



## ■ Self-Organizing Telephone Networks

# Phones with Brains

*Siemens is developing telephone systems that work without central switching. The phones communicate with one another independently — via the Internet.*

**F**ranz Kneissl picks up the receiver and punches in a phone number. A phone next to him rings, and the answering machine switches. “One, two, testing,” says Kneissl, who is in charge of Micro Business Products at Siemens Com in Munich. Kneissl has just established a telephone connection over a distance of 50 centimeters — a feat that few people would consider sensational. Nevertheless, his demonstration marks a premiere. The two telephones aren’t connected via a telephone system; they’re linked using a LAN (Local Area Network), a technology normally used to network computers. Telephoning over Internet connections — the Voice over Internet Protocol (VoIP) — has been around for quite a while. What’s new, is that the wires on Kneissl’s lab table terminate in the jack for a LAN. The two phones are so smart that they can communicate with each other directly without a switching system.

In terms of business voice communication needs, the Siemens innovation is a paradigm shift. Calls have always been handled by central telephone systems linking phones in a star pattern, or via a central computer for VoIP calls over the Internet. In both cases, “dumb” phones do little more than convert sounds

into electrical signals, and vice versa. Functions such as three-party conference calling and call forwarding are organized by the central exchange.

According to Kneissl, the telephones of tomorrow will be different. They’ll organize themselves. That’s old hat on the Internet. Music file-sharing services, for example, don’t use a central computer — the data is on users’ personal computers, which exchange music files with one another. But Siemens is transferring this principle — the technical term is peer-to-peer (P2P) — to telephones. The system needs a gateway (which Siemens offers) only when switching from a company’s internal network to the public network. And even if this fails, company employees can continue to call one another. If a phone is out of service, another one automatically takes over the function of the answering machine.

This innovation from Siemens Com Enterprise Systems, which is being tested in labs in Witten and Beeston, England, is appealing because it’s a pure software solution. The system uses conventional VoIP phones. The difference is in the software, which imbues the phone with intelligence and an identity. Via a telephone’s plug-in connection, the program

searches the local network for other phones and automatically allocates the next free number to the first phone. The configuration is saved in the P2P network, which maintains the allocation of the numbers even if a phone isn’t working. No electrical outlet is needed as power is fed in via the LAN cable.

Only the software has changed, so the phones won’t cost more than comparable models. And by eliminating the costs of a switching system or a VoIP server, the system becomes even cheaper. That’s good news, particularly for small firms that can simply plug in their phones to their existing LAN. For now, the number of phones is limited to 30, for purely practical reasons. More users would mean the end of the cost savings over the conventional, centrally controlled solution.

And Kneissl has even bigger plans for P2P telephony — for example, with cordless WLAN phones. These could set up ad-hoc wireless communications networks with other WLAN devices or serve as access nodes for laptops. The technology will get really interesting when the music file sharing concept is taken to its logical conclusion. The phones could exchange contacts from the numbers stored in memory, for example. And video telephony, which has often generated great interest without taking off, could have another shot at success. With fast LAN networks, images are transmitted without flickering, and there is a direct connection between two phones, without detours.

What works for a company, can also function for the public. Internet access providers looking to get into the telephony business could avoid the costs of expensive computing centers. The gateways that transfer data between company and public networks could function as public relay stations. To get there, however, will require the development of improved algorithms for searching and data synchronization to serve larger numbers of users. Put it all together and the Internet, with P2P telephony, could one day become a virtual, global telephone system. ■ Bernd Müller

## PHONE NETWORK WITHOUT CENTRAL SWITCHING

