

Your voice over your IP?

The concept of running telephone calls over data networks, or Voice over IP (VoIP) seems to have been around for as long as I can remember, and manufacturers have been promising commercial solutions for almost as many years. However, this is now a reality, with IP based telephone systems both readily available and reliable. In fact it is probably true to say that most manufacturers would consider their current product line to be IP based systems, and older TDM (time division multiplexed – a traditional phone switch) system as obsolete.

From a commercial aspect though, the proportion of currently installed phone systems that are purely IP based is still tiny. One of the main reasons for this is that telephone switches tend to have a long life span, often well over ten years, and are a significant item to replace. Another factor is that there is still very little in house experience with VoIP systems; most IT staff have yet to install their first system. Finally, while there are many advantages, these are rarely enough to justify the cost of replacing an old but working and reliable switch that is currently in place.

So, if like most other firms you are looking at your options for moving to voice over IP, what should you be considering? In the rest of this article, we will take a brief look at some things you may or may not know about VoIP and its place in your firm.

VoIP telephone switches are cheap

This is true, largely because most of them are little more than a standard Intel server with an ISDN card added. Unfortunately this is not the whole story. To create a complete telephone system, you need both the software to run it, and some handsets or other endpoints. The software is usually licensed as the core system at a reasonable rate, and then a per extension licence which is pretty hefty. Extension licences usually come in three types: a standard licence assuming you are putting a physical IP telephone on the end; a softphone licence that allows you to run a virtual phone on your PC (or use a USB handset with your PC); and extra feature licences to give special facilities to certain users (for example, links to mobile phones, or additional roaming features)..

As for handsets, if you are running fairly cheap handsets now, prepare for a shock. IP handsets are very expensive. The main reason for this is that they are actually very sophisticated and are computers in their own right. What many people do not realise is that for a modern enterprise phone system, the IP phone call goes directly from handset to handset, and not via the switch which simply handles directory and dialling information, and also provides the gateway to the outside world.

You might already have an IP switch

Many switches sold in the last few years have been 'hybrid' switches that use an IP based core, but contain enough electronics to support traditional digital handsets (usually from earlier versions of the switch) and appear to work in the same way. If you have one of these systems, you can simply licence a few IP extensions and try IP telephony out with a PC based softphone or by purchasing a few new handsets. The IP extensions will run seamlessly alongside the digital and analogue extensions you already have in use.

Good areas to try digital extensions are the IT staff (who like to have a play), home workers with good ADSL connections, and possibly staff in satellite offices with good WAN links. Trials with partners who work remotely from home from time to time can also show up the advantages of the system.

Digital and IP are not the same

A quick extra lesson to help avoid misunderstandings. While most of the world uses analogue and digital to distinguish between 'traditional' and computer based system, the world of telephony uses three separate terms. Analogue refers to phones based on a pair of copper wires carrying the voice signal as used in your house. Digital refers to systems that use digital processors and digital signals, but are almost always proprietary. For the technically minded, these are also link switched systems, where devices talking to each other are given a physical connection for the signals to go down for the duration of the call. IP based systems convert voice to IP packets, which can be sent out over any IP based network. Again, for the technical this is known as packet switched, and is a lot harder to make work.

IT staff do not understand telephones

It is worth bearing in mind that very few IT staff have any kind of background in voice or telecommunications, even if they have been administering your phone system. IP based phone systems present some unique issues for support as they are a mixture of data and voice technologies, and use (sometimes conflicting) terminology from both sides. If you are looking to implement a full voice over IP system, make sure your staff get some training and choose a supplier who can demonstrate that they understand both networking and telephony. Remember that the same rule applies the other way too, and very few telecoms engineers understand data networking, which is crucial to making the system work.

It's all about the data

While a digital phone system can rely on a good end to end connection to carry the voice signal, IP based phone systems break this up into lots of little packets which are sent over the networks and reassembled at the other end. The key to making a VoIP system work is getting this data across the network reliably.

Overall bandwidth, which used to be such a restriction, is no longer a problem. An uncompressed voice stream uses about 64K, but modern protocols carry very high quality voice in about 16K of bandwidth. Internally, this is too small to worry about over a switched network, and even for use over WAN links the equivalent traffic to a full ISDN30 line is only going to be 5% of the bandwidth of a 10Mb MPLS circuit.

What is much more important is the delay in moving packets across the network, known as the latency. For a system to work well, you need to be able to control the flow of VoIP packets, and give voice priority over other data. To achieve this, all the switches and routers need to support Quality of Service (QoS) and ideally a series of associated features such as VLANs (virtual LANS).

Many firms will have installed data networks with low cost unmanaged switches, which are ideal in simple situations. Unfortunately they will not provide the quality of call required, and VoIP systems running over them will suffer from digital echoes and noise (odd squeaks and whistles) and will probably drop calls from time to time. Managed switches, and especially switches that can handle IP routing at switching speed, cost many times as much as the simpler ones, but the benefits will not just be seen on the voice side, as the extra control should improve network reliability for all data.

In general, if you have a network that sometimes 'seems to be running slowly today', it will not be suitable for an IP based phone system. Of course, sometimes this is just the setup and configuration, and it is always recommended to get switches and routers set up by a specialist as there is a huge difference between a network that appears to work (it moves information around OK) and one that is working at its best.

DSL links are cheap and cheerful

The bad news is that cheap DSL links (ADSL for home users and satellite offices, faster SDLS for most offices) are not good for VoIP links between sites. The reason for this is the Quality of Service support. To get a good voice connection, all the equipment from one end to the other must understand how to prioritise voice packets over data packets. While you can control that in your own network, the shared basis of DSL networks does not allow this to work.

However, most providers of modern LES/MPLS circuits, which are in effect a new take on frame relay, do support QoS, although you may have to specifically request it. With these, voice calls become effectively free between locations.

Summary

There is nothing that complicated about running voice over IP. The main problem in real life is that it integrates the telephone system, the local data network and all wide area links, and in most situations requires a simultaneous upgrade of all three if you want to install a system for

the whole firm. It is worth remembering then when doing any networking upgrade to make sure that support for VoIP is built into the specification, so that when you finally come to change the telephone switch itself, the project is much smaller and more manageable.

Finally, it is worth noting that IP based voice solutions can often be used in a small way as a point solution for specific problems, often where geographically separate locations are involved.

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