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VoIP in Plain English! (Voice over Internet Protocol)

VoIP or Internet Telephony (IP Telephony) requires a significant leap in our traditional thinking about voice communications. In order to gain a better understanding of Voice over IP, it's helpful to understand the context in which it evolved. We all are accustomed to telephone calls carried over "Ma Bell's" copper wires from our telephone to the home or office of a friend, relative or customer. That's the way it has been since Alexander Graham Bell uttered those famous words in 1876: "Come here -- I want to see you" to his assistant, Mr. Watson.

ANALOG LINES

Since those early days, telephony has made use of "analog" technology that transmits its signals (your voice) by changing the shape of a continuous "wave" that is sent over the copper telephone wires. Until very recently, all residential and most business phone lines were analog. Analog circuits are fairly simple and are still the most common form of voice transmission circuit in use today. An analog line can make use of any brand of inexpensive analog telephone, fax machine, modem or other analog device.

DIGITAL LINES

A recent and significant innovation in the transmission of voice over copper wires was the development of the "digital" signal. This technology evolved during the post-WW2 era along with (and due to) the unfolding of computer technology. A digital circuit breaks the audio information into a binary format. A voice is represented by a series of "1"s and "0"s that are transmitted over the same copper wire as analog signals. Digital circuits, or lines or trunks, are faster, quieter and much more efficient than analog circuits at carrying voice signals over copper wires. They have also advanced many other innovations such as Caller ID, Wireless telephony, Voicemail, Conference Calling, FAX technology and numerous other improvements. Digital circuits require special telephone equipment at both ends of the call to process the "1"s and "0"s into a meaningful dialogue. This is the role of the commercial telephone system.



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VOIP LINES

Voice over IP originated in data transmissions over a computer network. The Internet, described as "a network of many networks," uses encapsulation to send data packets over a network. Those packets carry within them the IP address of their destination as well as that of the sender along with its payload (the message). VoIP technology encapsulates your spoken word into voice packets that travel across the same network as the Internet, along with data packets, to their IP destination. Special equipment is required at both ends of the conversation to manage the voice and data packet traffic, giving priority to the voice packets, so that a coherent conversation can take place. A VoIP line or trunk, then, is a virtual pathway through the Internet carrying encrypted voice packets between two points. In short, your voice is encrypted for security, "packetized" for transport, "tunneled" through the maze of Internet pathways along with a myriad of data packets, and then un-encrypted at the other end so your voice can be understood.

ANATOMY OF A VOIP PHONE CALL

VoIP telephony can refer to many very different things depending upon the origin of the call, the phone system in your office on which the call is originated, the network that will carry your conversation and the phone system at the destination. A VoIP phone call can originate on any phone that can be connected to a VoIP-capable phone system. Whether you have a digital or IP telephone on your desk, it is the telephone system that originates a VoIP phone call. An IP telephone system is appropriately considered a "voice server" on your company's data network but it must also be connected to the local phone company's network (the Public Switched Telephone Network or PSTN) if you want to be able to reach the 98% of the world who don't yet have IP telephony.

Your VoIP phone equipment determines which pathway or network to use.

1. If the call is destined for an analog device such as your home phone or the local pizza shop, the call will be directed over the analog ("Ma Bell") telephone lines or the PSTN and will be completed as an analog (non-VoIP) phone call.
2. If your call is to a remote colleague connected to your office by way of a VoIP connection, the call will be encrypted, packetized and routed directly over the Internet to your colleague.



3. If the call is to another company that has a communications system identical to yours, it is still not considered a VoIP telephone call since it is being carried over the PSTN between locations and still incurs long distance charges (if the distance warrants it).
- a. One of the configurations that would make this scenario a true VoIP connection is the creation of one or more VoIP "trunks" or virtual lines, over the Internet, between the VoIP phone systems at each location. This would form one single communications system where all telephones at both locations are extensions on the other system.
 - b. Another configuration is a VPN (Virtual Private Network) circuit to a tele worker who has an IP phone at home connected through a secure router to the phone system in your office. The common factor in these two configurations is the lack of the Public Switched Telephone Network. A VoIP trunk is a permanent connection between two VoIP systems (between your company's main and branch offices for instance). This same kind of connectivity can link several locations together and make everyone at all locations much more "visible" and reachable. Voice-over-the-Internet actually has a place in many ordinary businesses today and can bring some incredible cost-saving and other benefits to even very small companies.

First, a few examples to spark the imagination: Imagine your Receptionist answering all of your company's incoming phone calls from home...transferring them to their proper destinations within your office, fielding inquiries from you and others in your office, even if he lives across town or in another city, state, or country! Imagine being able to hire additional employees without having to come up with new office space! Imagine their productivity when they don't have to spend an hour getting to work every morning and going home every evening! And they're just a 3-digit extension away! Imagine communicating all day long with all of your colleagues in your West Coast or Florida office, for free! You get the feeling that they are just another phone extension in your office... because they actually are! You just can't see them because they are hundreds or thousands of miles away.

This scenario has an even greater impact on your bottom line when it's your team of engineers in India or Hong Kong with whom you discuss issues several times a day! That can get very expensive doing it the old fashioned way. Imagine having to expand your company but you can't relocate to a new facility because your data infrastructure would be too costly and / or too disruptive to move. You can locate new employees in another building and, through their Internet connection, connect their phones as additional extensions to your existing phone system. They'll actually feel much closer to your operations as opposed to being "that group across town." Our topic is strictly commercial VoIP or business VoIP.



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Residential VoIP technology such as those provided by cable companies and pure VoIP providers like Skype and Vonage are not part of this discussion.

One of the most common misunderstandings about VoIP is that you can save *all* of your long distance telephone charges by starting to use this new technology. VoIP earned this really impressive cost-savings reputation in the days when even domestic long distance charges were very expensive. Today, these rates are quite literally approaching *zero* and these kinds of savings just aren't the case any longer for domestic usage. Instead, *proximity*, and its indirect efficiencies, has replaced the more directly-measurable long distance cost-savings as the principal focus of Voice over IP. Proximity enhances the value and productivity of the tele worker by bringing him or her much closer to you and your colleagues in the office. Together with remote computer access, the IP-connected phone on their desk gives the tele worker a much more effective business connection to the office but with all the comforts of home, literally. Truly a unique and highly productive experience! The proximal effect of VoIP connectivity enhances the collaborative efforts among remote offices and headquarters or between an executive working from home and his various principal and remote offices. *Proximity is the driving force of VoIP today.* VoIP technology has been evolving since the early 1990's but its vocabulary has been lagging. So let's start to define some terms to help make some sense of this mystery.

INTERNAL VOIP or (VOIP Extensions on Campus / In Building)

When a VoIP-capable telephone system is installed with IP telephone sets throughout the office, it is making use of Voice over IP technology *within the facility only*. The IP phones plug in to the data jack for your computer and your computer then plugs in to the back of the phone. (Most IP phones include an integrated 2-port data switch.) If you are cabling a new or remodeled facility, this means that you only need one cable instead of two for each office thus greatly reducing the cost of your structured voice and data cabling infrastructure.

HYBRID VOIP or (VOIP Enabled TDM Telephone System)

This describes telecommunications equipment that is capable of supporting both digital and VoIP technologies. Most telephone systems of the past few decades have been "digital" in design as opposed to the "analog" phones that we all have at home. A hybrid system can be installed to function digitally;



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often re-using your existing telephone sets and, at the same time, supports a tele worker at the other end of a VoIP connection at home or in a remote office.

TELEWORKER VOIP (Tele working)

This applies to an individual working from home or in a remote office where it's not necessary or practical to install a phone system. This solution requires a high-speed (broadband) Internet connection such as a T-1, DSL, coaxial cable or fiber optic connectivity. A SIP-compatible IP telephone and a VPN router for security complete this virtual telephone and computer communications "bridge" to your office where you have a VoIP-capable phone system.

MOBILE VOIP (Soft phones)

The traveling employee can connect to a VoIP-capable phone system at headquarters with a "soft phone" on a laptop to make or receive calls just as if he or she were actually in the office. In this scenario, one must remember that when calling the local pizza shop, one is doing so from the home office, complete with its Caller ID and long distance charges.

TELEGROUP VOIP – This type is divided into two distinct categories:

1. DISCRETE, where a small group of remote employees (up to 6 or 8) share the connectivity described above by adding a voice-capable data switch to that scenario to increase the number of connections to the main office. Consideration should be given to the need for local phone lines.
2. INTEGRATED where a small to medium-sized group of remote employees have a need for multiple local phone lines but still want to be connected to the main office by using extensions. This scenario would make use of a smaller "sub" phone system that is connected to the main system with VoIP trunks over high-speed Internet connections in each office. Centralized Voice Mail and shared applications like Contact Center, Screen POPS and other such resources create a very strong ROI for the entire system.



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HOSTED VOIP

The Hosted PBX (Public Branch Exchange or phone system) provides all of the communications services needed by a business remotely from a data center. This eliminates the need for premise-based telephone equipment – There is no need for the box in the back room or in your Telco closet. The services offered are numerous and the hosted communications solution can emulate almost all of the services provided by the traditional hardware-based system. The only equipment to buy is the phone set on your desk. It simply plugs in to your data network sharing the computer's wall jack. Beyond that, you simply pay a monthly fee per phone for the service. This solution is very flexible and usually allows you to create new remote locations of any size very quickly. It accommodates Mobile VoIP very well by allowing travelers to connect to the system with a soft phone client on their laptop or PDA from anywhere. There is still the need for high-speed Internet connectivity at every location where the service will be used and sometimes this must be a dedicated T-1 circuit, adding considerably to the initial setup and recurring monthly costs. This is pure VoIP in its truest sense. The hosted PBX completely replaces your phone system so it is the hosted PBX that makes the decisions about which network (PSTN or Internet) to use to complete the call.

WHAT OTHER ADVANTAGES DOES VOIP HAVE?

Flexibility and more flexibility! Imagine receiving a call meant for your desk phone while on vacation in Hawaii. With VoIP it's not only possible, it's easy! (And you can always turn that off!) Another great application of VoIP is in heavy use by companies who provide phone support. No longer do these companies require massive warehouses full of employees. They now use a VoIP system to route calls to agents with VoIP phones on their desks at home. Often, these agents are scattered across the country or even the world – often purposefully in order to offer their services from multiple time zones!



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SO IS VOIP RIGHT FOR YOUR COMPANY?

As with most business decisions, the answer is, "It depends." The number of locations you support, the amount of money you spend on traditional local and long distance services and, most importantly, the relevance of the "Proximity" of your company workforce to your organization are a few of the considerations that help to determine the effectiveness of a VoIP system for your company. At Falcon we do not feel it is a question of "Is VOIP right for your company, or not?" The real question is how and what kind of VOIP will best your company, your customers and your staff? There is no question that VOIP technology has come light years in the past 5 years and continues to get better each and every month. There is no doubt that VOIP technology will be utilized in the future by your company, it is just a matter of how much and how fast you will adapt to it.

For more information on VOIP please feel free to contact Falcon at 703-335-5000 or visit us at our website at www.falconcom.net.