



# AccuConference

## Good-VOIP vs. Bad-VOIP

The term "Voice Over IP", or VOIP has been thrown around in a lot of different circles within the telecom industry. There seems to be a growing confusion about what it is, whether or not it's good or bad, and why, specifically, someone would want or not want VOIP telephony services. What this article will do is to better define what VOIP is, why we need it, and why we don't.

### I. VOIP defined

VOIP is a generic term that refers to any telephone signal that is translated into data packets, sent across a network, and then translated back into audio. Imagine you and your friend on your computers at home. You use your microphone to record a sound into your computer (presumably a wav file) and then attach the file and e-mail it to him. He opens the file, listens to it, and then composes his own response using Windows Sound Editor, or some other sound tool, and then sends it back to you through e-mail. Now, imagine it occurring much faster, and with much less user intervention. This, in a nutshell is what VOIP is. To get to the essence of what VOIP is, you must first understand what IP is. IP is the Internet protocol developed by Xerox Parc and a government agency known as DARPA, back in the 1970s. Despite popular belief, Al Gore did not invent this protocol, nor was he ever employed by Xerox Parc or DARPA.

The protocol that eventually became the driving force behind the Internet became extremely popular primarily due to the fact that anyone could access it from anywhere. You simply had to have a connection to the "backbone" of the Internet and you could get to any other computer in the world that was connected to the backbone as well. Now, there may be 30 or 40 routers and about a dozen computers between you and the computer you want to talk to, and you have to go through each of them (known as a "hop") to get to your destination. Each of these hops introduces a phenomenon known as latency, which slows down the traffic some. Generally speaking, the more hops you

go through, the slower your connection is. This can also be affected by poor performing routers, outages (requiring a rerouting of your traffic through alternate routers), or congestion caused by an overload of the router you need to go through. To see an example of exactly how this process works:

1. Click "Start->Run" and type "cmd"
2. Type "tracert www.google.com"

What you will see is a list of routers that your traffic must go through to get to Google. The route that you take will be different than my route, but eventually, we wind up on the same network and get to the same system. Also note that the times on the left (in milliseconds) are how long it takes to get to that particular router.

Now, imagine your voice traveling over this same path. Every stop along the way delays the sound being received on the other end. This can introduce a number of problems in a telephone call, including a phenomenon known as "jitter" (where the sound begins to break up), added delays, and echo. There are compensations for this, but each of them reduces the quality of the phone call.

## II. Good VOIP vs. Bad VOIP

There have emerged two distinct classes of VOIP traffic. The first of them is traffic traveling over the public Internet, and the second is traffic over a private or semi-private network. Both function generally the same, but the first one introduces significantly more problems than the second one. Let's say that your office has another branch office in a different part of the country. This branch office is connected to the public Internet through your corporate headquarters, just you're your branch office is (meaning that that branch offices has a direct network connection over private lines to the main corporate headquarters).

Now you want to call someone in the other office using VOIP. The voice packets only have 3 hops to make, one to your router in your office, then to the main headquarters, and then to the other branch office. If your network administrator has done his job, then you will have a very good quality

connection. As an alternative, your company could not have the dedicated lines, but be connected all to the same Internet Service Provider. This ISP, even though it is connected to the public Internet, will route your traffic over their lines and their network, resulting in minimal delay being introduced, and most likely, a good phone call. Now, suppose that you want to call me using VOIP. Your ISP is most likely not the same as mine, and the result is that your traffic has to hop out onto the public Internet now, resulting in possible delays. Note that my office is 5 hops away from our branch office using the same ISP, but 16 hops from my Internet address at home. A phone call to my co-worker is likely to be clear, while a phone call to my wife or to another company is not as likely to have good quality.

It is important to note at this point that bandwidth and latency are two very different things. You can have a massive Internet “pipe” or connection, with 1.5Mbps (a typical T1) up through a 100Mbps connection (the speed of a typical office network), but if you are 25 hops away from it, and one of the segments on the route is having performance problems, then you may introduce serious latency into your conversation. Just because you have a lot of bandwidth doesn’t necessarily mean that you can have a good VOIP connection.

### III. Sources of Good VOIP

Good VOIP can generally be attributed to a good network design, and the least traffic going across the “public” Internet. The example that I gave above with the branch offices being connected to the same ISP can be considered Good VOIP, if the network is designed correctly.

Other sources of Good VOIP can be an inter-office PBX system that uses IP, such as the Cisco AVVID solution, and their 7000 series of phones with a Unified CallManager system. This solution, while still utilizing the IP protocol, travels on your private data network in your office, which is considerably faster and fewer hops than most Internet connections.

Many telecom carriers are utilizing VOIP within their own private backbone. They have discovered that it is considerably cheaper to build a large data network, and simply route the voice traffic across it. Since these networks

are private to the carrier, and well maintained by a network staff, the connections are generally very reliable, and sound as good as a standard fiber-optic phone call.

#### IV. Sources of Bad VOIP

Any VOIP traffic that travels over the public Internet is going to have some sort of problem at some point. If you are on a cable modem at home, and the kid next door is downloading a significant volume of music from the Internet, then your connection will be slow and you will have a poor quality VOIP connection. If you are connecting from your office to another company, and the Internet connection that you are using is congested, then you will experience problems.

Some examples of this can be seen on many of the Vonage forums. You will hear many examples of people that can talk, but not hear the person they are calling. This generally occurs because the Internet bandwidth on the upload side is lower than the bandwidth on the download side (such as is the case with ADSL).

Also, the recent introduction of “free” calling services, such as Skype and Yahoo Messenger with Voice are potential causes of trouble. These services utilize the Internet and the connection quality that you will have with them is subject to the same problems as any “public” connection.

#### V. The Failure of “free” VOIP services, such as MS Messenger and Yahoo

Recently, the US Congress has begun discussing a concept known as “net neutrality”. This refers to the concept that every packet traveling across the Internet is treated equally. Currently, this system is under fire from ISPs that want a “tiered” system, providing a better performance for people willing to pay for it. Most of the free providers would undoubtedly suffer from a tiered system, in which a router would discard these “free” packets in favor of packets from people paying more for their service.

The theory is that if enough people continue to deluge the internet with “free” voice traffic (and video as well), that the bandwidth will not be there for people who use the Internet for traditional uses, such as surfing the web,

playing games online, etc. The ISPs have based their pricing model on a certain usage pattern, and they are seeing these patterns changing with paid VOIP services such as Vonage and AT&T CallVantage, as well as with free services, such as Skype and MS Messenger.

Eventually, these people will realize what most of us already know: you get what you pay for. Name one other free service that you get where you don't have to suffer through either some kind of advertisement (such as television and "free" websites), or pay for a service (such as cable TV movie channels and a fee-based website). There's always a catch, and for right now, the catch is quality.

## VI. How to make Bad-VOIP good, and what the future holds

Someday, instead of calling and ordering three or four phone lines for your business or home, you will call and order bandwidth. This bandwidth will be used for video (instead of satellite or cable), voice (instead of phone lines), and data (to access the Internet). Once this happens, the phone company will have VOIP between your house and their switch, and from there, the call will take a "clean" route to its endpoint. If I am on SBC VOIP and I call another SBC VOIP person, then we remain on SBC's private network. If I call someone not on SBC, then SBC simply routes the call to a traditional POTS line and the call quality remains good.

The reason that this will not happen any time soon is that the local carriers (predominately SBC, Verizon, and Qwest in the US) derive a very large portion of their business from POTS lines, and are not likely to give that up in the near future. Until that time, we are left with Vonage, AT&T CallVantage, etc. over public networks, or some in-house Cisco-type VOIP solution over private networks. The only way that VOIP becomes mainstream is if the local dial-tone carriers push the service.

The VOIP products that are available are even beginning to push enhanced services, such as voicemail for free and conference calling services. Recently, a company known as Vapps, Inc. announced a free conference calling service provided over Yahoo's instant-messenger. This service claims to provide high voice quality for up to 500 simultaneous participants per call. The service

still uses the public Internet and is tied directly to the quality (and size) of your customers' Internet connections. Also, they can no longer dial in from a standard phone or mobile phone without Internet access. The costs of conference calling services have come down recently, with companies such as AccuConference offering services 9.9 cents per minute with no taxes or fees. If you are concerned about the costs of hosting a large or long call with these pay services, then AccuConference also offers a flat-rate plan, where your participants call into a 404 (Atlanta area code) number, thus relieving you of the cost of the long distance call. With many cell phones and some land-lines now offering free long distance, these services become an even better value for a business.

While I believe that the current consumer VOIP offerings have a place in our society, I do not think that this place is in a business environment. Too many companies depend on both the service and the quality of their communications to allow a free provider to give them service. With MS Messenger, you would have to open your network up to anyone that wanted to contact you, by adding them to your friends list. Yahoo works the same way. Besides the fact that a telemarketing company could now call for free (basically the equivalent of SPAM for the VOIP market), you also open yourself up to the vulnerabilities that can be associated with a third-party product running on your computer (such as viruses and other attacks). These products may have a place in a consumer product, such as a residence where the quality doesn't matter as much, but how will your business appear to a potential customer when you cut out frequently or drop a call with them. You get what you pay for.

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