoIP, aside from how much you can save. Then, if the business case supports the switch, start looking for a VoIP service provider that offers the services and features that you need.

Combining Home and Office

In the quest to reduce costs, many home business owners combine their home and business telephone service and then separate the two using services that enable differing rings for incoming calls to different numbers.

The problem with these types of services is that they can be very expensive. However, they do get the job done, and despite the fact that the Distinctive Ring feature is expensive, it's usually less expensive than a separate telephone line.

Unfortunately, an option like that leaves many facets of business communications unattended. For example, what happens if you need to send or receive a fax? Sending a fax is relatively simple. You just connect the fax machine to the existing line and send the fax. However, incoming faxes are more difficult. You need to know when the fax is coming so that you have the fax machine set up, or you need to have a fax machine that supports manual acceptance of faxes.

It's frustrating to deal with faxes under these conditions, and that doesn't even take into consideration the other types of business services that you might be missing out on if you have a single line for both your home and business services. VoIP ends all of those frustrations and the confusion that goes along with multiple lines.

With VoIP service you have two options: Two separate voice lines and a fax line (one voice line for home and a voice and fax line for business) or a single voice line with multiple numbers and a fax line. Either option will work, but the separate voice and fax lines are the better option.

The benefit with VoIP is that you can have those dual voice lines and a fax line for less than a traditional telephone line with all of the enabled features discussed previously. Which VoIP service you choose is up to you, but you can have the service, with all of the features and elements that you need, and you can do it for less than if you have traditional phone service.

VoIP for your home business makes sense in a lot of ways, especially if you already have a broadband Internet connection. VoIP phone service offers all of the features that you need to make your home business communications effective and cost efficient. The tradeoff is that you get savings on your phone bills, and your customers get a better impression of your business.

12

CHAPTER

Pocket PCs and VoIP

Two of the hottest technologies to meet the consumer market are Pocket PCs and wireless networks. Pocket PCs are those great hand-held computers that manage everything from your contact list to your word processing program and even surfing the Internet if the Pocket PC is wirelessly or WiFi-enabled. Of course, wireless Internet access is necessary and that's where wireless networks come into play.

Most Pocket PC manufacturers are now developing and shipping wirelessly enabled Pocket PCs because the demand for them has gone through the roof. Even those that don't have wireless capabilities built in can be wirelessly enabled with the addition of a wireless network card.

Wireless networks have grown steadily over the past few years because a wireless network allows you to access your network, including Internet access using any computer on the network, no wires required. And these days wireless networks aren't only available in your home or office, but there are thousands of public *hotspots,* or wireless networks, where you can use a wirelessly enabled PC to access the Internet.

Any WiFi-enabled computer can be used anywhere there is an 802.11b wireless network. Analysts predict that by 2008 there will be 167,000 public hotspots and more than 75 million wireless users worldwide. Now combine all of those networks and wirelessly enabled Pocket PCs and you have the recipe for VoIP accessible by Pocket PCs.

It makes sense that Pocket PCs would quickly adapt to VoIP. After all, a Pocket PC is about information portability and VoIP is an information technology. So, imagine being able to use your Pocket PC to make VoIP calls from any wireless network. Then, combine the capabilities of other types of digital communication and you're starting to see how VoIP and the Pocket PC are the perfect solution for communications on the go.

VoIP for Pocket PCs

One question you might be asking yourself is, Why would I want VoIP if I have a cellular phone? The answer is easy. Cellular phone service is expensive, and should you make a mistake in calculating how much you plan to use your phone and go over your allotted number of minutes, you'll probably pay a ridiculous rate of about $0.35 to $0.45 per minute. Ouch!

VoIP, on the other hand, is much lower in cost. One way to reduce your cost of communications with your Pocket PC is to install a free PC-to-PC VoIP application on your handheld. For example, Skype offers a version of its software that can be used with your Pocket PC. With this software you can call other Skype users for free or, as shown in Figure 12.1, you can use it with your SkypeOut account to call any telephone number for as little as $0.023 per minute.

Another option for VoIP on your Pocket PC is to use a softphone from your current VoIP provider. For example, the softphone shown in Figure 12.2, which you can install on your Pocket PC.

The Vonage softphone is one of the SIPPhone options, the Xten X-Pro. In order to have access to it, you must be a Vonage subscriber and add the softphone as an enhanced feature of your VoIP service. The cost for the softphone is $9.95 per month. For that fee, you receive 500 minutes each month that you can use to call any phone number, whether VoIP, cellular, or traditional phone service.

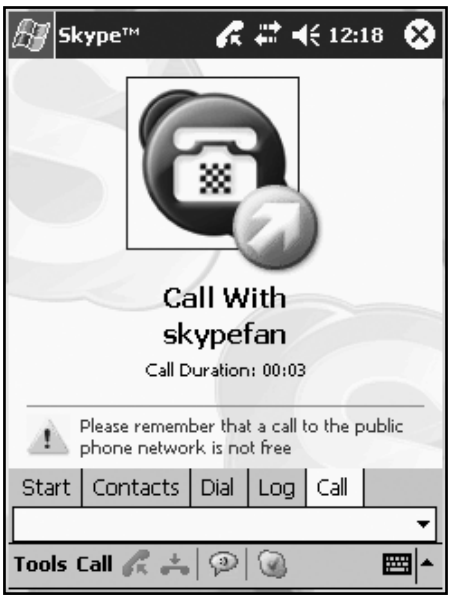

FIGURE 12.1

The SkypeOut Pocket PC interface for making calls to any telephone from any WiFi hotspot.

FIGURE 12.2

A softphone.

Once you have a VoIP softphone installed on your Pocket PC it's easy to use it. Anytime you have access to a wireless network, the softphone works just like it would if you were using a computer on your home network. Just make sure you have a wireless connection and dial the call.

The one piece of additional hardware that you might need is a multimedia headset. Some Pocket PCs don't require a headset, but not using one leaves your conversation open to anyone who cares to listen. Instead, connect a multimedia headset, which you can purchase for $10 to $25 at most department and electronics stores, and you've got a private conversation that doesn't eat up your cellular minutes.

If you happen to go over the number of minutes allotted to your softphone from your VoIP service provider, additional minutes are usually charged at a rate of about $0.02 to $0.07 per minute; a cost that's considerably lower than what your cellular phone service provider would charge for additional minutes on your cellular phone service plan.

By using VoIP service with your Pocket PC, you can reduce your communications costs, no matter where you travel, and you don't have to carry any additional hardware with you. If you travel often and need to cut your communications costs, VoIP for your Pocket PC just makes sense.

Advantages of Pocket PCs

Price seems to be the biggest driver of VoIP from all angles, but there's more to using VoIP with your Pocket PC than just saving money. The advanced features of VoIP also drive the use of VoIP with the Pocket PC. Many of the same features that you depend on with your in-home or in-office VoIP are available for VoIP for your Pocket PC. For example, some of the most frequently available services include the following:

- Conference calling
- Call forwarding
- Call transfer
- Call hold
- Redial
- Speed dial
- Caller ID
- Voice mail

If you're using your Pocket PC with VoIP while you're traveling, it's possible to conduct a conference call with your office and the office you're traveling to while you're stuck in the airport in Albuquerque. Or, if you're talking to your wife about booking tickets to the symphony, you can put her on hold, call and reserve the tickets on another line, and then return to the call with your wife to tell her that the tickets have been reserved.

You can even transfer your calls from your office VoIP service to your Pocket PC if you're on a call and you need to be free to move between offices. As long as your wireless network connection remains intact, your VoIP service works.

That's the biggest drawback of VoIP for the Pocket PC. Not every location has a wireless network connection, and although some cell phones are coming into the market that are enabled for both cellular communications and VoIP communications, there's currently no service that enables the switch from the cellular network to a VoIP network. However, it's only a matter of time before these services are available and work together without a second thought from you.

VoIP is the telephone of the future. There will be many changes to the VoIP market over the coming years. However, when the dust settles from all of the construction on the telecommunications industry, VoIP will be at the top of the new structure, and all other types of communication will integrate with it making communications via VoIP second nature, just like traditional telephone service is now.

Pocket PC Requirements and Considerations

The more immediate worry with VoIP for your Pocket PC is how to get started using it. There aren't tons of technological requirements for VoIP service to work properly, but there are some. In order for VoIP to work properly on your Pocket PC you must have the following:

- In most cases, Windows Mobile 2003 for Pocket PC or higher
- A 400-MHz or higher processor
- Wireless capabilities

One additional piece of hardware that you'll probably want to invest in is a multimedia headset. This piece of hardware shouldn't be hard to find, and it won't be too costly. You might even consider a Bluetooth headset to use with your Pocket PC. And if you use your Pocket PC for other multimedia tasks, like watching streaming video, listening to music, or recording voice notes, you may already have a multimedia-enabled headset.

Of course, the preceding requirements are only guidelines. You're not limited to a 400-MHz processor, and in truth, if you have a faster processor you'll probably experience better-quality VoIP.

More About Pocket PCs and VoIP

Pocket PCs equipped with VoIP are a natural combination for two of today's hottest technologies. If you've paid any attention to the mobile communications market, you've seen the efforts of industry members to combine Pocket PCs and mobile communications. PDA phones, such as the phone shown in Figures 12.3 and 12.4, feature both cellular capabilities and Internet capabilities.

Figure 12.3

A PDA phone.

Figure 12.4

A PDA phone with keyboard exposed.

In addition to these features, today's mobile phones have other functionality, such as voice recording capabilities, image capture programs, and so much more. It's just a matter of time before VoIP capabilities are not only added to phones, but also supported by service providers.

Using your Pocket PC with a VoIP service is a great way to cut your telecommunications costs. It's portable, the price is right, and the features are much advanced over the features of other types of phone service. For now, VoIP that switches seamlessly with cellular service is a vision for the future. In the future it, or something like it, will be a reality.

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CHAPTER

Sample VoIP Services

The types of VoIP services available are as varied as the VoIP service providers themselves. The services that follow are just a sampling of the different services that are available. Each service includes a description of how to set up and use the application, along with a few tips thrown in to help you get the most out of each service.

These services might or might not work for you. If you find that none of these meets your needs, check out Appendix C for a list of additional service providers. Be sure to choose a service provider that not only meets your needs but is also stable in the marketplace. A smaller company might offer a better price on VoIP service, but better price is a small consolation if the service is terrible or if the company disappears after you begin using their service.

Setting Up and Using Skype PC-to-PC Services

Skype is probably one of the best known names in VoIP. In fact, the company claims to have more than 35 million registered users. That's due in part to the company's popular PC-to-PC application. It's just the tip of the iceberg for Skype's service offerings, but it's free to use with other Skype users, and that alone has drawn many people and their friends and family to the service.

Note

Before you can set up any of the services listed in this chapter you have to download and install the software. Click the Download command on the service provider's page. A dialog box appears to walk you through the download and installation process. In most cases you should select Run to run the application from its current location. An installation wizard walks you through the remaining details of installation.

Skype offers several services. Its PC-to-PC application is located on its Web site at http://www.skype.com. Once you have downloaded and installed the Skype PC-to-PC software, the installation is easy.

The first time you open the Skype software you will be prompted to create an account. Figure 13.1 shows the dialog box that prompts you to create a username and password for the service. Be sure to choose one that you will remember but will be hard for other people to guess. When you complete these steps, click Next.

A second dialog box appears, as shown in Figure 13.2, which prompts you to enter your full name and e-mail address so that other Skype users can find you. This information is optional. If you prefer not to list it, leave the form blank and click Next.

From this point you can choose to have the software search your existing contacts programs (such as Microsoft Outlook) for friends and family that already use Skype. Figure 13.3 shows that Microsoft Outlook may try to prevent Skype from searching through its contact database. Following the instructions in the dialog box you can choose to allow Skype to examine Outlook or not. It's not required to finish the Skype configuration.

Figure 13.1

Skype's first Create Account dialog box for creating a username and password.

Figure 13.2

Skype's second Create Account dialog box for adding your name to the Skype directory.

Figure 13.3

Another Create Account dialog box, which provides directions for importing contacts from another program.

If you choose to allow the Skype software to search your contacts for other users, the process could take up to ten minutes. If you have a lot of friends who have broadband Internet access, it's probably worth your time to let Skype check for other users with which you can connect. Of course, there's always the option of skipping it and just sending an e-mail to everyone in your address book with your Skype contact information when you complete the installation process.

When you finish this third Create Account page and click Next, the Skype installation is finished. Figure 13.4 shows the Skype interface.

Once the Skype software is installed it's easy to use. Simply double-click a user in your contact list and the call is initiated. You can also use the keyboard to enter the contact number of another Skype user and then click the Call button.

Figure 13.4

The Skype user interface.

You have two options for handling the call audio: your speakers and a microphone or a multimedia headset. Either works, but you may find that a multimedia headset is less awkward than using your computer's speakers and a microphone. Either way, you're tied to the computer for the duration of the call.

Note

Skype's PC-to-PC service will only work with other users who also have the Skype PC-to-PC service. If you don't know anyone who has the service installed, you can invite your friends and family to download and install the service so that you can use Skype to contact them.

Skype's PC-to-PC VoIP is a great way to try out VoIP before you commit to it. The service is free, so there's no risk for you, and if you decide you don't like the service, uninstalling it is easy. Skype won't replace your home phone number, but if you have friends or family who live out of town and would be willing to use the service too, you could save money on your long-distance calling bill.

Setting Up and Using SkypeOut

SkypeOut is a service similar to Skype's basic service. The only real difference is in who you can call. And SkypeOut isn't free. With SkypeOut, you can call any other phone in the world, whether it's a landline phone, cell phone, or other Skype user.

Note

Skype, which was founded by the same people who founded KaZaA, the peer-to-peer downloading service, is based in the United Kingdom. Even so, the Skype applications can be used anywhere in the world as long as you have broadband Internet access.

The basic installation is the same as the basic Skype service, and downloading the software is free; however, in order to use SkypeOut to call anyone that's not a Skype user, you have to purchase a block of minutes to use for those calls. These blocks of minutes are sold in £10 increments. That translates to about $13.30 USD, and is the equivalent of 10 hours' worth of calling time.

Caution

The minute blocks available for the SkypeOut application are only valid for up to 180 days if the account is inactive. Be sure to keep your account active so that you don't lose the minutes that you paid for.

When you use up the block of minutes, a new block is automatically charged to the credit card that you used to purchase the original block of minutes. You can decide not to purchase additional minutes if you're not ready when your time runs out.

If you already have the Skype user interface downloaded and installed on your computer, there's nothing additional to download with SkypeOut. You simply purchase the minutes and then use the same Skype software to make calls to anyone, anywhere. Figure 13.5 shows the appearance of SkypeOut.

SkypeOut gives you the option to call anyone whether they have a traditional telephone or a VoIP phone, but calling other Skype users is still free. This is an economical way to cut down your traditional telephone bill while staying in touch with your friends and family.

Figure 13.5

The SkypeOut user interface.

Note

Neither the basic Skype software nor SkypeOut gives you the ability to receive incoming calls from callers that are not also Skype users. In order to receive calls with the Skype software you need SkypeIn. With this service, which is in Beta testing at the time of this writing, you can purchase a phone number that will ring to your computer for £10 ($13.30) per quarter.

Setting Up and Using Skype for Pocket PCs

One of the hottest-selling pieces of computer equipment on the market right now is the Pocket PC—a hand-held computer that has many of the same functions that a desktop or laptop computer has. VoIP happens to be a great addition to a Pocket PC.

The portability of Pocket PCs makes them the perfect VoIP companion, and Skype has a Pocket PC version that takes advantage of that fact.

In order to use Skype's Pocket PC version, you must have ActiveSync installed on your Pocket PC and a partnership established with your computer. You also need a WiFi connection for the VoIP application to work.

Once you meet those requirements, download the Skype Pocket PC version and save it to your computer's hard drive. When the file is downloaded, connect your Pocket PC to your computer and open the Skype file to complete the installation. The installation wizard walks you through putting the software on the Pocket PC and activating it.

Figure 13.6 shows how the Skype interface will appear on your Pocket PC when the installation is complete. After the software is installed, making calls with your Pocket PC is just like making calls with your desktop computer or laptop.

Skype's Pocket PC software is a great solution for those times when you're on the run but don't want to use a cell phone to stay in touch. As long as you're in a wireless hotspot, you can use Skype for Pocket PC to make calls to other Skype users. If you purchase calling credits, you can even use your Pocket PC to make SkypeOut calls, reducing your cellular bill even further.

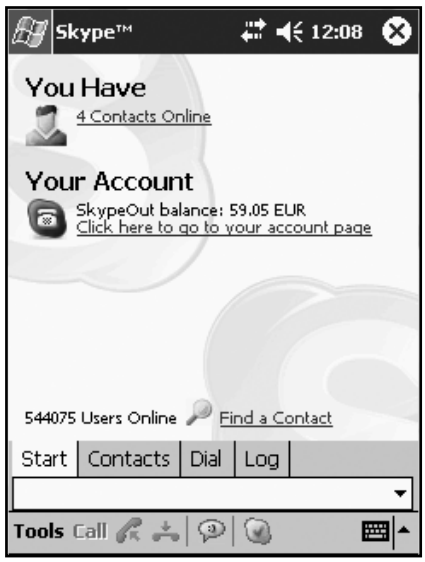

Figure 13.6

The Skype Pocket PC interface.

Setting Up and Using SIPPhone's Xten X-Lite

If you're looking for a VoIP option that lets you make calls to landline phones, cell phones, or other VoIP users for free, SIPPhone has an option, called Xten X-Lite, that might meet your needs. You can download the software from http://www.sipphone.com.

SIPPhone offers three options: they provide you an adapter, you use a softphone, or you provide your own adapter. It's the basic softphone version that's free. On the site, you choose the softphone option and then you're given three options for the softphone: Xten X-Lite, Xten X-Pro, or PhoneGaim, which is a softphone for Desktop Linux.

The Xten X-Lite is the application that is discussed here. When you choose to download this program, you're prompted to choose an operating system. When you do, a download dialog box appears. Select Run and the program walks you through an installation wizard.

The first time you open X-Lite after you install it on your computer, you are prompted to create an account. Figure 13.7 shows the dialog box that appears. Fill in the information requested, choose a password, click OK, and you're done.

Figure 13.7

The X-Lite Create an account dialog box.

Installing and configuring the X-Lite application is that easy. After you click OK, the X-Lite softphone appears on your computer screen, as shown in Figure 13.8, and you can begin using it to make calls to anyone immediately.

Figure 13.8

The X-Lite softphone interface.

Making calls with X-Lite is easy. A microphone and speakers or a multimedia headset is required, and dialing is accomplished with the mouse or with the numerical keypad on your computer. And X-Lite has three lines so you can conduct multiple calls or conference together multiple people. X-Lite even allows you to receive incoming calls from anyone for free, whether they're using VoIP or a traditional telephone line.

Additional features that you might find useful are an address book that enables Click-to-Call, and Recent Call logs. The administrative menu is shown in Figure 13.9.

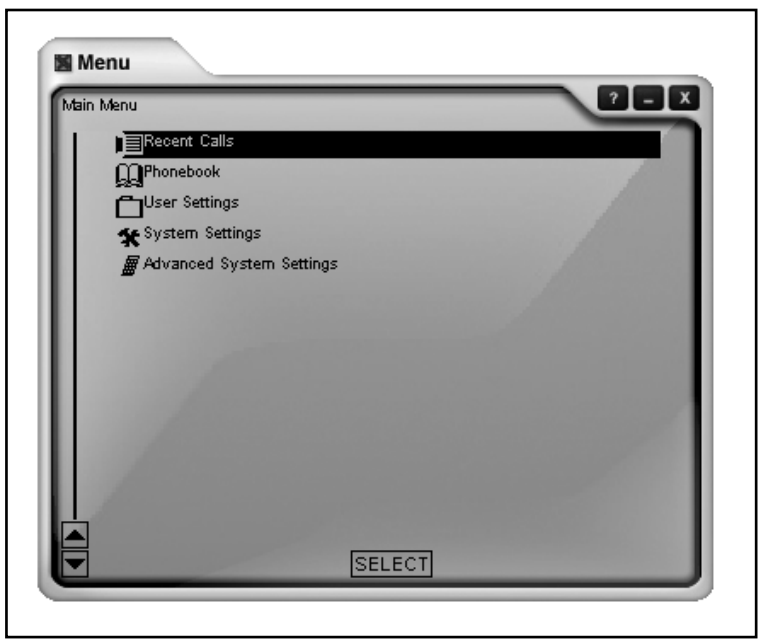

Figure 13.9

The administration panel of the X-Lite application.

X-Lite is easy to install and easy to use, and it allows you to make calls to anyone for free. You can even receive calls from other people when you have the X-Lite software enabled, even if they don't use VoIP. Those factors make X-Lite a good application to help you reduce your long-distance costs.

Setting Up and Using GloPhone's GloPhone2AnyPhone

One last service to consider is GloPhone's GloPhone2AnyPhone. You can download this application at http://www.GloPhone.com. Begin by choosing from one of three VoIP plans that GloPhone offers:

- $9.95 per year plus an additional calling card fee. You choose how much the calling card is worth: $10, $25, $50, or $100.
- A monthly fee of $4.95 that includes 100 minutes of calling in the U.S. and Canada. Each additional minute is $0.039.
- A yearly fee of $49.95 that includes 1500 minutes per year, good in the U.S. and Canada. Each additional minute is $0.039.

Once you choose a plan, you're prompted to create an account and choose an area code. Then you enter your account and payment information, and the GloPhone is downloaded and installed on your computer.

As shown in Figure 13.10, there is an activation process you must go through the first time you access your GloPhone. Enter the requested information and then click Activate Your GloPhone.

Figure 13.10

The GloPhone activation dialog box.

After you've activated your phone, the GloPhone interface appears on your screen and you're ready to make and receive calls. Figure 13.11 shows how the GloPhone interface will appear when the activation process is complete.

The GloPhone also has an administrative panel that allows you to add contacts and chat buddies as well as organize those contacts by category. Figure 13.12 shows the administrative panel.

GloPhone, like the other services listed in this chapter, is one option among many. Each VoIP service provider is slightly different and their offerings will be slightly different too. Which of these services will work for you is dependent upon your needs. Try several different services before you decide on one. And don't feel tied to any service you try, especially if it's a software-based service that doesn't require additional equipment.

Just beware. VoIP is such a new technology that there are still some kinks in the service. For example, all of the services mentioned in this chapter suffer from a slight lag between the time you speak and the time the person on the other end of the call hears your voice. It's a minor annoyance, but an annoyance nonetheless.

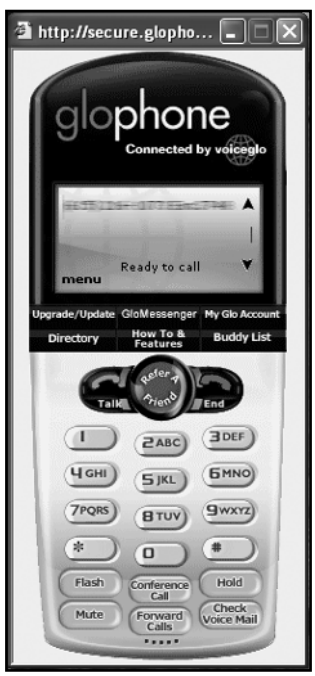

Figure 13.11

The GloPhone interface.

Figure 13.12

The GloPhone administration panel.

For truly great VoIP service, an ATA is your best option. The call quality when routed through an ATA will always be better than the call quality of a software-based program. However, the services listed in this chapter offer a few options for you to try VoIP and decide if it's the right technology for you.

14

CHAPTER

Getting the Most from VoIP

VoIP has had to overcome some serious flaws to get to the point it is at today. In the past, quality and reliability were two of the major sticking points for the technology, and today those sticking points are still small problems. People remember using VoIP services that quite simply stunk! But yesterday's VoIP is a thing of the past. Improved standards, better technology, and increased broadband access make the VoIP that everyone is using today much better than its older brother.

That's not to say there won't occasionally be problems with the quality and reliability of today's VoIP. There very well could be. As with any technology, what works amazingly today may not work so well tomorrow. So many factors impact the quality and reliability of VoIP that there is no guarantee you'll always have crystal clear service.

For example, you can't control the static in some broadband Internet lines. Any number of factors can create static in the lines: thunderstorms, electrical impulses, even a good hard rain. When these factors create static in your broadband cabling, you may not notice the issue as you surf the Internet or download e-mail. However, VoIP is much more sensitive to these factors and you'll most certainly notice it when you make or receive a telephone call using VoIP service.

The way to correct the problem is simple—unplug your ATA or Internet router for a few minutes and then plug it back in. While it's unplugged the static in the line dissipates and reconnecting the box resets it so you start out with a fresh signal when everything is reconnected and functional again.

These are the kinds of nuisance issues that you're most likely to have with VoIP today. The small things that affect quality and reliability have nothing to do with the VoIP service, but everything to do with everything that it takes to accomplish VoIP service.

Increasing Quality

It's the quality of traditional telephone service that sets the expectation for VoIP. With a traditional phone, you can expect to have a clear call every time you pick up the phone. If you don't, it's probably a problem with the wiring, either inside your house or out on the street, and a call to the telephone company will have a repairman out to fix the problem in no time. Just be prepared. Unless you have a wire maintenance addendum on your telephone service, you could pay as much as $75 per hour, plus the cost of materials, to have the telephone company update the wiring in your house. Up to the house, the wiring is the phone company's responsibility, but from the box through the house, it's your responsibility.

VoIP isn't quite that cut and dried. So many things can affect the quality of a VoIP call. One that you've learned about already is the wiring that feeds your Internet connection. If that wiring is old or of low quality, you can expect a low-quality experience with VoIP. This is because VoIP is different from analog. VoIP is much more sensitive than other data services, thus problems with your Internet service affect the quality of VoIP.

Just the presence of VoIP isn't a reason to expect problems, however. In truth, VoIP has the potential to be a much higher-quality service than traditional telephone service, and it's because of that detail that this is possible. What's really created problems within the VoIP industry until recently is immature compression technologies. Compression technologies are what make it possible for a phone conversation to carry from one point to another.

When you speak into a telephone that is connected to a VoIP service, a piece of software converts your voice to data packets. In the process, the software compresses those packets into very small pieces of information that are then transported over the Internet. When the call reaches its destination, the packets are decompressed, meaning that the voice is reassembled to the same "size" that it was before it was converted to Internet delivery.

That compression is just a way of making the audio file size smaller so that it will travel faster over the Internet, but it also codes each of those packets for destination and reassembly. In the past, compression technology wasn't as efficient as it is now. Very often small pieces of a conversation could be lost or corrupted in some way so that the conversation didn't sound the same once it reached its destination.

Today's compression technologies are much advanced over those early attempts to decrease file sizes. The result is better compression that is smarter. For example, every phone call has an amount of white noise in it. White noise is noise, or sounds, that you don't really hear on a conscious level, but they are there. For example, turn on your television but mute the volume. That hum you still hear is white noise; you don't hear it when the volume is on, but it's still there. That type of audio is in every telephone call that you make or receive, you just don't hear it because it's masked by other sounds.

However, some VoIP compression technologies can lessen or even completely remove the white noise that is carried in most telephone calls. The result is much better clarity and call quality when you're using VoIP. Unfortunately, not all VoIP service providers use the same compression technologies, so the sound quality you experience during a VoIP call could vary from provider to provider.

Today's compression algorithms also allow for a certain amount of delay or other difficulties in packet delivery. To compensate for these problems, which manifest as poor audio quality during your call, the compression algorithm overlaps data packets, meaning that a small amount of the beginning or end of each packet is included in the previous or next packet.

This ensures that packets lost, damaged, or delayed during transport don't affect call quality. Those problems still occur; the service just compensates better now than it did in the past.

Some of the other quality issues that you can experience with your VoIP are distortion, or garbled calls, echoes, and dropped calls. Distortion sounds as if you're speaking on a cell phone in a bad signal area. It's caused by a variety of issues, from dropped packets to electrical interference.

Because VoIP uses packet switching to transport calls via the Internet, there are some built-in controls to help decrease quality issues. One of those controls, which is similar in nature to the redundancy in packet information, is packet rebuilding. If a packet is lost or corrupted along the call route, information in the packet envelope (it's like the envelope around the letter, only with packets it's electronic rather than physical) can be used to "rebuild" the data contained in the packet. If packets are lost or corrupted only occasionally, you probably won't ever know there was a problem. However, if a stream of packets is lost, or if chunks of packets are lost, the result is garbled conversation that's difficult to understand.

In all, however, VoIP quality is usually as good as or better than the quality you've come to expect from traditional telephone service. Occasionally events take place that affect the quality of a call, but most of those events are controllable in some way. For the ones that you can't control you have to rely on your VoIP service provider to fix.

What Affects Quality?

Better technology isn't the only way to increase VoIP quality. Some settings, such as the amount of bandwidth that you use for your VoIP service, have a huge impact on the quality of your VoIP calls. If you have the option to adjust bandwidth settings, consider setting them at the highest level. This ensures that you have great calls all the time. Of course, the tradeoff could be that your Internet speeds decrease slightly, but only while you're actively on the phone. When you're not using the VoIP service, there's no impact on your Internet connection at all.

One other issue that could affect the quality of your VoIP calls is the location of your ATA, if you're using one. Electrical interference can create service issues with VoIP, and that interference can be generated by something as simple as having your ATA too close to your Internet router. If you experience quality issues with your VoIP calls, try moving your ATA away from other computer hardware. Even your telephone could interfere with the box, so keep them separate as well.

VoIP equipment is vulnerable to all kinds of interference. In one instance, a VoIP subscriber tried to use VoIP service with a 5.8-GHz telephone system. The customer experienced constant quality issues and suffered through what seemed like endless hours on the phone with tech service until someone mentioned that his phone might actually be the problem. The subscriber tried a different telephone and the quality of his calls immediately improved to better than traditional telephone service. The frequency of the 5.8-GHz phone interfered with the signaling frequencies used by the ATA his VoIP company provided.

Of course, equipment is just one evil among many. The weather can cause problems with your VoIP service, especially if you're in a place that's prone to lose telephone or cable reception during rains or storms. For example, one VoIP subscriber in Mississippi experienced service issues with her ISP every time it rained for more than a few minutes at a time. When she added VoIP service to her setup, the same problems plagued that service. After weeks of headaches and frustrations trying to figure out the problem, the ISP installed new cabling and the problems with both services cleared up immediately. Evidently, the age of the cabling made it susceptible to the moisture.

The quality problems that plague your Internet connection will probably also plague your VoIP connection, only they're likely to be far more noticeable with the VoIP service. Be prepared to meet those challenges or learn to live with them.

So, for example, if your ISP is known for going out of service every time the wind blows, you can expect that your VoIP service will be out of order on the same weather schedule. If, however, you have Internet service that will survive through tornadoes or hurricanes, it's a pretty good bet that you'll

have VoIP service that can survive those same issues. The Internet is the backbone of your VoIP, so expect it to mirror issues that you have with your Internet service.

The quality of today's VoIP service is much improved over the quality of the past. But there will always be some quality issues, just as there are with traditional telephone services. The trick is to keep the quality issues that you can control in order.

Tips for Improving Call Quality

Some quality issues are out of your hands, but you can control some issues. Here are a few things you can do to take control of your VoIP call quality:

- Adjust your bandwidth settings. On your account dashboard you may have a quality control setting that lets you decide the level of bandwidth you want to allot to your VoIP service. In most cases the default setting for that control is mid-level. Try changing the setting to high, to allow for the highest amount of bandwidth to be allotted to your VoIP programs. Then you'll always know that your VoIP service is performing at peak capacity.
- Separate your equipment. When your VoIP equipment is too close to your Internet router, there might be some electrical feedback in the line. This feedback is expressed as call quality issues such as garbled calls, echoes, or dropped call segments. Move your ATA or IP phone out of the vicinity of other computer equipment, especially the CPU (central processing unit) and the Internet router.
- Make sure the phone you use is compatible with VoIP. Some phones have a frequency that interferes with VoIP service. If you have service quality issues, try changing to a different type of telephone before you give up on the service completely. Your quality problems might simply be interference between the phone and the ATA or IP phone.
- Use high-quality broadband Internet access. Your Internet connection is your key to great VoIP service. Make sure that your Internet service operates at sufficient levels to support your VoIP service. If not, consider choosing another ISP or upgrading your Internet account.

Using the tools and capabilities that are available isn't going to ensure that your VoIP service is of the highest quality all of the time; however, it will help you have high-quality VoIP most of the time. Make the adjustments needed to ensure that you've done everything within your control to improve the quality of your VoIP calls. Then it rests on your service provider's shoulders to provide you with high-quality service; all you have to worry about is reliability.

Improving Reliability

VoIP reliability is a lot like VoIP quality in terms of what you can do to ensure that your service is always available to you. There will be times when you have no control over the reliability issues that determine whether or not you have phone service. For example, your VoIP service provider might experience growing pains and during that period there could be issues with the availability of your VoIP service. It doesn't happen often, but with the growth in the industry, it's not entirely unbelievable.

Software or hardware upgrades or feature additions can also cause hiccups in the reliability of your service. Usually, the reliability issues are short lived and you may not even know there has been a problem since most technology vendors upgrade their services during the early morning hours when the fewest users will be affected.

There are also security issues, which you learn more about later in this chapter. Electricity can be a reliability issue, and many other factors affect your VoIP service as well. The problem is that many of those factors are completely out of your control. The solution is to make the adjustments you can and depend on your ISP, VoIP service provider, and electric company to do the rest. It's not a foolproof solution, but until the industry reaches full maturity, it's about the best that you can do.

Improving VoIP Reliability

The issues that can affect VoIP reliability are as widely varied as the issues that affect the quality of the service, but in general they fall into two

categories: hardware or software. For example, Jim had a great VoIP service until the company he chose to provide the service went through a sudden growth spurt.

Then for about two months, it seemed like every time that Jim picked up the phone the service was unavailable. Or if it was available, the calls were garbled or riddled with annoying echoes. The sudden growth in the number of customers forced the company that Jim chose for his VoIP service to upgrade some equipment and software and during the upgrade, the quality and reliability of the VoIP service wasn't up to standard.

Within a couple of weeks, when the upgrades to the system were complete, Jim's service was back to normal. The time during the upgrade had been frustrating, but it ended relatively quickly and after the upgrade, Jim's service was better than it had ever been.

As with Jim's problem, there are some hardware and software issues that you just can't control. Another problem you could face, for example, is blackouts. If your power blinks in and out during storms, or even just a good stiff breeze, you'll experience frequent outages or garbled calls with your VoIP service. Although there's nothing you can do about the factors outside your control, it might not be a bad idea to take some time to ensure that the wiring that carries your Internet connection is in good shape.

It also helps to have a battery backup system if you expect that you'll have frequent power problems. Most battery backup systems last for around two hours and cost between $100 and $300. But if your phone service is essential or if you live in an area where electrical wiring is unstable, the cost is justifiable.

Connecting the battery backup system is easy. You simply plug it into the electrical outlet and then plug the power connections for all of your equipment into the battery backup. The systems recharge themselves when you have electricity, so there are no replacement batteries or other charging worries for you to think of.

Faulty equipment will cause poor service reliability as well. Occasionally the ATA or IP phone that your service provider sends you (or that you purchase separately) has technical problems. It might not work properly or over time

it may become less than stable. The result is service that's low quality or no service at all. Replacing the ATA should bring your service reliability up to expected levels. Of course, this isn't a problem with a softphone.

The only hardware problem that you might experience with a software-based phone such as a PC-to-PC phone or softphone is in the internal workings of the computer—the soundcard, speakers, or microphone—or with the multimedia headset that you use. If you plan to use a multimedia headset, choose one that is high quality. You'll probably pay a little more for it—$30 to $50 is not unreasonable—but the increased quality and reliability of your conversation will be worth it.

The other reliability issue that you may have with software-based phones is in the software. The simple fact that software-based phones are software-based means they are subject to the same issues that other software programs might have: corruption, accidental deletion, viruses, and those always-fun unknown errors.

Use the same precautions that you use with any other type of software:

- Don't delete files unless you know what they do.
- Set up and schedule regular maintenance routines for your computer.
- Protect your files from viruses and other security threats with security technologies such as firewalls, anti-spam, and anti-spyware programs.

Security is probably the greatest threat to your VoIP service. To date, there have been few security attacks on VoIP. Viruses, Trojans, and denial of service (DoS) attacks have been limited. However, as more and more consumers and businesses implement VoIP services, security threats will certainly become more of an issue.

Securing It All

Security with traditional telephone service has never been too much of an issue. Yes, you have to be careful of the occasional telephone scam, and for a while the practice of slamming—switching your long-distance carrier without your permission—was a problem, but that's really about as bad as

security threats with traditional telephone service ever got. VoIP service has the potential to be a whole different story.

VoIP service is very much like e-mail. Packets of data are carried over the Internet from one place to another, and IP addresses are used as roadmaps for those data packets. So, it's not too much of a stretch to conjecture that VoIP is subject to the same threats as e-mail—viruses, Trojans, spoofing, and even spam. But, it's not conjecture. It's truth. VoIP is subject to all of these threats and more.

Fortunately, to date there have been few security issues with VoIP. This is because there have been few VoIP subscribers, so the payoff for a criminal or hacker isn't nearly appealing enough for them to target VoIP systems.

Now the number of VoIP subscribers is growing at an astronomical rate, and the payoff to hackers and criminals to gain access to these systems is gaining value every day, so it's likely that hackers will soon have VoIP in their sights. When that happens, the small number of security threats that plague VoIP today will grow exponentially. And many VoIP service providers aren't prepared to defend their services.

VoIP is such a new service, and it's taken off so quickly, that most service providers just didn't think far enough in advance to protect their customer base. So now, those service providers are faced with exponential growth, and industry analysts are examining their services with high-powered magnifying glasses. What they're finding is that VoIP service providers have few, if any, security controls in place.

By itself, that's a problem. But it's a problem compounded when you take media coverage of the lack of security controls into consideration. Hackers aren't pasty-faced kids sitting in a back room, playing with the computer because they have nothing better to do. Today's hackers are intelligent, motivated people with more knowledge than they've ever had in the past. Not only that, they're well informed. They read newspapers, watch the news, and follow all of the technology publications closely. And they're always looking for new ways to gain access and make more money.

What that means is that those hackers are being challenged. Articles and news stories that outline the security risks of VoIP only drive hackers to commit more crimes. If you want to know where a vulnerability is, watch the news. You'll probably find it without much effort at all.

So, hackers are catching on to the vulnerability of VoIP, and the size of the VoIP market is growing so rapidly that suddenly, VoIP companies and their customers are worth going after. There's money to be made, and hackers have been told that that money can be made by going after VoIP. So naturally, that's where those hackers set their sites. The problem is small at the moment, but it's just a matter of time before it becomes very large.

What Are the Top VoIP Security Concerns?

Numerous threats to VoIP exist, and most of those threats are the same threats that face e-mail users. Hackers want to gain something from you, and they'll use whatever means they can find to get it. Here are some of the ways they do it:

- **Eavesdropping:** Eavesdropping is relatively easy with VoIP, because it uses packet switching to transport voice data over the Internet. Just as hackers can intercept e-mail messages, they can also intercept voice data that is transported in packets. It's easy for hackers to tap into your conversation. But why would they do that? Simple. How often do you give out your credit card number or Social Security number over the phone? What about other sensitive information? It takes a good criminal only minutes to learn all he needs to know to take over your life with nothing more than your name and Social Security number. And even without the Social Security number, a criminal can gain access to your personal records. Once that happens, he can use your good name in any way that he wants.
- **Clipping:** Clipping is the loss of the beginning or ends of words; they are "clipped" short. Hackers trying to stir up trouble can artificially induce clipping in VoIP calls by targeting your cable modem with high levels of traffic. The result is that words are cut short. The threat is that clipping is the first step in a denial of service attack.

- **Denial of service (DoS) attack:** A denial of service attack is a technique used by hackers to prevent you from accessing your VoIP service. The attack can be conducted in one of two ways: against you or against your service provider. Most attacks happen when hackers flood your equipment or the service provider's equipment with more requests than the equipment can process. When this happens, the equipment shuts down, resulting in a service shutdown. Hackers perform DoS attacks as a nuisance (usually against companies that they feel deserve to be harmed) or to gain control of the equipment so that they can use those resources in some other criminal activity.
- **SPIT:** SPIT is spam over Internet telephony. Envision your VoIP service being targeted by the same number of spam e-mails that you get in any given day. This is SPIT, and it's one of the greatest security concerns in the VoIP industry, because service providers aren't prepared for it and it has the potential to be a tremendous problem. Automated software programs can send out as many as 1000 advertisement e-mails each *minute* over VoIP. Those services are generally restricted to use by organizations for emergency purposes only, but it's only a matter of time before hackers get their hands on one of these programs (or design their own). Can you imagine having to wade through thousands of voicemails each day (or even each hour)? This is what SPIT can do to your VoIP service. In effect, SPIT can render voicemail useless.

  SPIT also has the potential to completely shut down a VoIP service. Most services are not equipped to deal with thousands of voicemails per minute. And an industrious hacker could use the software to send those voicemails to thousands of mailboxes, simultaneously. If a VoIP service provider were to be hit with this type of attack, it would quickly overwhelm their resources and the result would be a shutdown in service. SPIT is also called *V-Bombing.*
- **Caller ID spoofing:** Caller ID information is a valuable tool to marketers. It's also a valuable tool to hackers, and given the opportunity to capture and use your caller ID information, they will. One way that they may use it is to *spoof* other caller ID information. Spoofing is replacing a legitimate piece of information with an incorrect piece of information that looks legitimate. So, a hacker could capture someone's caller ID

information, then intercept incoming caller ID information to your phone and replace it with the captured information. For example, John Hacker could call your telephone number from his home phone while his brother, Phil Hacker, spoofs caller ID information to replace his brother's information. So, when the call registers on your caller ID, you might see City Bank and Trust rather than John Hacker. Then John could proceed to con you into giving out private information, which he would resell to the highest bidder. Caller ID spoofing seems inconsequential, but in truth it could cost you your identity.

- **Pharming:** Pharming as it applies to VoIP is when hackers hijack a DNS server and redirect VoIP calls to a different IP address. So, for example, if you call your credit card company, a hacker could successfully redirect your call to another IP address. Then a person pretending to be with your credit card company would answer the phone and before you finished the call, you will have given them all the information that they need to take over your credit card account. The worst part is that you probably won't know anything about it until your account has been charged to the limit. Even then you probably won't know how the criminals got your account information.
- **Viruses and Trojans:** Just as hackers can send viruses and Trojans to cell phones and Instant Messages (IMs), they can send viruses and Trojans to VoIP calls, as well. VoIP calls travel over the Internet, using the same mode of transportation that e-mails and IMs use. It's no stretch for a hacker to send a virus or Trojan to a VoIP account. Once there, the virus or Trojan can be used to launch a SPIT attack from your service, or to bring a group of VoIP systems together to launch a DoS attack against any number of companies or individuals. These bugs function just as they would in e-mail. If you receive an e-mail virus, it automatically replicates itself and sends itself out to everyone in your address book. A VoIP virus could do the same. If you receive a Trojan in your e-mail, it can plant itself on your hard drive and turn your computer to a *zombie*, which it uses as a *node*, or connection point, to help launch a denial of service attack. The same thing can happen with VoIP, only your ATA becomes the node instead of the computer.

It may be a small problem right now, but security is a future threat for VoIP, and unless something changes now, it's likely to be a large and complex threat. Hackers will use any method they can to steal information or disrupt your service if there is something for them to gain from it. For some, the reward is money or purchasing power if they can gain access to your personal financial information. For others the reward is status and reputation. Whatever the reward, though, hackers have the tools necessary to attack VoIP, and as more and more telephone users become VoIP subscribers, those hackers will turn to VoIP, because there's territory to explore and money to be made.

However, it's important to emphasize the fact that as of yet there have been no real attacks against VoIP. In fact, some industry analysts say that security threats to VoIP have been greatly overexaggerated. Have they? Only time will tell, and in the meantime, it never hurts to protect yourself.

How to Protect Your VoIP Connection

So, how do you protect your VoIP connection from the wolves at the door? In truth, most of your protection has to come from your VoIP service provider. And although they're scrambling now to get security precautions into place, most of them just aren't ready if an attack happens right now.

That's going to change over time, but until security becomes an industry standard, you should ask any service provider you're considering about the security protection that they offer. The following are some of the technologies that a service provider should have in place:

- **Encryption:** Encryption is a method of securing information, data packets in the case of VoIP, by changing the information to a format that is unreadable without a key to decode the information. Your VoIP service provider should have some method of encryption in place to protect your information as it travels from one destination to the next.
- **Authentication:** Authentication is the practice of verifying that the party sending information and the party receiving information are

truly who they are supposed to be. Few VoIP providers, if any, have authentication technologies in place. However, authentication is a key to ensuring the best possible security.

- **Firewalls:** A firewall is a piece of software that creates a protective barrier between you and hackers or other criminals. Firewalls can be built into hardware; for example, some Internet routers have built-in firewalls. Or a firewall can be a separate piece of software that you install on your computer. Your VoIP service provider should have firewalls installed on the equipment that routes your VoIP call, but you should also have a firewall installed on your computer.

Some security responsibility falls to the service provider, but as you saw in the preceding list, some security responsibility falls on your shoulders as well. Make sure that you have the proper security technologies installed before you begin using your VoIP service.

A firewall is a must. It's essential that you have some form of protection in place, and a firewall is the best first step that you can take. However, be careful of your firewall, because it can cause conflicts with your VoIP service. It may be necessary for you to change your firewall settings to allow the traffic that your VoIP service creates.

In most cases your firewall will automatically detect your ATA, IP phone or software-based phone, and make the correct adjustments so that traffic can safely pass in and out of the firewall. But there are instances where your firewall will block your VoIP traffic. If you encounter such a problem, use your firewall's documentation to change your firewall settings to allow VoIP traffic.

Security in VoIP hasn't been much of a problem yet. However, as more and more people turn to VoIP to cut the costs on their telephone bills, it's likely that hackers will see VoIP as another avenue to gain access to personal and confidential information. Use the same security precautions that you would use for e-mail or Internet usage, but don't be afraid of VoIP. The instances of security breaches in VoIP are miniscule. Good security practices should keep it that way.

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CHAPTER

Potential Challenges

Where there is technology, there is the potential for challenges with that technology. VoIP is no exception to that rule. It's like Murphy's Law for computers—if technology is involved, tech support will be, too!

Generally, VoIP is easy to connect. The connection process should take about 15 minutes (or less), and is just a matter of connecting a few wires to a few boxes. Software is easy, too. Fifteen minutes from download to first use is a reasonable expectation. You may have to make a few adjustments and tweak a few settings here and there, but getting your VoIP set up so that you can make calls should be easy.

Should is the operative word. Occasionally you may experience some difficulties with your VoIP service. Whether those difficulties are in the service, the connection, or the settings, they can happen. The rest of this chapter is dedicated to some of the most common problems that occur with VoIP service.

Common Connection Problems and How to Solve Them

Connecting your VoIP is relatively straightforward. If you're using a VoIP service to replace your traditional telephone service, you should connect your ATA to your broadband router and to the telephone that you want to connect to it. Turn the ATA and the broadband router on, give it a few minutes to boot up completely, and you should have service. That said, once in a while the configuration requires a little tweaking. Here are some of the most common problems you may encounter:

- *I have no dial tone.* If you have no dial tone, your equipment might not be connected correctly. Check your connections to be sure that everything is hooked up properly. If all of the connections are correct, try rebooting your ATA. To reboot the ATA, disconnect the power from it, wait 15–20 seconds, and then reconnect the power. After you reconnect the power, wait at least five minutes before trying to make a call. The ATA needs that time to fully reboot. If that doesn't work, check the cords you're using for your connection and check that your phone is set to tone dialing rather than pulse.
- *I have a dial tone but I can't make a call.* If you have a dial tone but you can't make a call, the problem might be in your Ethernet cable. Try replacing the Ethernet cable between the broadband router and the ATA.
- *I can't receive calls.* If you can't receive calls, your ATA may not be able to register with the proxy server. Reboot your ATA and wait for at least five minutes after you plug the power back in for the ATA to completely reboot. This should reset the ATA so that it does register with the proxy server.
- *There's no power to the ATA.* No power going to the ATA could be the result of a faulty power cord or a faulty outlet. Check the outlet to be sure there is power flowing through it by plugging in a different device. If you have power flowing through the outlet, the problem is in the power cord and you need to replace it.

- *Everything's connected properly, but I still can't complete calls using my VoIP service.* You may be experiencing a problem called *Network Address Translation (NAT) Transversal.* NAT is a technology used by firewalls and routers to allow several devices on a network with private IP addresses to share a public IP address. It does this by masquerading the device's IP address. The result is that VoIP packets are improperly routed, so that it seems that your call is going through, but then on connection the call is shut down completely. If you use a device that has NAT capabilities, use the device's documentation to adjust settings to allow VoIP traffic.

These are some of the most basic and frequently experienced problems that you might have with your VoIP service. You could experience other problems, so familiarize yourself with your VoIP service provider's technical assistance features. Some companies offer only telephone support if you have a problem. Be prepared to spend a long time on the phone waiting for assistance. It's not unusual for a VoIP company to have wait times that exceed a half-hour.

To help alleviate some of these wait times, many VoIP companies also have self-help features like Frequently Asked Questions (FAQs), knowledgebase databases that you use to select the problems that you are experiencing and are taken to an answer. Some may even have message boards where you can discuss your problem with other users that have experienced the same problem.

In some cases, your VoIP company might have an online tech support feature that uses instant messaging or chat technology to provide technical support in real time. These Internet-based technical support programs are useful because you're not stuck on hold forever. It could take just as long to get support via the Internet, however, so be prepared to spend some time waiting.

If the problem that you're having is not in the hardware that connects your VoIP, it might be a configuration or setting error. Read on to learn how to correct some of the most common configuration and setting errors.

Common Configuration Errors

Because VoIP is relatively easy to set up, many of the problems you encounter could be in the software that powers the VoIP service. Configuration and setting errors can lead to low-quality calls or no service at all. Here are some of the most common problems that you might encounter:

- *There's an annoying echo in the line when I make a call.* There are two types of echoes that you could experience in your VoIP service (or traditional phone service for that matter). They are *sender echo* and *receiver echo.* Sender echo is when only you, as the person making the call, can hear the echo, but the person on the other end of the line cannot. Receiver echo is when the person you are calling can hear an echo, but you cannot. Regardless of who hears the echo, it's an annoyance.

  Echoing can be caused by a number of factors, some that are out of your control. If you're experiencing an echo in your calls, it could be the result of feedback from your telephone equipment. Try changing telephones or reducing the volume on the phone you're using. It's also possible that the echo is caused by latency, or delay in the delivery of voice packets. To decrease latency, change your software settings to allow for more bandwidth usage, if possible.

- *The beginnings and endings of my words keep getting cut off.* Clipping, when the beginnings and endings of words are cut off, can be caused by two things—either incorrect sound settings or hackers trying to crack your system by assaulting your broadband router. To correct this problem, try increasing the quality of your sound settings or reducing the volume of your phone. If these tricks don't work, then disconnect your broadband router, leave it disconnected for at least five minutes, and reconnect it. Disconnecting the router will deter hackers by making it unavailable. When their target disappears, they'll move on to someone else.

- *Conversations sound choppy, garbled, or hollow, like I'm talking in a long tunnel.* Poor sound quality could be the result of several different things. It may be that other electronic devices near your ATA are causing interference. Try separating your broadband router, ATA, and telephone to see if that clears up the problem. If it doesn't, it's possible that there's not enough bandwidth in your Internet connection to support both your VoIP service and whatever other activities are taking place at the same time. For example, if you're downloading files or playing a bandwidth-hogging game, those activities could affect the quality of your call. Stop all other activities to see if it clears up the problem. If so, you may need to find a higher bandwidth Internet service, or change the settings on your VoIP service to give more priority to the bandwidth needed by the VoIP than by the other activities.

  If none of these solutions fix your problem, it's possible that there are problems with the cables and lines that connect your VoIP or broadband service. Replace your cables and wiring.

- *There's always static or buzzing in the line when I'm on the phone, whether I make or receive the call.* Static or buzzing in the line might be caused by your telephone. The newer 5.8-GHz phones on the market tend to create some electrical feedback that interferes with VoIP service. Replace the phone with one that is 2.4 GHz, and your problem should be solved.

- *When someone tries to call me, they are directed straight into voicemail.* If you have a dial tone but your calls are going straight to voicemail, your VoIP account is probably set to Do Not Disturb. Use your account control panel or dashboard to turn off the Do Not Disturb feature.

- *My power went out and since it came back on I've had no VoIP service.* The power outage may have created an error in your ATA. Reboot the ATA by turning the power off for at least 15 seconds and then turning the ATA back on. Wait at least five minutes before trying to make a call to give the ATA time to reboot and connect to the network completely.

Any number of factors can affect your VoIP service quality. The problems in the preceding list are just some of the most common problems that you might encounter. If you're having a problem that isn't listed here, check your VoIP service provider's Web site for a solution. If there's no solution listed there, you might need to give them a call to get the help you need. Just be prepared—you could spend a long time on hold waiting for a technical support agent to come on the line.

Equipment Incompatibilities

As you've already seen, the equipment that you use to connect your VoIP service might not play well with others. If you're having service problems, check the equipment first. It may be that your broadband router doesn't like your ATA. Or perhaps the ATA doesn't like the phone.

It could also be that your equipment is just too close. All electronic equipment emits some electrical signature. That signature might be interfering with the other equipment, so separate all of the hardware pieces that make up your network and VoIP service. Then move your phone away from all of that, too. It's likely that the simple act of rearranging the proximity of the equipment will solve most of your quality issues.

One other problem you might encounter with equipment is that it's programmed to lock out all but one service provider. What this means is that you won't be able to use that equipment with any other service provider. It's a marketing gimmick that's caused some customers and even some service providers to turn to legal means to have it corrected. Essentially, the service provider has the equipment programmed, usually through a partnership with the manufacturer, to only work with that company's software.

The result of the legal skirmishes over equipment locking is that some companies have begun to offer "unlock" services. For a fee, the service provider unlocks the equipment so that it's usable with other service providers. The fee is usually about $15 to $25, but it can be more, and it might take a few days for the change to take place.

VoIP service is no different than traditional telephone service. Any number of small, minor occurrences and events can create quality problems that aren't so small, especially if those problems seem to drag on forever without any solution. Be patient. You will find a solution. It might take a few days or several attempts to fix the problem working with the technical support group at your VoIP service provider's call center, but eventually you'll get the problem fixed and when you do, you'll have VoIP service of equal or higher quality than your traditional phone service.

There are still some bugs in the system, but they're being worked out very quickly. It won't be long before you're telling your kids and grandkids about having to make a telephone call that was delivered over wires that stretched around the world. Those kids will look at you in amazement that anything as ridiculous as that could ever happen. Technology, as they say, marches forward at an ever dizzying pace.

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GLOSSARY

Jargon Buster!

802.11a: A wireless networking standard that uses the 5-GHz band to transport wireless signal.

802.11b: A wireless networking standard that uses the 2.4-GHz band to transport wireless signal. However, 802.11b transports signals much slower than 802.11a or 802.11g.

802.11g: A wireless networking standard that uses the 2.4-GHz band to transport wireless signal. 802.11g transports signals much faster than 802.11b, but is compatible with 802.11a.

Activation Fee: A fee, charged by a service provider, before the service provider will grant service to any consumer.

Analog Telephone Adapter (ATA): The ATA is a device that allows you to connect a standard phone to your computer or your Internet connection for use with VoIP. It's an analog-to-digital converter that takes the analog signal from your traditional phone and converts it to digital data for transmission over the Internet.

Authentication: Authentication is a way to ensure that users are who they claim to be. Various methods might be used to verify the identity of the user.

Bandwidth Overhead: The amount of bandwidth needed to operate the Internet connection.

Bluetooth: A protocol used in wireless devices to allow those devices to connect to Bluetooth-enabled wireless networks.

Broadband: Data transmission where multiple pieces of data are transmitted simultaneously to increase the effectiveness of a network connection. In respect to the Internet, an Internet service that operates much quicker than dial-up Internet service.

Broadband Clocker: A tool used to measure the speed of your Internet connection.

Broadband Router: A special type of modem that directs an Internet connection over the infrastructure used to provide cable television. May also be a special type of modem used to access the high band of a telephone line.

Cable Internet: An Internet connection that uses a broadband router to access the Internet via the cable telephone infrastructure.

Cable Triple Play: A bundle of services that may be offered by your local cable company that includes broadband Internet service, cable television service, and VoIP.

Call Blocking: The ability to keep a call from ringing through based on the telephone number.

Call Filtering: The ability to sort through telephone calls based on the caller ID information.

Call Forking: The ability to direct a telephone call to another number or multiple numbers based on the caller ID information.

Call Forwarding: The ability to direct a telephone call to another number based on the caller ID information.

Call Logs: A list of incoming and outgoing telephone calls by number, owner, time, and date.

Call Return: The ability to return an incoming call by dialing a special two- or three-digit code rather than the full telephone number.

Call Transfer: The ability to pass a telephone call from the phone on which it was originally received to another phone with a different telephone number.

Call Waiting: The ability to see an incoming call while you're on the phone with another person. Rather than receiving a busy signal, the call is announced to you by a tone that interrupts your existing telephone conversation.

Caller ID: A collection of information that includes the telephone number and who owns the number. This information is displayed on telephones that have caller ID capabilities and the caller ID service installed.

Caller ID Spoofing: The practice of stealing someone's caller ID information and using it to replace another person's caller ID information so that the original caller cannot be identified.

Circuit Switching: A communication system that establishes a dedicated channel for each transmission. POTS uses circuit switching. Dedicated channels with this type of communication system means strong reliability and low latency, but only one type of communication can use each channel at any time.

Clipping: The loss of speech signal components, resulting in the dropping of the initial or end parts of a word or words.

CODEC: A device or program capable of performing transformations on a data stream or signal.

Communications Assistance for Law Enforcement Act of 1994 (CALEA): A piece of legislation that makes it mandatory that telecommunications companies assist law enforcement agencies in the interception of call information.

Compression: The process of making a packet of data smaller by compressing it into a smaller format.

Connection Speed: The speed with which your computer connects to the Internet.

Convergence: A coming together of all of the different types of communication using a single network, such as the Internet, as a transport mechanism for those different types of communication.

Dashboard: The control panel for your VoIP service, usually found online at the service provider's Web site.

Data Port: A connection point along a network or on a network device.

Deactivation Fee: The fee that your VoIP service provider charges if you decide not to keep their service.

Decompressed: To remove the compression used to make data smaller so that it will travel across a network faster. To decompress the information, there must be a key to decode the method used for compression.

Denial of Service: An attack on a network that causes the loss of service. Loss of service is accomplished by overwhelming the network with requests. Once overwhelmed, the network will simply shut down, creating a denial of service to any user trying to access the network.

Device Control Protocol: A communications protocol designed to control the devices used to communicate.

Dial-up Internet Access: Internet access that is accomplished by connecting a computer to a telephone line and calling into the Internet. This type of Internet access results in extremely slow access to information on the Web.

Digital Signal Processors (DSPs): All digital audio systems use DSP technology in order to differentiate between signal and noise. In telephone communications, too much noise creates problems in maintaining connections and in VoIP systems, the DSP component provides features such as tone generation, echo cancellation, and buffering.

DNS: A system that stores information about the domain names on the Internet. It provides IP addresses for each machine located on the Internet.

Do Not Disturb: A function that prevents your telephone from ringing when you have the Do Not Disturb feature enabled. If someone calls while this feature is active, they are put straight into voicemail.

Digital Subscriber Line (DSL): A high-speed Internet connection that travels over copper telephone lines. DSL uses the high band of the copper wire, leaving the low band free for telephone calls.

E911: Enhanced 911 services. Enhanced 911 services are emergency services that make it possible for emergency services operators to know where you are located even if you cannot tell them in an emergency situation.

Eavesdropping: Listening in on someone else's conversation. In VoIP eavesdropping is accomplished by decoding and listening to packets of data as they pass through a point on their way to their final destination.

Encryption: The process of encoding information in a format that is unreadable without a key that will decode the information. Keys are typically only available to authorized users.

Endpoint Protocol: A protocol that controls the termination points in a communications network.

Ethernet: A computer networking technology for local networks. May also refer to the type of cabling used to network together multiple computers or devices.

Frequently Asked Questions (FAQs): A listing of questions that are most frequently asked by users of a technology or software and their associated answers.

Federal Communications Commission (FCC): An independent government agency that regulates interstate and international communications by radio, television, wire, cable, and satellite.

Firewall: A software program or hardware device used to prevent access to a computer or network by unauthorized users.

Full Duplex Sound Card: A sound card that can carry information in two directions. Most sound cards today are full duplex.

Gatekeeper: A gatekeeper provides address information and translation to other applications accessing a specific technology or application. The gatekeeper may also prevent access of an outside user based on authorization protocols.

Gateway: In VoIP systems, a gateway is a network device that converts voice and fax calls in real time from a Public Switched Telephone Network (PSTN) to an IP network. A gateway can also convert calls between branch offices to VoIP so they can travel over the Internet.

Gigahertz (GHz): A measure of frequency.

H.225: A substandard of H.323 that establishes, controls, and ends a call using the H.323 protocol stack.

H.235: A substandard of H.323 that covers security and encryption for calls using the H.323 protocol stack.

H.245: A substandard of H.323 that directs the travel of data packets for calls using the H.323 protocol stack.

H.323: The standard call protocol stack for voice and video conferencing over LANs, WANs, and the Internet, allowing these activities on a real-time basis as opposed to a packet-switched network. Initially H.323 was designed to allow multimedia function over unreliable networks. It is the oldest and most established VoIP protocol.

Industry Standards: A group of standard operating procedures tested and approved by a governance group within a given industry.

Instant Messenger: An application that allows text communications between two or more people over the Internet.

Integration: The state of combining all of the technologies of a given type.

International Call Block: A service that allows for international telephone calls to be blocked, meaning that they cannot be called from the telephone with the International Call Block activated.

Internet Phone: A telephone that is specially designed to be used with VoIP and the Internet.

Internet Telephony: See Voice over Internet Protocol.

Interoperability: The ability of various disparate systems to work together regardless of manufacturer, operating system, or other technological constraints.

IP Address: A unique number used by computers to refer to each other when communicating via the Internet. Also the location of a machine on the Internet.

IP Phone: See Internet Phone.

IP Telephony: See Voice over Internet Protocol.

Internet Service Provider (ISP): The company that provides your access to the Internet through its hardware and software interface.

Jitter: A variation of signal characteristics that creates a disturbance in the quality of a call, usually in the form of garbled or missing audio.

Kilobytes Per Second (Kbps): A unit of measurement for the speed of data transfer.

Latency: The time it takes for a packet of data to travel from its point of origin to its destination. In telephony, the lower the latency the better the communication. Latency has always been an issue with telephone communications taking place over an exceptionally long distance. With VoIP, latency takes on a new form because of the splitting of message into packets and the network delays that can occur.

Legacy Communications Systems: A communication system based on the technologies of the public switched telephone network.

Local Number Portability: The ability to take a telephone number that belongs to you to another telephone service provider, whether that provider is a wireline telephone company, a wireless telephone company, or a VoIP telephone company.

Media Gateway Control Protocol (MGCP): See Media Gateway Controller.

Media Gateway Controller (MEGACO): A signaling protocol that allows the transmission of voice, fax, and other multimedia data between the Internet and the PSTN.

Multi-handset Telephone System: A telephone system that uses a single connection to the base unit to provide telephone service to multiple handsets.

Multimedia Headset: A computer headset that includes both speakers and a microphone in a single unit.

Multimedia Terminal Adapter (MTA): See Analog Telephone Adapter.

Multiple Telegraph: A telegraph design being developed by Alexander Graham Bell when he developed the telephone. The telegraph design would allow multiple messages to be transmitted via the same telegraph line using harmonic frequencies.

Multipoint Control Units (MCU): See Gatekeeper.

Naked DSL: A DSL line that is not attached to any specific telephone number and therefore doesn't require telephone service to remain active.

Network: A system of interconnected computers, for example, the Internet.

Network Address Translation (NAT): A technique in which the source or destination of IP packets are changed as they pass through routers or firewalls, usually to allow addresses on a private network access to the Internet via a single, public IP address.

Number Portability: See Local Number Portability.

Packet: A small unit of data.

Packet Switching: A communication system that chops messages into small packets before sending them to their destination. All packets are addressed and coded so they can be reassembled at their destination. Each packet can follow its own path and therefore can work around problematic transmission segments.

Packetized Communications: See Packet Switching.

PC-to-PC VoIP: VoIP service that connects callers together as long as both the caller and the receiver are using a computer with the same VoIP software installed.

PC-to-Phone VoIP: VoIP software that allows anyone to use their PC to call any other telephone, whether a VoIP or traditional phone.

Pharming: The exploitation of a vulnerable DNS to redirect Internet and voice traffic to a different location without the user's knowledge of being redirected.

Pocket PC: A handheld computer, similar to a personal digital assistant, but with much of the functionality of a full-size computer.

Point of Presence: An Internet exchange point.

Porting: Moving your existing telephone number to a different telephone service provider.

Porting Authorization Code: A code issued by your existing telephone service provider that is used to tell your new telephone service provider that it is okay for you to move your telephone number to the new service provider. A porting authorization code will not be issued if there are outstanding bills that have not been paid or pending services being added or changed on an existing telephone line.

POTS (Plain Old Telephone Service): Nothing more than a standard telephone line, the kind that you've probably used all your life.

Protocol: A rule or guideline for how a specific activity should take place. In VoIP a protocol is the guideline for how VoIP service is provided.

Public Switched Telephone Network (PSTN): The international telephone system based on copper wires carrying analog voice data from one destination to the next. The network of wires, signals, and switches that lets one telephone connect to another anywhere in the world.

Real-time Billing: The ability to view your telephone bill and see every transaction on the bill as it happens.

Real-time Streaming Protocol (RSP): A protocol used to define how streaming media should behave.

Real-time Transport Protocol (RTP): RTP controls the transmission of packets of data that demand low latency. It also supports real-time transmission of data over IP networks and streaming as one means of delivery.

Receiver Echo: An echo that only the person receiving a telephone call can hear.

Repeat Dialing: A method of redialing the last number dialed until the call either goes through or until a specified amount of time has expired.

Resource Reservation Protocol (RSVP): A protocol that guides how information is passed from one server to another as it makes its way from initiation to destination.

Ring Lists: A service that allows you to designate which phone numbers or groups of phone numbers an incoming call should ring at in the event that the number called is not available.

Router: A computer networking device that sends packets of information toward their final destination.

Scalability: The ability of an application or program to scale to meet the need of as many or as few users as are trying to access the application or program at any given time.

Sender Echo: An echo that only the person making the call can hear.

Sessions Announcement Protocol (SAP): A protocol for broadcasting session information for sessions with multiple destinations.

Short Messaging Service (SMS): A service that allows short text messages to be sent back and forth between users.

SIP (Session Initiation Protocol): A communication protocol that operates similarly to H.323, but is less complex and more Internet and Web friendly. It is fully modular and designed from the ground up for functioning over IP networks.

Skinny Client Control Protocol: A signaling protocol that allows for efficient communications with the Cisco Call Manager.

Slamming: The practice of switching a telephone user's long-distance carrier without their knowledge.

Softphone: A software application that gives you the ability to make and receive calls over the Internet using your PC and a multimedia headset or microphone and speakers. A softphone's interface can look like a traditional telephone dial pad or more like an instant messaging client.

SPAM: Unsolicited bulk electronic messages, usually advertisements.

SPAM Over Internet Telephony (SPIT): Unsolicited bulk electronic messages that are targeted to VoIP users.

Trojan: A specialized computer virus that is planted in a manner that is undetected. Once planted, the Trojan carries out a specific function like sending out e-mail, opening a gateway for a hacker to enter your computer system, or some other damaging activity.

Universal Service Fund: Legislation that requires that traditional telephone service be available to everyone, no matter what their income level.

V-Bombing: See SPAM Over Internet Telephony.

Virtual Number: A telephone number that doesn't really exist. Instead, the number rings on your main telephone line.

Virus: A self-replicating program that inserts itself on your computer hard drive and causes damage or deletes files.

Voice over Internet Protocol (VoIP): A telephone service that uses the Internet to transport your telephone conversations from one destination to another.

Voice over Wireless Fidelity (VoWiFi): VoIP that takes advantage of a wireless network connection to enable telephone calls.

Wireless Fidelity (WiFi): A set of wireless compatibility standards that guide how cellular phones and wireless devices access wireless networks and the Internet.

Wireless Network: A network over which all of the components of the network connect wirelessly.

A

APPENDIX

Frequently Asked Questions

New technologies come with lots of questions. Here's where you can find the answers to some of those questions. What follows are some of the most frequently asked questions about VoIP.

Basics

What is VoIP?

VoIP stands for Voice over Internet Protocol. VoIP is a category of hardware and software that allows people to make phone calls that use the Internet instead of the public telephone network to transport call data from location to location.

What is PC Telephony?

PC Telephony is another term for VoIP. However, PC Telephony specifically refers to PC-to-PC VoIP.

How can I use VoIP?

Calls using VoIP technology can be made using computers only, specialized phones, or normal phones with a specialized analog telephone adapter (ATA).

How does VoIP work?

VoIP uses packet switching technology to transport calls over the Internet. Packet switching involves converting voice data to small packets of information that are coded with compression and decompression information as well as routing and reassembly instructions. The packets are then sent over the Internet to their destination where they are decompressed and reassembled into voice data again.

What advanced features can I get with VoIP?

The savings offered by VoIP is not the only reason that VoIP is so popular. Because the technology for VoIP is more advanced than the technology used for traditional telephone services, advanced features are enabled. Some of those features include:

- Virtual numbers, which are numbers that ring on your line but are located in another city that has a different area code.
- Call filtering, which allows you to deny calls that are identified as Unknown Name, Unknown Number.
- Call hunting, which allows you to have incoming calls ring additional numbers if you don't answer at your home phone number.
- Enhanced voice mail, which you can access using the Internet, or even have forwarded to your cell phone.
- Conference calling with up to ten other lines, depending on your service provider.
- Do Not Disturb, which allows you to keep calls from ringing through when you don't want to be disturbed.

What VoIP service plans are available?

Service plans differ from provider to provider; however, you can expect to find service plans that might be structured like the following:

- **Unlimited Calling Plan:** Usually unlimited calling to both the U.S. and Canada, includes both local and long distance. With an unlimited calling plan, the only additional per-minute fees that you might be responsible for are international calls.
- **Predefined Usage Plan:** A predefined usage plan usually includes your local and long-distance calling for a specified number of minutes (usually 500 to 1000 minutes per month). If you need more minutes, the per-minute fee is $0.02 to $0.07.
- **Limited Unlimited Plan:** A limited unlimited plan usually includes unlimited calling to anyone using the same VoIP service, whereas calls to those who don't are billed at a per-minute rate.
- **Free Plan:** Some PC-to-PC VoIP service providers don't charge you to make calls to other people using the same service. However, you're limited to calling only those other people with the same service from the same service provider.

Can I transfer my existing phone number?

Some VoIP service providers do offer number portability. However, there can be many difficulties when transferring your number from traditional phone service to VoIP, and phone numbers provided by your service provider are not usually portable to another service.

How long will it take to port my existing number to VoIP?

When transferring your existing telephone number to your service provider, be patient. Although most service providers that offer number portability claim it could take 20 to 30 days, very often porting your number to a VoIP service provider could take 6 to 8 weeks.

What are the advantages of VoIP over traditional telephone service?

Not only is VoIP *much* less expensive than traditional telephone service, but because VoIP is built on the same technology as other data services, more features are enabled in VoIP. In addition, VoIP is the first step in communications convergence—the future of communications.

Why doesn't everyone use VoIP?

VoIP is a relatively new technology. The first generation of VoIP was plagued by low quality and no reliability. Many people tried VoIP during that first generation and are skeptical about the newest generation of VoIP, even though it is much improved over the past.

Is VoIP limited to only other VoIP users?

That depends on the VoIP service that you choose. Some PC-to-PC VoIP providers limit you to calling only others who have the same software installed and activated on their computers. However, softphones and monthly VoIP service plans that use an ATA to convert calls from analog to digital allow you to call anyone you want, whether they use VoIP or traditional telephone service.

What states and countries is VoIP available in?

Essentially VoIP is available anywhere there is a high-speed Internet connection. For example, if you have VoIP service in Texas, but you're traveling to Hong Kong and take your ATA with you, as long as you have high-speed Internet access you can have VoIP service. However, in some states and countries VoIP service is not available. Contact the service providers that you're considering to find out if they have service available in your state or country.

Can I use my monitored alarm system with VoIP?

Probably not. Most monitored alarm systems do not work with VoIP. However, if having a monitored alarm system that works with VoIP is essential to you, check out Alarm.com to find an alarm system that's compatible.

Can I use TiVo with VoIP?

No. TiVo requires that you have a regular telephone line attached to the box to operate properly, and to date there is no similar service that works with VoIP. The same is true for other types of on-demand television services that require a telephone line to work properly.

Are there minimum contract periods?

The term of your contract, if one is required, depends on the service provider that you choose for your VoIP service. Most VoIP service providers don't require that you sign a specific contract, though some might. However, beware that some service providers charge a penalty fee if you don't keep your VoIP service for a specific amount of time (usually 90 to 180 days).

Is there a cancellation fee?

With some VoIP service providers there is a cancellation or termination fee. The fee might be dependent upon you returning the VoIP equipment, or it could be based on the length of time you've had VoIP through that service provider. If you're concerned about a cancellation fee, be sure to read the service provider's documentation carefully.

How many types of VoIP are there?

There are three types of VoIP:

- **PC-to-PC VoIP:** This type of VoIP requires that you download a software program that turns your computer into a phone system. To use PC-to-PC VoIP you need an installed sound card and a multimedia headset or speakers and a microphone. Most PC-to-PC VoIP can only be used between people who have the same software downloaded and installed on their computers.
- **Softphone:** A softphone is like PC-to-PC VoIP. However, with a softphone you can call anyone that you would call with a regular telephone.
- **Monthly VoIP Service:** Monthly VoIP service is a subscription service with which you use an analog telephone adapter and your regular telephone. With this type of VoIP you can call anyone anywhere and you use your regular telephone, which is hooked up to your computer.

What kind of quality can I expect from VoIP?

For the most part, VoIP quality is as good as or better than the quality you get from traditional telephone service. However, many factors affect VoIP quality, so it's possible that from time to time the quality will be less than with traditional telephone service.

How stable is VoIP?

The VoIP industry as a whole is very stable. It's here to stay. It's some of the VoIP service providers that might not be stable. Because the industry is still young in relative terms, many of the smaller companies that have entered the market in the last two or three years are destined to be absorbed by other companies or to be overwhelmed by growth in the industry.

Who regulates the VoIP industry?

There's much debate about whether or not the VoIP industry should be regulated. The FCC has ruled VoIP is an information service rather than a telecommunications service, making it exempt from the regulations that govern the telecommunications industry. However, the FCC has taken a hands-off approach to regulating VoIP, but the agency has organized an Internet Policy Working Group to identify and address regulatory and policy issues that arise as telecommunications services move to IP-based platforms.

Technology

What are the limitations of VoIP?

Although a good service, VoIP does have some limitations. They include the following:

- Limited 911 and emergency services capabilities.
- Limited directory assistance capabilities.
- Call quality that is directly affected by the quality and speed of your Internet connection.
- VoIP doesn't work during a power outage unless you have a battery backup system installed.

- It may not be possible to transport your existing telephone number to your VoIP service provider.
- There are some concerns about the security of VoIP.

Will VoIP work with DSL?

Yes, VoIP will work with DSL; however, most DSL is attached to an existing telephone line so you cannot disconnect the traditional telephone service once you get your VoIP service up and running. For this reason a "naked" DSL line, or one that is not connected to a telephone number, is the best option.

What type of Internet connection do I need?

In order for VoIP to be effective, a broadband Internet connection is the most optimal solution. Broadband Internet can be either cable Internet or DSL. VoIP will work with a dial-up Internet connection, but the quality will be very low and most VoIP service providers won't grant service to users with dial-up connections.

Should I switch to a different Internet service provider (ISP)?

Your Internet service defines your need to switch ISPs. If you have high-quality, broadband Internet service, there's no need to switch. However, if your Internet service is not high quality or if you frequently experience service outages, you should probably change ISPs.

What equipment do I need?

The equipment that you need is determined by the type of VoIP that you decide to use. Here's the equipment you need for each type of service:

- For PC-to-PC VoIP, you need a computer with an installed sound card and speakers and a microphone or a multimedia headset. You could also use a specialized IP phone.
- For softphones, you need a computer with installed sound card and speakers and a microphone or a multimedia headset. You could also use a specialized IP phone.
- For monthly VoIP service, you need an analog telephone adapter and a standard telephone.

How do USB VoIP phones work?

USB VoIP phones work like regular telephones, except that they are connected to the Internet through the computer, rather than to the public telephone network. The USB VoIP phone has a built-in ATA, so it performs the functions of both the ATA and the phone.

Can I use equipment from one provider with a different provider?

In most cases the answer to this question is no. Most VoIP service providers and equipment specific to those providers is "locked" to only that provider. This means they won't work with other services. However, some companies have begun to offer "unlock" services, for a fee, that will allow their equipment to be used with other service providers.

Should I use an ATA or an IP phone?

The choice between an ATA and an IP phone is a personal one. However, if you want to have the freedom to use the telephone just as you always have, the ATA is the best option.

What is a softphone?

A softphone is literally a software-based phone application. This software is installed on your computer and essentially turns it into a telephone.

What is the minimum bandwidth requirement for a softphone?

A softphone, like any other type of VoIP, requires a minimum bandwidth of 90Kbps both upstream and downstream. Higher bandwidth is good, lower bandwidth could result in decreased service quality.

Can I integrate VoIP into my existing telephone wiring?

VoIP can be integrated into existing telephone wiring. However, the traditional telephone line coming into your residence must be cut before VoIP is connected through the house wiring to protect the VoIP equipment.

Can I use VoIP for all the phones in my home?

VoIP service providers generally provide ATAs that allow only one or two lines to be connected. To have more than those lines, it's necessary to use an expandable telephone system or to wire VoIP through your existing telephone wiring.

What is packet switching?

Packet switching is a data transport mechanism that divides data into small packets that are coded with information about the destination of the packet and the order in which packets should be reassembled. Additionally, packetized data is encoded with compression and decompression algorithms. All information that travels over the Internet uses packet switching protocols.

Do I need a computer for VoIP?

Some types of VoIP do not require a computer; however, an Internet connection is essential.

Does my computer need to be turned on?

With some types of VoIP service, it's not necessary for the computer to be turned on. For PC-to-PC VoIP and softphones, the computer does have to be on.

Does the way I use my computer affect the quality of my VoIP?

In some instances, yes, the way you use your computer will affect the quality of your VoIP. Downloading large files or Internet gaming might take away from the broadband that's necessary for VoIP. If you experience quality issues while using the Internet and talking on the phone, check with your service provider to find out if settings can be adjusted to give more priority to the VoIP service.

Can I fax over VoIP?

Faxes can be sent over VoIP; however, they require that you have fax service enabled through your VoIP service provider. Most service providers charge an additional fee for fax services over VoIP. Those services usually cost $5–$10 per month.

Can I go wireless with VoIP?

It is possible to go wireless with VoIP as long as you have a Pocket PC with an installed VoIP softphone. With this combination of hardware and software, when you're in a location with wireless broadband Internet access, you can use the softphone to make calls with the Pocket PC. A good multimedia headset is required if you don't want others listening in on your calls.

What is VoWiFi?

Voice over Wireless Fidelity (VoWiFi) is VoIP over a wireless broadband connection. It's currently available only in a few places; however, in the future VoWiFi may become the answer to those skyrocketing cell phone bills.

What is H.323?

H.323 is a packet-based VoIP protocol that manages setup, teardown, and call control. This suite of protocols does not carry data.

What is SIP?

SIP is a text-based session-management protocol that handles user location, availability, and call setup. SIP is beginning to replace H.323.

What is latency?

Latency is the amount of time that it takes call data to travel from one point to another.

How does latency affect call quality?

Latency is noticeable in VoIP calls as echoes and garbled or dropped calls.

Is installing VoIP hard?

No. If you can hook up a DVD player, you can install VoIP, and it only takes about 15 minutes.

Is configuring VoIP hard?

Configuring VoIP can be confusing in some obscure instances. Otherwise, configuration is not much more difficult than installation.

What's an IP address?

An IP address is the physical address of your computer. It's similar to a telephone number, and tells the location of your computer on the network, which in this case is the Internet.

How does the IP address affect VoIP?

An IP address can be static or dynamic. A static IP address is an address that is permanently assigned to a device. A dynamic IP address is an address that is temporarily assigned to a device. With VoIP it's best to have a static public IP address, because this prevents destinations from becoming temporarily unreachable.

Security

How secure is VoIP?

As I write this book, there have been very few security issues where VoIP is concerned. However, it is expected that VoIP will become the target of more and more hacker (and criminal) attacks in the future. As long as the industry stays one step ahead of these unsavory characters, VoIP security should remain reliable.

What is SPIT?

Spam over Internet Telephony (SPIT) is the equivalent of spam on the Internet. SPIT has not yet proven to be a problem, but industry watchers warn that it could be a problem in the future if VoIP service providers don't formulate ways to prevent it.

Can VoIP conversations be hacked?

Anything on the Internet can be hacked. Fortunately, most hackers find no value in hacking VoIP conversations at this time. The security of VoIP conversations in the future remains in the hands of VoIP service providers, but there is likely to be legislation that mandates VoIP security before the end of 2006.

What other threats are there to VoIP?

Any security threat that haunts the Internet also haunts VoIP. Phishing, pharming, denial of service attacks and viruses, worms, or Trojans pose potential problems for VoIP. There have been no reports of these security threats becoming actual security problems, but each day brings us one step closer to a security issue with VoIP.

Calling

Does VoIP replace my traditional phone line?

Whether or not VoIP replaces your traditional phone line is up to you. If you're comfortable with the technology, there's no reason why you shouldn't reduce your communications costs and replace your traditional telephone line with VoIP.

Does VoIP require a special phone?

No. Depending on the VoIP service that you choose, it can operate either directly from your computer, or through an adapter that allows you to use a regular telephone.

Can I receive incoming PSTN calls using VoIP?

It depends on what type of VoIP service you choose. Most PC-to-PC VoIP services don't allow incoming calls from the PSTN, but some softphones do and a monthly VoIP service plan works with any incoming calls.

Can I call directory assistance (411) with VoIP?

This depends on your service provider. Some service providers have a directory assistance service for which they charge by the use. Other service providers don't offer any type of directory assistance.

Who can I call using VoIP?

That depends on your VoIP service. If you have a monthly VoIP service plan, you can probably call anyone in the world with the people in the U.S. and

Canada being part of your free calling area. The same generally holds true for softphones. However, PC-to-PC VoIP is often limited to calling only other people who have the same PC-to-PC VoIP service downloaded and installed on their own computer.

Are VoIP-to-VoIP calls free?

With almost all of the VoIP service providers on the market, VoIP-to-VoIP calls are free. However, as with everything in the VoIP industry, some service providers do not offer this service.

Can I call 911?

It's up to your service provider whether you have 911 or other emergency services available. Some service providers do not offer this service, and those that do offer an older version of 911 calling that requires you to actually tell the emergency services operator where you're located.

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APPENDIX

Resources and Utilities

Resources are available on the Internet that offer enough information and tools for VoIP to keep you busy for months. Here are some of them:

Andilinks

http://www.andilinks.com

Here's a site that collects information about VoIP services, service providers, and equipment. It also has links to articles and blogs that are relevant to VoIP.

Blog of VoIP Blogs

http://blogofvoipblogs.blogspot.com/

This site is just what the title says it is, a blog about VoIP blogs. It's a great central location for VoIP information.

Brix Network's Test Your VoIP

http://www.testyourvoip.com

Do you want to know how well your VoIP service is performing? If so, this is the place to test it. This free VoIP test takes about 20 seconds and will tell you the status of your VoIP service.

Broadband Reports

http://www.broadbandreports.com

You'll find reports on how VoIP services tested out on this Web site. The tests are updated frequently and you'll even find new information about the VoIP industry on the site.

CNET's VoIP Guide

http://reviews.cnet.com/4520-9140_7-5973803.html

CNET offers a great VoIP guide in this site. You'll find information about VoIP calling, reviews of VoIP equipment, and a terminology guide. Additionally, it has articles that cover the VoIP industry.

Columbia University's SIP Web Site

http://www.cs.columbia.edu/sip/

This site is fairly technically advanced, but if you want to know more about SIP, this is the place to learn it. The site is devoted entirely to disseminating information about SIP.

Computerworld VoIP Resources

http://www.computerworld.com/networkingtopics/networking/voip/resourcepage/0,5242,,00.html

This is the section of Computer World's Web site that is devoted to VoIP. You'll find industry information and news about VoIP in these pages.

Federal Communications Commission

http://www.fcc.gov/voip/

The FCC's Web site offers some interesting information about how VoIP works and news about the VoIP industry. You'll even find any advisories that the FCC has issued about the industry.

Help.com

http://www.help.com

Help.com is CNET's online learning resource. The Web site features free technology courses including occasional courses about VoIP.

Network World Convergence/VoIP

http://www.networkworld.com/topics/voip.html

This is the section of Network World's Web site that is devoted to VoIP and convergence. You'll find lots of article here that analyze the VoIP industry and what it might look like in the future.

OrderVoIP.com

http://www.ordervoip.com

When you're ready to sign up for VoIP service, this site helps you find the right service provider. It features provider reviews and discussion forums. There's even a listing of the specials that VoIP service providers are offering at the time you log on to the site.

Protocols.com

http://www.protocols.com/pbook/VoIP.htm

Here you'll find more information about VoIP protocols. All of the current VoIP protocols are explained on this Web site.

Pulver.com

http://www.pulver.com

This is Jeff Pulver's Web site. Pulver is one of the foremost industry experts on VoIP. On his site you'll find his VoIP blog in addition to news about VoIP, a VoIP store, and a calendar for upcoming events.

SearchNetworking.com

http://searchnetworking.techtarget.com/bestWebLinks/0,,sid7_tax3a3,00.html

This is TechTarget's site for networking in general and VoIP in particular. Although the site is geared more toward businesses, it contains valuable information about the VoIP industry and links to interesting articles about VoIP.

SIP Center

http://www.sipcenter.com/

This is another Web site devoted to information about SIP. On this site you'll find the latest news and events associated with SIP as well as a newsletter devoted to SIP and how it fits into the VoIP industry.

SmartPrice.com

http://www.smartprice.com

You'll find more than just VoIP on this site. The premise here is for phone companies to compete for your business. A section of the site is devoted to VoIP, and you can even talk to a company representative for free and with no obligation to learn more about VoIP.

Techie VoIP

http://www.techie.techieindex.com/ug/voip/home.jsp

This site is a VoIP portal from TechieIndex. You'll find news, interviews, event listings, and even freebies and book reviews on this site. It's geared toward the business VoIP user, but still contains plenty of useful information.

TestYourVoIP.com

http://www.testyourvoip.com

This Web site, part of the Brix Network, offers a VoIP test that gives you insight to the quality of VoIP you can expect from your broadband connections.

The VoIP Center

http://www.thevoipcenter.com

This site offers information for everyone from the novice to the expert. You'll find news, service providers, articles, and even guides to help you get your VoIP service connected.

Unlimited Long Distance 4 U

http://www.unlimitedlongdistance4u.com

This Web site offers lists of VoIP service providers as well as articles about VoIP services.

Virtual Voice

http://www.virtual-voice.com/FAQS/index.html

This site lists some of the most frequently asked questions about Internet Telephony. There's also a virtual dictionary that defines some of the terms associated with Internet Telephony.

VoIPAction

http://www.voipaction.com

This site offers a directory, divided into five channels, to help you find the information and service providers that meet your needs.

VoIP Basics

http://www.voipbasics.co.uk/

This is a UK-based Web site that outlines the basics of VoIP and provides links to additional resources and service providers.

VoIP Calculators

http://www.voip-calculator.com

This site features a variety of VoIP calculators to help you measure and improve the performance of your VoIP service. Many of the resources on the

site are more business-oriented than consumer-oriented, but there are still many useful tools.

VoIP Choices

http://www.voipchoices.com

This site offers comparisons of some of the top-rated VoIP companies. There are also some informative articles about VoIP linked on the site.

VoIP-FAQ.com

http://www.voip-faq.com

Do you have questions? This site is where you'll probably find the answers. There's very basic information as well as links to where you can buy VoIP equipment and services.

VoIP Forum

http://www.voip-forum.com

If you're looking for information about Asterisk, the open-source VoIP software, this is where to find it. This is a blog site that includes links to Asterisk news.

VoIP Guide

http://www.voip-guide.org

This site offers lots of information about VoIP, mostly for the business owner. However, there are articles and tools of interest to consumers, and if you're looking for information, you can find it here.

VoIP-Info.org

http://www.voip-info.org

This site is a Wiki that covers everything related to VoIP and the VoIP industry. Because it is a Wiki and is updated by people just like you, the site is constantly changing and growing.

VoIP Magazine

http://www.voip-magazine.com

This online VoIP magazine offers great information on the VoIP industry, including news and trends, and includes sections on security and wireless VoIP.

VoIP National

http://www.voipnational.com

This is a resource directory for VoIP. It includes information on residential services, commercial services, equipment, software, and VoIP news.

VoIP News

http://voip-news.com

This site is geared more toward enterprises; however, you'll find plenty of information on the VoIP industry and VoIP equipment on this site.

VoIP Now

http://www.voipnow.org

This is an interesting blog about VoIP. If you want to know what other people in the industry think about the state of the technology and the industry, here's where to find out.

VoIPProvidersList.com

http://www.voipproviderslist.com

This site claims to have a database of more than 1200 VoIP service providers worldwide. You'll also find VoIP calculators and how-to's on the site.

VoIPResources.com

http://www.voipresources.com

This site is dedicated to answering all of your questions about VoIP. You'll find articles, reports, phone and service provider reviews, and answers to some of the most frequently asked VoIP questions.

VoIPReview.org

http://www.voipreview.org

Here's another VoIP service provider location service. The site includes a newsletter and other tools to help you find the right VoIP service provider.

VoIP Security Alliance

http://www.voipsa.org

The VoIP Security Alliance is an organization dedicated to improving the security of VoIP. If you want to know what security risks you might face as a VoIP user, this is the place to learn more.

VoIP-Start

http://www.voip-start.com/

This is another site with basic information about VoIP. It includes a VoIP tutorial, news about VoIP, and a section on how to set up VoIP.

VoIPSelections.com

http://www.voipselections.com

If you're ready to find a VoIP service provider, this broker is a good place to start. The company offers to find the right service provider to meet your needs, and offers free consultations for the service.

VoIPSolution.org

http://www.voipsolution.org

This site bills itself as an industry site for professionals in telephony; however, you'll find plenty of basic information about what VoIP is and how it can help you. The one drawback is that the site is geared more toward businesses.

VoIPTalk

http://www.voiptalk.org

This site belongs to an equipment vendor. The target audience for the site is businesses; however, it appears that consumers can shop for VoIP equipment here, as well.

VoIP User

http://www.voipuser.org

This UK-based Web site offers lots of information about VoIP, including IP phone reviews and tools to help measure and improve your VoIP service. You don't have to be located in the UK to gain plenty of education and support from this site.

Von Magazine

http://www.vonmag.com/

Voice on the Net: VON Magazine is the premier publication of the VoIP industry. If you want to know more about the industry, this is the publication to read. There is a subscription-only magazine, but there are also bonus articles and news releases on the Web site.

Voxilla

http://www.voxilla.com

If you're interested in open-source VoIP, this site is a good resource. You'll find news, how-to's, and other information about open-source VoIP.

Whichvoip.com

http://www.whichvoip.com

This site bills itself as the broadband phone expert, and you'll certainly find a lot of useful information here. From service comparisons to a tool that helps you find the right service provider, whichvoip.com is a useful Web site for consumers.

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APPENDIX

List of Service and Equipment Providers

(aq) limited
26 Park Square
Leeds
LS1 2PL
Ph: 08707 449 227
Fax: 08707 449 228
http://www.aql.com

4ecalls.com
http://www.4ecalls.com

AllDayTalk.com
1200 W. 73rd Ave., Suite 1200
Vancouver, BC V6P 6G5
Canada
Ph: 604-606-0669
Fax: 604-638-0818
http://www.alldaytalk.com

Allen-Martin Inc.
217 East 16th Ave.
Gulf Shores, AL 36542
Ph: 251-968-3829
Fax: 251-968-3827
http://www.allen-martin-inc.com

Alpha Telecom
Loja Number 7, Ocean Park Promenade
Promenade Do Lido
9000-100 Funchal
Madeira, Portugal
Ph: 800-279-3205
http://www.alphatelecom.com

Anyuser VoIP
http://www.anyuser.com

Asterisk
http://www.asterisk.org

AT&T CallVantage
Ph: 1-866-816-3815
http://www.usa.att.com/callvantage/index.jsp?

AudioCodes
2099 Gateway Place, Suite 500
San Jose, CA 95110
Ph: 408-441-1175
Fax: 408-451-9520
http://www.audiocodes.com

babyTEL Voice over IP
1835B 10th Ave SW
Calgary, AB T3C 0K2, Canada
Ph: 888-682-5387
Fax: 403-541-9474
http://www.nucleus.com/voip

BestNet Communications
5075 Cascade Rd. SE, Suite A
Grand Rapids, MI 49546
Ph: 616-336-1753
http://www.bestnetcall.com

Broadvoice
900 Chelmsford Street
Tower Three
Lowell, MA 01851
Ph: 978-418-7300
Fax: 978-418-7100
http://www.broadvoice.com

Call2.com
Ph: +44 (0)1753 710430
Fax: +44 (0)1753 710499
http://www.call2.com

CallDaddy
http://www.calldaddy.com

CallEveryone
30 Broadway, Suite 204
Kingston, NY 12401
Ph: 845-943-6100
Fax: 845-338-7797
http://www.calleveryone.com

Callserve
2 Harbour Exchange Square
London
E14 9GE
United Kingdom
http://www.callserve.com

CallUnion
http://www.callunion.com

CentricVoice
http://www.centricvoice.com

CrystalVoice
510 Castillo Street, Suite 200
Santa Barbara, CA 93101
Ph: 805-899-4260
Fax: 805-899-2694
http://www.crystalvoice.com

Damaka
2140 Lake Park Blvd.
Suite 300
Richardson, TX 75080
Ph: 972-331-6211
http://www.damaka.com

Dialpad Communications, Inc.
430 N. McCarthy Blvd.
Milpitas, CA 95035
Ph: 408-635-1000
Fax: 408-516-9515
http://www.dialpad.com

DigiLinea
11924 Forest Hill Blvd.
Suite 22216
Wellington, FL 33414-6258
Ph: 561-807-3516
Fax: 561-807-3517
http://www.digilinea.com

DingoTel
Ph: 866-447-8884
http://www.dingotel.com

DuckVoIP.com
http://www.duckvoip.com

Earthlink Free Online Calling
http://earthlink.net/software/nmfree/onlinecalling/

easy-dial
http://www.easy-dial.com

Ekofone
17/C, Block 12
Laguna City, Kwun Tong
Hong Kong SAR
http://www.ekofone.com

FreeCall.net
22/47 Neridah Street
Chatswood, NSW, 2067
Ph: (02)8448 3803
Fax: (02)9413 3617
http://siphone.com.au/

Free IP Call
http://www.freeipcall.com

FreePhoNet
Ph: 305-728-6417
http://www.freephonet.com

FreeWorld Dialup
115 Broadhollow Rd.
Suite 225
Melville, NY 11747
Ph: 631-547-1440
Fax: 631-549-4656
http://www.freeworlddialup.com

GalaxyVoice
188 Needham Street, Suite 110R
Newton, MA 02464
Ph: 617-558-0920
Fax: 617-558-0905
http://www.galaxyvoice.com

GateShare
17330 W. Center RD
Suite 110 PMB 250
Omaha, NE 68130
Ph: 888-703-4366
http://www.gateshare.com

iConnectHere
75 Broad Street
31st Floor
New York, NY 10004
Ph: 212-500-4850
Fax: 212-500-4888
http://www.iconnecthere.com

iFreedom Communications
3 Holland
Irvine, CA 92618
Ph: 949-461-9266
Fax: 949-461-9267
http://www.ifreedomcom.com

InPhonex
7204 NW 31st ST
Miami, FL 33122
http://www.inphonex.com

LetsRing
http://www.lets-ring.net

Level3 Communications
1025 Eldorado Boulevard
Broomfield, CO 80021
Ph: 720-888-1000
http://www.level3.com

Lingo VoIP
Ph: 866-546-4603
http://www.lingo.com

LiveVoip
7228 East Volante Avenue
Mesa, AZ 85212
Ph: 877-333-8200
http://www.livevoip.com

Mach5Voice
Ph: 866-265-MACH
http://www.mach5voice.com

MediaRing, Ltd.
262 Santa Ana Court
Sunnyvale, CA 94085 – 4512
Ph: 408-962-1251
Fax: 408-962-1252
http://www.mediaring.com

MeritCall
13001 Ramona Blvd., Suite A
Irwindale, CA 91706
Ph: 888-886-8647
Fax: 626-609-0415
http://www.meritcall.com

MyPhoneCompany
http://www.myphonecompany.com

MyVoIPLine
http://www.myvoipline.com

Net2Phone
520 Broad Street
Newark, NJ 07102
Ph: 973-438-3111
Fax: 973-438-1829
http://www.net2phone.com

NetFone Services, Inc.
P.O. Box 76017
Coal Harbour Postal Outlet
Vancouver, BC V6E 4T2
Ph: 604-676-3410
Fax: 604-662-7950
http://www.netfone.ca

NeuTouch
17041 Catalpa Ct.
Derwood, MD 20855
Ph: 877-638-8682
Fax: 888-217-4459
http://www.neutouch.com

OpenTelecoms.org
http://www.opentelecoms.org

Packet8
3151 Jay Street
Santa Clara, CA 95054
Ph: 408-727-1885
Fax: 408-980-0432
http://www.Packet8.com

PCCall
One Silicon Alley Plaza
90 William St., Suite 702
New York, NY 10038
Ph: 212-324-1100
Fax: 212-324-1101
http://www.pccall.com

PC-Telephone
http://www.pc-telephone.com

PeerCall
1535 Eddy Street #305
San Francisco, CA 94115
Ph: 415-462-0454
Fax: 415-462-0517
http://peercallusa.favic.com/

PhoneFree
http://www.pbxsoftware.com/phonesoftware/phonefree.shtml

PhoneOpia
15 W Strong Street, # 25b
Pensacola, FL 32501
Ph: 800-357-5800
Fax: 800-357-2230
http://www.phoneopia.com

Phoneserve
2 Harbour Exchange Square
London
E14 9GE
United Kingdom
Ph: +44 (0)20 7517 7100
Fax: +44 (0)20 7517 7101
http://www.phoneserve.com

Quantum Voice
41 Enterprise Drive
Ann Arbor, MI 48103
Ph: 800-914-2943
Fax: 734-786-4604
http://www.quantumvoice.com

Rhinobell
http://www.rhinobell.net

Sipgate
(V.i.S.d.P)
Ronsdorfer Straße 74 Halle 15/22
D-40233 Düsseldorf
Germany
http://www.sipgate.co.uk

Skype
http://www.skype.com

Speakeasy
2222 2nd Ave.
Seattle, WA 98121
Ph: 800-556-5829
Fax: 206-728-1500
http://www.speakeasy.net

StanaPhone
http://www.stanaphone.com

SunRocket, Inc.
8615 Westwood Center Dr., Ste. 300A
Vienna, VA 22182
Ph: 703-394-4150
Fax: 571-633-0193
http://www.sunrocket.com

SuperPhone Unlimited
15 W Strong Street, # 25b
Pensacola, FL 32501
Ph: 800-357-5800
Fax: 800-357-2230
http://www.superphoneunlimited.com

TeleSIP
http://www.telesip.net

TuFone
http://www.tufone.com

UbiFone
http://www.ubifone.com

VirtualPhoneLine.com
15 W Strong Street, # 25b
Pensacola, FL 32501
Ph: 800-357-5800
Fax: 800-357-2230
http://www.virtualphoneline.com

Visitalk.com
http://www.visitalk.com

VoiceGlo
110 E. Broward Blvd., 14th Floor
Fort Lauderdale, FL 33301
http://www.voiceglo.com

VoicePulse
http://www.voicepulse.com

Verizon's VoiceWing
Ph: 800-270-5369
http://www.voicewing.com

VoIP.net
1020 NW 163rd Dr.
Miami, FL 33169
Ph: 888-VOIP-255
http://www.voip.net

VoIP2Save.com
www.voip2save.com

VoIPBuster, The
Finarea SA
P.O. Box 5648
Lugano 6901 CH
http://www.voipbuster.com

VoIPGate
41, z.a. Am Bann
L-3372 Leudelange
Luxembourg
Ph: 360-227-5688
Fax: +352 202020 37
http://www.voipgate.com

Vonage
Ph: 866-243-4357
http://www.vonage.com

VoxFlow
Ph: 800-605-8276
http://www.voxflow.com

Web4Calls.com
701 Renner Road
Wilmington, DE 19810
http://www.web4calls.com

WebCall
http://www.webcall.ca

WhistlerTel
2929 E. Commercial Blvd.
Suite 610
Ft. Lauderdale, FL 33308
Ph: 954-771-6515
Fax: 954-771-6503
http://www.whistlertel.com

wIPphone
65 Broadway, Suite 1801
New York, NY
Ph: 888-268-7600
Fax: 718-520-0605
http://www.wipphone.com

Yate
http://www.yate.null.ro

ZipGlobal
219 Quincy Ave., Suite 13
Quincy, MA 02169
Ph: 617-786-0909
Fax: 617-786-9966
http://www.zipglobal.com

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APPENDIX

Worksheets and Checklists

Quiz: How Much Do You Know About VoIP?

Take this quiz to find out how much you know about VoIP. The correct answers to these questions, along with explanations, follow this quiz.

1. What is VoIP?

   a. An instant messaging service
   b. A Push-to-Talk service
   c. A telephone service
   d. A text message service

2. How many "flavors" of VoIP are there?

   a. 1
   b. 3
   c. 5
   d. 7

3. Which type of VoIP allows you to call only other people who have the same VoIP software installed and activated on their computer?

   a. PC-to-PC VoIP
   b. ATA-based VoIP
   c. Softphone
   d. PC-to-Phone VoIP

4. If you want to use your traditional telephone to make a call using VoIP, which type of VoIP service do you need?

   a. PC-to-PC VoIP
   b. ATA-based VoIP
   c. Softphone
   d. PC-to-Phone VoIP

5. True or False: The quality of VoIP service today is about the same as it was when VoIP first became a known technology.

   a. True
   b. False

6. What type of Internet connection is best for VoIP? (Check all that apply.)

   a. Dial-up
   b. DSL
   c. Cable
   d. Wireless

7. True or False: VoIP is just a "flash in the pan" technology that no one will remember in a few years.

   a. True
   b. False

8. What's the most common reason people choose VoIP over traditional phone service?

   a. Convenience
   b. Cost
   c. Enhanced features
   d. Communications convergence

Quiz Answers: How Much Do You Know About VoIP?

1. **C;** VoIP is a telephone service. It differs from traditional telephone service in the way that calls are transported. With traditional telephone service, calls are transported over the public telephone network, whereas VoIP calls are transported over the Internet.

2. **B;** There are three flavors of VoIP: PC-to-PC VoIP, PC-to-Phone VoIP (also called a softphone), and a VoIP service, which is an ATA-based VoIP.

3. **A;** PC-to-PC VoIP is a VoIP service that allows you to call only other people who use the same VoIP service. To connect to those people, they must have the software installed and activated on their computer when you try to place the call.

4. **B;** ATA-based VoIP makes it possible for you to place and receive calls using your regular telephone. ATA-based VoIP is a service you contract for monthly.

5. **B;** The quality of today's VoIP service is much better than it was in the past. First-generation VoIP wasn't very mature when people began using it. The new generation of VoIP is much more mature and the quality is much higher.

6. **B & C;** A DSL or cable Internet connection is best for using VoIP. Dial-up Internet access doesn't have enough bandwidth to support VoIP.

7. **B;** VoIP is no "flash in the pan" technology. It's a communications technology that is changing the way we communicate. It's often viewed as the first step to communications convergence, or the aggregating of all methods of communication into one centralized location.

8. **B;** Cost is the number one reason people choose VoIP over traditional telephone service. VoIP enables telephone users to save 30 to 70 percent on their monthly telephone bills.

Worksheet: Which VoIP Service Is Best for You?

Determining which VoIP service to use isn't the easiest decision to make. Use this worksheet to determine which type of VoIP service best suits your communications needs.

Yes	No	
☐	☐	Do you want or need to replace your existing phone service with VoIP? If you answered yes, then ATA-based, monthly VoIP service is best for you. If you answered no, then a softphone or PC-to-PC solution is your better choice.
☐	☐	Are you interested in VoIP but not committed to replacing your traditional telephone service? If you answered yes, then a softphone or PC-to-PC VoIP solution is your best option. If you answered no, the ATA-based VoIP might be a better choice if you can come to terms with the potential risks of using a new technology.
☐	☐	Do you want totally free calls to your friends and family members? If you answered yes, then using PC-to-PC VoIP is for you. This type of VoIP allows you to make free calls to anyone who has the same VoIP software installed on their computer.
☐	☐	Do you want or need a better way to call your friends and family when you are traveling? If you answered yes to this question, then a softphone might be a good solution for you. Softphones can go anywhere you go as long as they're installed on your laptop or Pocket PC.
☐	☐	Are you worried about depending on a new technology? If you answered yes to this question, try PC-to-PC VoIP or a softphone before you commit to an ATA-based VoIP service. If you answered no, then jump right into an ATA-based VoIP service.

Yes	No	
☐	☐	Do you have DSL? If you answered yes, then you might want to start with PC-to-PC VoIP or a softphone to reduce your current telephone bills. Most DSL services require an active phone line.

Worksheet: Comparing VoIP and Traditional Telephone Costs

One of the biggest reasons that people choose to switch to VoIP service is the cost. POTS (plain old telephone service) calls must travel through dedicated switches, which are more expensive than VoIP, because calls that travel over the Internet can share pathways. It's like comparing a one-lane road to a six-lane highway; hundreds more vehicles can travel the same route on a six-lane highway.

Another cost factor is the lack of regulated taxes applied to VoIP service. Regulated taxes account for between $9 and $15 per month of your POTS bill. Those charges don't apply to VoIP services, so that cost savings alone can reach sizable levels.

To get a better idea of the amount of money that you'll save by switching to VoIP service, let's try something. First, find your last month's telephone bill. Then use it to fill in the following information:

Services

Monthly local service fee $_____

Monthly long-distance service fee $_____

Total service fee $_____

Taxes

Federal universal service charge	$_____
FCC local number portability line charge	$_____
Emergency 911 service	$_____
FCC charge for network access	$_____
Federal excise tax	$_____
State/local taxes	$_____
Total taxes	$_____

Now, when you have these numbers all figured out, spend a little bit of time researching the different VoIP companies and their service offerings. Compare your current month's bill to the bill that you would have if you were connected to VoIP service. And be sure to take a close look at the taxes. You'll be pleasantly surprised at the amount of money that alone will put back in your pocket.

Checklist: VoIP Features

Use this checklist to decide what features you need to have with your VoIP service. You can also use this checklist to compare the cost of those features between two different service providers.

Check here if you need this service	Cost Service Provider 1	Cost Service Provider 2
☐ Caller ID	_____	_____
☐ Call Waiting	_____	_____
☐ Three-Way Calling	_____	_____
☐ Call Return	_____	_____
☐ Voice Mail	_____	_____
☐ Real-time Billing	_____	_____

Check here if you need this service	Cost Service Provider 1	Cost Service Provider 2
☐ Call Filtering	_____	_____
☐ Do Not Disturb	_____	_____
☐ Call Forking	_____	_____
☐ Call Forwarding	_____	_____
☐ Virtual Numbers	_____	_____
☐ Fax Capabilities	_____	_____
☐ Auto Attendant	_____	_____
☐ Call Transferring	_____	_____
☐ Call Parking	_____	_____
☐ Hunt Group	_____	_____
☐ Other Services	_____	_____

Worksheet: Number Portability

Transferring your number from your existing telephone service provider to your new VoIP service provider can be a hassle. Use this worksheet to prepare for and manage the process.

Before You Port

_____ 1. Check that your current service records are up-to-date. Your mailing and billing addresses must match.

_____ 2. Check your current account to make sure there are no outstanding service tickets.

_____ 3. Obtain a current copy of your telephone bill to have on hand in case your VoIP service provider requests one.

_____ 4. Inquire about your VoIP service provider's number portability policies.

During the Port

_____ 1. Order VoIP service from your chosen provider.

_____ 2. Request that your chosen VoIP service provider port your existing number to their company.

_____ 3. Provide any written request or copies of your existing service bills that the service provider requests.

_____ 4. DO NOT DISCONNECT YOUR EXISTING SERVICE.

_____ 5. Be patient. Porting your existing number to your new service provider could take from 20 days to two months or more.

Communication Log

There may be times when you inquire about the status of your number port. Use this log to keep track of those conversations.

Date of Call	Person Spoken To	Details of the Call
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Worksheet: Assessing Your Broadband Connection

Your broadband connection is the most important element of quality VoIP service. If the connection is too slow, calls you make using your VoIP service will be choppy, garbled, and may be subject to frequent drops or disconnects. Use this worksheet to compare your broadband connection to the average broadband connection and to minimum VoIP requirements.

To determine what your connection speed is, call your broadband service provider or use an online speed clocking tool like the one at http://www.dslreports.com.

Average Connection Speed	Minimum VoIP Requirements	Your Connection Speed Downstream	Your Connection Speed Upstream
Dial-up Internet Access	56K or Less	Not recommended for VOIP	
DSL Internet Access	128 Kbps both upstream and downstream	128–256 Kbps both upstream and downstream	
Cable Internet Access	1–3 Mbps downstream 90–383 Kbps upstream	128–256 Kbps both upstream and downstream	

Recommendation: If your broadband service doesn't meet at least the minimum VoIP requirements, consider switching to a higher bandwidth Internet access. Your current ISP may have tiered service levels that would make it possible for you to increase your bandwidth without switching service providers. If not, however, you should find a different ISP.

Worksheet: VoIP Service Provider Comparison

Use the worksheet on the next page to compare up to four VoIP service providers to determine which service provider best meets your needs.

	Service Provider 1	Service Provider 2	Service Provider 3	Service Provider 4
Monthly Service Fee				
Activation Fee				
Equipment Fee				
Included Minutes				
Per-Minute Rate				
Included Features				
Advanced Features				
Additional Feature Costs				
Number Portability				
911 Services				
Contract Terms				
Cancellation Fee				
Money-Back Guarantee				
Specialized Equipment Required				
Additional Fees and Service Charges				
Miscellaneous				

Guide: Step-by-Step Installation

Installing VoIP isn't hard at all. This guide is designed to walk you through the most common installation steps. It's possible that your VoIP service provider will have different or additional steps, so be sure to check with them first. Use this as a basic guide in addition to the instructions that you receive from your service provider.

To install ATA-based VoIP:

1. Unpack your equipment. Be sure to save the original boxes in case you decide you're not satisfied with the service. Most service providers require that equipment be returned in original condition, in the original packaging.
2. Make sure all of your hardware is turned off. That includes your modem and PC. And don't power up the ATA box just yet.
3. Connect the ATA box to your router. On the back of your ATA box (which is what the VoIP service provider sent to you) you'll find an Ethernet port (or ports). Connect one end of the Ethernet cable that came with the box to one of the ports. Then connect the other end to your cable modem or other network device.
4. Disconnect your POTS line from the wall and connect it to the ATA device. Your ATA device probably won't come with additional telephone lines, so use the line that you already have your phone connected to. Remember, you can usually only have one phone line connected to the ATA device, so you may want to purchase a long phone line in order to have a centrally located phone.
5. Power on your cable or DSL modem.
6. Connect the power to your ATA device and then plug it into the electrical outlet.
7. Now power on your PC.
8. If there is software included from your VoIP provider, install that according to the provider's instructions.

That's all there is to it. It might take a few minutes to actually get a dial tone on your phone, because of the internal processing that your ATA device and your broadband modem must go through. But it's really that simple. Within minutes, your phone service should be operational and you can be having conversations with anyone you choose to call.

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