# It is a very aggressive evolution

INTERNET TELEPHONY

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Internet Telephony has been one of the hottest topics in the Internet development during the past few months. It has been celebrated as a new communication paradigm, a revolution in the making at one extreme or condemned as a toy and pure nonsense at the other. We believe that – as in most cases – the truth lies somewehre in the middle. Internet Telephony is an exciting development that will change the telecommunications landscape significantly over time, but it is rather a very aggressive evolution than a revolution.

We are convinced that the Internet will join the existing networks in being a carrier for voice, but it will not any time soon replace what we know as the telephony network. Rather a convergence will take place

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that causes a new broadband Internet to emerge step by step. This new network will carry voice and data and have properties of switched and routed networks.

Today, Internet Telephony is mostly restricted to PC-to-PC communication. The basic principle is simple (Fig. 1): convert voice to a traditional IP data packet stream and transport it over the Internet just the same way as one would transport other data packets. Consequently, the same basic equipment is used as in traditional Internet communication (e.g. via email). One only has to add sound capability in the PCs and some extra software. The software is applying some 'tricks' to make the overall scheme work. The critical element is delay. If it gets too large, communication is no longer possible; therefore, the software minimizes bandwidth requirements and takes measures for reconstructing packets that arrive too late or are lost on the way. Nevertheless, there is a limit of what can be done today.

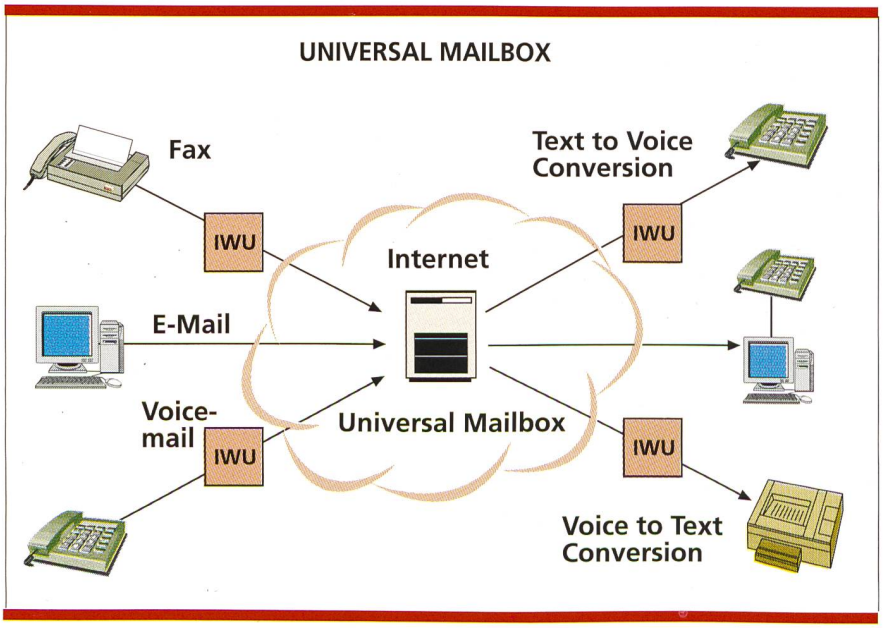


Fig. 1. Internet Telephony: How does it work?

## The Internet is different than traditional networks

The reason is that the Internet is constructed quite differently than traditional networks. It was designed as a data network with no real-time applications in mind. The chart 'Traditional telephony vs. Internet Telephony' shows some of the most significant differences. This level of difference is not surprising. Asynchronous data communications have very different requirements compared to real-time synchronous services. In data communications for example it doesn't matter if packets arrive in a different order or if a packet gets lost. Protocols can be set up that buffer and rearrange the packets or ask for a retransmission. In real-time applications, however, there is no time for this.

So despite of the variety of products on the market, many technical problems remain. Internet Telephony quality is nowhere near the quality of existing traditional voice services.

## What is the attraction of Internet Telephony?

Why do we spend time and money developing something that already exists in the form of traditional telephony? Internet Telephony has mainly two prospects: lower tariffs and integrated voice/data services. Internet Telephony is truely cheap, and there are quite a few reasons why it has a cost advan-

tage over traditional networks. This cost advantage becomes striking when you compare the voice-based fax service or even traditional mail with Internet e-mail.
The slide 'Comparison costs to deliver a 42-page document' shows the comparison cost to send a 42-page document to various locations around the world. Internet cost is based on fixed monthly cost divided by portion used to send document. Assuming that traffic eventually moves to least-cost network, then Internet is the sure winner. Internet cost basis may eventually change, but it will not increase to current voice network levels; therefore, Internet is important to any communications company.
However, competition and the reduction in bandwidth and equipment cost will eventually bring down voice pricing regardless of the Internet development. Regulation of Internet traffic might further narrow the gap. At some point in time tariffing will be based on quality of service rather than on the used network type.
In any case, carriers will face reduced income from providing voice services, and they need to react. In this respect the Internet provides an important opportunity to create new services and revenues. These services can and will take advantage of the Internet and of existing traditional networks.

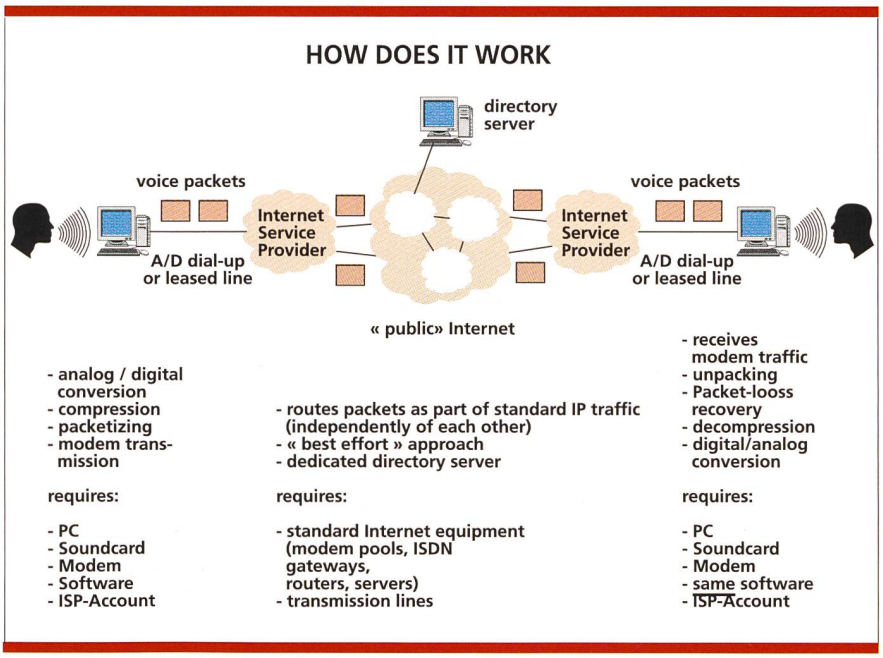


**Fig. 2. Internet Telephony applications: universal mailbox. (Fig.: Siemens)**

## Bandwidth is continuously added to the Internet

Today's Internet is plagued by severe bandwidth problems in access and core. This causes problems for all services ('worldwide wait'), but real-time services, like telephony are most severely affected. At worst the resulting delay could cause a telephone connection to break down completely.
Nevertheless, bandwidth is continuously added to the Internet. Especially new access and backbone technologies as well as new protocols will dramatically improve the ability of the Internet to carry real-time services like telephony, radio and video.
We clearly believe that the Internet will move to a broadband topology over time. But even today network operators can take advantage of technologies available to upgrade their portion of the network to broadband, i.e., creating a regional broadband Internet. This allows them to offer controlled quality of service for real-time services (such as voice services) on their portion of the network.
Only when these regional broadband networks proliferate and the Internet backbone gets upgraded, we will have a ubiquitous broadband network.
Interworking units (IWU) that are under development now and will become available this year will allow voice traffic to move from the Internet to the traditional network and vice versa. This allows an Internet Service Provider to offer worldwide voice services to its customers, even if these services are only partially transmitted through the Internet. The main applications will be value-added services that integrate voice and data. As the quality of voice services on the Internet improves, more and more companies will bring voice traffic to the net – even for phone-to-phone connections. But for many years to come, the PSTN network will remain the most important carrier of voice traffic.

## A universal mailbox

Here is given an example of a value-added application using both traditional networks and the Internet. A universal mailbox (Fig. 2) on a server within the Internet could store voice, fax and text messages. These messages could be sent from telephones, fax machines or PCs and accessed through the same devices. Thus, one could send voice messages from a PC and retrieve one's e-mail through the telephone transparentely, using an IWU with text-to-voice conversion.
Another example of an integrated voice/data service is a telephone call during web browsing. There are a variety of applications for such a service, ranging from customer service to home shopping and home banking. The user need not be aware of where the call terminates: at a PC or a telephone.
Intelligent Internet services can be implemented combining intelligent network and management features of existing networks with the capabilities of the Internet. Thus, a 'Free Internet' offering could be made, where a company both pays the telephone and Internet access charges for the time a customer spends on the companies web page. Management features could be accessed directly by a customer through the operator's netpage (e.g. for changing the billing plan), significantly reducing the operator's cost. The examples illustrate the potential of 'Intelligent Internet' services. [7]

(Quelle: PK Siemens)

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