

## The Promise of Voice over IP.

*For over a decade now the prospect of using the internet to carry voice calls has been 'next years technology'. Although there has not yet been any revolution in the way we route our phone calls, a number of enabling technologies, services and providers are now in place which can finally deliver a reliable, high-quality solution at very low cost.*

Most businesses and individuals who are serious internet users now have un-timed and effectively un-limited connection to the internet. Users can spend all day downloading data from the other side of the world at no added cost. And yet, when those same users make a phone call they are charged by the minute, whether the call is local, national or international. In practice the data may well travel over exactly the same route, on the same wires, owned by the same people. Only the billing mechanism and price is different. Wouldn't it be better for the end user if the telephone call went with the internet traffic with the attendant price saving?

Another attractive application for many businesses would be to connect home workers and sub-offices. The only on-going cost at each site would be the charge for an always-on internet connection. The remote sites could use the internet connection to log-in to the main office network and also run their telephones as extensions to the main office phone system.

A third use of Voice-over-IP technology is to replace the expensive telephone system that most companies require. The idea is to use existing computer hardware such as servers and Ethernet cabling to handle telephone traffic. Telephone system functions such as call-transfer and hold could be handled by software and telephone devices could just be plugged into a network point instead of dedicated wiring.

The three applications outlined above can be summarised as:

- Long-distance call routing.
- Point-to-point connections.
- In-house PBX systems.

We'll consider each of these applications in greater detail in a moment, but first let's have a look at the hardware.

### **VoIP Hardware.**

From the very beginning of the internet the idea of being able to call Auntie Gladys in Australia for just the cost of a local connection to the internet has had users scrambling for their headsets and microphones and running voice applications on their PCs. And it worked, though the need for a pre-emptive phone call to get Auntie Gladys ready rather spoil the effect.

In the real world, reliance on Microsoft work-station platform stability for telephone services is not practicable and actually, most people want a hard plastic telephone to hold to their ear. Headsets and microphones are just not acceptable.

### **VoIP Phones**

Now, assuming that there is some sort of Ethernet connection nearby, an ideal solution would be a hard plastic telephone with an Ethernet connection on it. Such a device is called a VoIP phone. At the simplest level a couple of VoIP phones on a network lets you make calls between them. The network can be just the wires running around your office. Or it could be two internet connections at opposite sides of the planet, as long as there is a route between them.

### **VoIP Gateways**

But what if you already have a telephone system (called a PBX) in your office and you want to set it up so that the existing extensions on your desks can access your VoIP/internet

connection as well as the standard phone lines? To do this you will need a device which connects between your telephone system and your Ethernet network. It's called a VoIP Gateway.

VoIP Gateways have telephone ports which come in two flavours. One flavour has a connection to plug a phone into, called an FXS port. The other flavour has a connection for a phone line, called an FXO port. So you can see that VoIP gateways can connect to either the trunk line side of your PBX or to the extension side of your PBX. For all this to work your PBX should be able to support connections to ordinary phones or ordinary phone lines. This standard is called POTS, which stands for Plain Old Telephone System. If your phone system uses only special digital phones or has only ISDN trunk lines, then you will need to contact your PBX supplier and ask them if POTS type ports can be provided as well.

You will find VoIP gateways available with one or more ports in various mixes of FXO and FXS flavours. You just select a device to handle the connections you require.

To summarise then, a VoIP gateway has an Ethernet port and one or more telephone ports. FXO ports behave as if they were a telephone and FXS ports pretend to be a telephone line.

## ***Routing the Traffic***

Now we have some hardware to provide the telephone interface we need to arrange to pass telephone traffic between the two ends. Actually, this is the hard part of VoIP. There is usually some way to achieve any desired application though some care may be required in specifying the routing hardware and software.

## **Point to Point Connections**

To call one VoIP device from another you can just 'dial' its IP address. The situation can get more complicated if the devices are on sub-nets working behind routers, but the principle is just the same. The path between the VoIP devices is more complicated, especially if NAT routing is being used, but with careful selection of routers the path can be made effectively transparent.

One way to set up the path across the internet is to use a virtual-private-network, VPN. This approach is especially suitable for connecting various branches of a company. Once the VPN paths are configured, each of the devices at the sub-offices appears as if they were on the same local network. No more need to think about routing at all. The easiest way to set up VPN is with a router which handles the VPN termination itself, such as the Solwise SAR-715PV.

Of course, in practice, it would be inconvenient to dial the full IP address for every call. To get around this, VoIP phones and gateways have 'Speed-Dial' memories. These memories give access to the correct path by just dialling two or three digits. VoIP phones and gateways can even be configured to 'hot-dial' a given address, that is, dial the number as soon as the handset is lifted (or when a call comes in for an FXO device). This function is especially useful for routing calls to your extension at the office through to your home.

Speed dial memories can also be used to store domain addresses, such as 'solwise-voip.co.uk'. This function means you can have access to VoIP services even when your ISP provides you with a dynamic IP (one in which your IP address may change from day to day). It also means you have control of your VoIP telephone 'number', even if you change service provider.

## **Long Distance call routing**

To minimize call costs to ordinary phone lines in a foreign country: First you need to get your call traffic onto the internet using a voice-gateway in conjunction with your internet connection. Second, you need to get the traffic delivered to an internet address in the foreign country. Third, you need to get your call off the internet and back into the phone system of

the destination country. That way all you will be paying for is the call within the destination country.

This third phase can be achieved in two ways. If all your calls are to (or from) one or two target countries then you could buy an FXO port gateway and just plug it into some local phone lines there. Obviously this will entail having an office in the destination countries. Think of this as a DIY solution. It is likely to be a contender if you operate a foreign sub-office or similar.

A more common solution for the 'off-ramp' phase is to use a third-party service. These services are becoming increasingly common, very practicable and very economical. Although you will pay by the minute for connection through the service providers system, this is usually more than offset by the better rates they get on call delivery in the destination country. Such service providers are usually registered telco's in the destination country and thus pay only for the 'last-mile' delivery of calls. The resultant end user rates are usually much lower than the cost of a standard national call within the UK, or wherever you are.

These IP-Telephony services use software called a Gate-Keeper. This software keeps track of users billing and routes calls in the most appropriate way.

### **In-House PBX Systems**

By putting VoIP telephones at each desk and running some GateKeeper software you can use your computer network as a telephone system. This route is excellent if you need unified messaging where faxes, voice messages and emails are all stored in individual users own boxes. Unfortunately there is only one significant manufacturer of this type of system, Avaya (formerly Network Alchemy), a division of Lucent.

The lack of competition results in a rather higher price than one might expect to pay for an equivalent conventional PBX and you may find the feature set excludes some features you would expect to find.

No doubt new brands will appear shortly and we at Solwise will definitely be monitoring this developing field.