Bringing the world together

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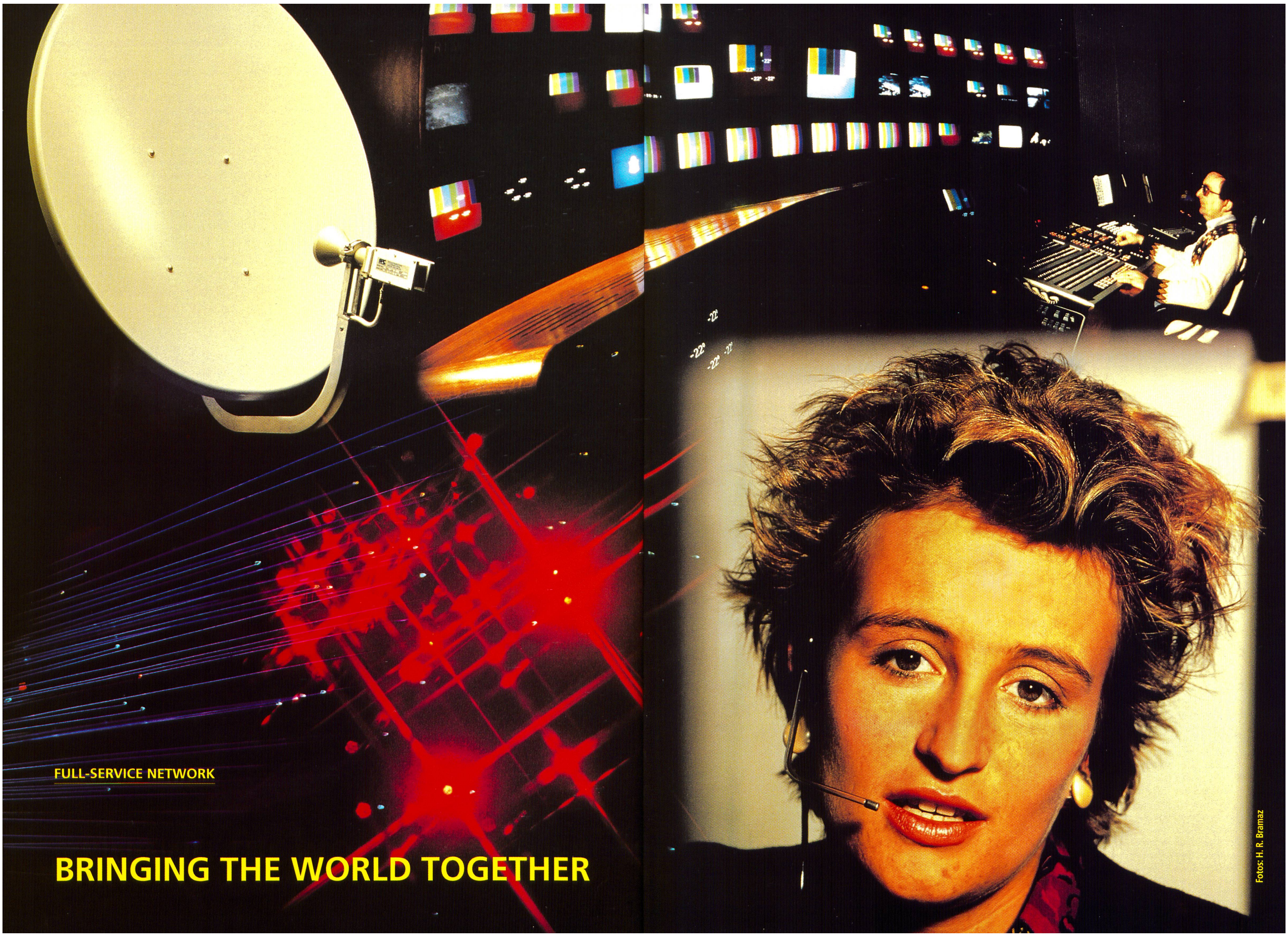

FULL-SERVICE NETWORK

BRINGING THE WORLD TOGETHER

Fotos: H. R. Bramaz

No longer a vision lying just over the horizon, the dream of achieving a global broadband network is within reach – a network that will combine the power of the current phone network to reach anyone, anywhere with the capacity of cable TV. Voice, data, audio, video images and graphics will be delivered via the network to homes and businesses. The cable-TV, telephone and personal computer businesses are converging into a single industry, dedicated to creating what are being called full-service networks.

The industrialized world, particularly the United States and Japan, boasts the best examples of modern telephone networks – if you're making a voice telephone call, that is. Service is nearly universal. Digital switches and high-speed fiber optics handle calls instantaneously and reliably. Supporting the voice network is a large computer-based intelligent network that acts as traffic cop and traffic manager.

STEVEN TITCH, STOCKHOLM

But despite the billions of dollars phone companies and newer wireless and cable-TV providers have collectively invested in the network, it still lacks the capacity to handle the data-intensive 'new media' services envisioned for the future.

'New media' itself has become, if anything, another industry catchphrase. For lack of a better word, it describes the entertainment and information services that will be available in an age of convergence. Some examples of new media already exist – CD-ROM for PCs and the Internet's World Wide Web sites are two. Other, more futuristic examples include interactive shopping and video on demand. In telecommunications, new media services are generally those that involve customer interaction with a computer or data base that provides voice, data, video, audio, images and documents, or any combination of these, through a direct, one-to-one connection.

But to handle new media, the new network must be robust enough to transmit the voluminous data files that contain all this information. At the same time, services must be inexpensive enough to be universally accessible. The major obstacle is the lack of bandwidth capacity needed literally to bring these services home.

'In the U.S. we need to upgrade the network,' says Sultan Zia, vice president and general manager of Digital Equipment Corporation's Video Interactive Information Services unit. 'We've got to get out of the archaic network.' Zia sees more progress outside the United States, where heated competition, as in Britain, or national mandate, as in South Korea, are driving improvement.

Bandwidth refers to the amount of information that can be delivered over a particular transmission medium. Broadcast TV is an example of a high-bandwidth, or broadband, service. The radio frequency that carries a single television channel has enough bandwidth to carry 30 color video frames per second plus stereo sound. The coaxial cable used by cable-TV providers has even more bandwidth. It has enough room for some 60 to 100 TV channels. Fiber optic networks offer even more bandwidth than coax.

On the other hand, telephone connections to the home are very much narrowband. While it is true that long-distance networks use fiber optics, these networks amalgamate tens of thousands of calls. The line coming into your home is copper. And it is roughly limited to the amount of bandwidth that's needed to transmit human voice.

If you think of bandwidth as a water faucet coming into your home, your cable-TV line offers a cascade that could fill a bathtub in seconds, while your phone line provides a trickle.

In fact, after the security question, bandwidth limitation is probably the biggest problem that vexes Internet content providers today. As a user, you can have the latest Pentium computer, with scads of memory and processing speed, but because you must rely on the phone network for connection, downloading large amounts of information, especially graphics, can be time-consuming and frustrating, even with a relatively snappy 28.8-K bps modem.

One important element the telephone network does have is a sophisticated matrix of switches that can route calls anywhere in the world in a matter of seconds. And it can reliably and accurately manage, track and bill those calls. It has an enormous underlying network of computers that can detect and fix problems and faults in most cases before users notice them.

The phone network is also two-way and can be used for interactive applications. The most basic of these is a voice-mail system or another automated response system. On reaching a voice-mail system you can press 1 to leave a message, 2 to go to an attendant or 3 for more options.

Cable-TV networks, on the other hand, though capable of transmitting enormous amounts of information, are one-way and nonswitchable. If you turn on Channel 10 right now, you will see the same thing as anyone else who's watching Channel 10 at the moment. The only interactivity you have is the ability to change a channel, set your VCR timer or order a pay-per-view program. Cable systems do not yet have the ability to be as individualized and user-specific as telephones.

But both sides want what the other has, and both sides are slowly trying to make their way there.

The Internet as prototype

As an example, let's start with the Internet, which is becoming an increasingly popular way of supplementing conventional print and TV advertising. It's become the vogue lately to bash the prospects for Internet com-

The Internet is becoming an increasingly popular way of supplementing conventional print.

merce. A recent study of national computer habits conducted by the Times Mirror Center for the People and the Press showed 14 % of American households have successfully used modems to get on-line.

The spin most of the press took was that the masses were resisting the information revolution. Another interpretation, however, could be that, given the bandwidth limitations of the phone network, it is phenomenal that as many U.S. households have dabbled with the Internet or other on-line services.

Why? Because today accessing the Internet, especially the World Wide Web, requires a tremendous amount of patience. Again, this delay, or latency, as the industry is beginning to call it, is not inherent in the hardware or software. It's purely a function of the narrow pipeline that runs into everyone's home. Once this problem is overcome – and once on-line services become accessible through means other than a personal computer – you can expect the number of households using on-line services to grow dramatically and the essential nature of online services to become truly multimedia.

But how close – or how far away – are we? Returning to the Internet example, services exist that can boost the speed of Internet delivery to as fast as 144 K bps – five to ten times faster than most of the modems currently used for Internet access. This, of course, is ISDN, the Integrated Services Digital Network.

There are many misperceptions about ISDN. When it was first introduced, many felt it was a technology in search of an application. Its uptake among businesses throughout the late 1980s was low. By 1990, it was being dismissed as a dismal failure.

But the failure was all on the marketing end. ISDN technology works fine. If anything, the biggest mistake was in not deploying universally from the outset. Instead, a monopolistic mindset led them to roll out the service in the tradition of the old Bell system – target large customers first, deploy selectively and charge more.

Ironically, the largest users had only limited use for ISDN, and by charging more, the telephone companies offered them no incentive to switch from leased lines. What the Bell companies have only begun to realize in the last few years is that ISDN is ideally suited to small and medium-sized businesses – and now residences, because it provides unprecedented telecommunications power at a very low cost. You don't need fiber, you don't need coax, you don't need any really expensive or bulky equipment. The only unfortunate aspect about it is the way the phone companies have failed to capitalize on it.

If the telcos had had better foresight about ISDN, perhaps they would be in a better position to fend off the cable challenge. Cable companies are looking for ways to offer telephone-company-type services. One extremely good opportunity right now is Internet access, particularly because cable companies can immediately overcome the bandwidth bottleneck problem. Cable companies such as Time Warner are testing cable modems that operate at up to 10 Mbit/s, and this technology should be commercially deployable in 1996. What's even more significant than the speed at which information can be transferred is that once cable-TV providers enter the Internet access business, the home terminal will no longer be the PC, but the TV set. The user interface is no longer Windows and a mouse, but an ordinary remote-control device.

Architectures

Increasing bandwidth capacity in the local loop is the most costly aspect of getting broadband services to the home. Internet services are easy to provide because they are principally one-way. The best and most cost-efficient method of delivering two-way interactive services remains a puzzle.

Last year, hybrid fiber/coax (HFC) systems were generating a lot of attention. In such a system, traffic is carried from a central office or host digital terminal over fiber to a node that splits telephony traffic onto conventional twisted-pair and video traffic to coax. Each fiber node would support 200 to 500 homes.

Staging something of a comeback is fiber to the curb, now known by the somewhat more technical if misleading term 'switched digital video'. As with HFC, switched digital video has a host digital terminal that drives fiber to an optical network unit (ONU) that then bifurcates telephony onto copper and video onto coax. The difference is that the ONU is at curbside and serves only 24 households, compared with the several hundred that HFC can handle.

Lastly, carriers are looking at technologies that boost the bandwidth capacity of twisted-pair copper over short distances, especially asymmetrical digital subscriber line (ADSL). Most telephone company video trials worldwide include ADSL, although more and more carriers describe it as purely interim.

Also being discussed are wireless applications, including digital wireless broadcast involving 28-GHz radio beamed from a nearby head end to a dish on the home. This approach is not much different from classic master antenna television systems, although, because these digital wireless systems operate in the very high microwave frequencies, the signal has greater capacity and clarity.

These access solutions are available from a number of vendors, including Ericsson's Broadband Network Systems business unit, which is made up of Ericsson Raynet, a joint venture of Ericsson and Raychem.

Although cost weighs heavily in decisions about carriers, the capabilities of each technology factor into the choice of architecture. 'One of the more critical aspects,' says Rich Sims, international marketing manager for Ericsson Raynet, 'is the "upstream" capability of each.'

Upstream refers to the speed at which information is transmitted from the customer to the server in the network. While all these architectures provide suitable downstream capacity, some of them are better suited than others for full two-way broadband interactivity.

'What are the upstream requirements that are going to drive the technology?' asks Sims. '860 MHz to 1 GHz is enough for downstream, but the tricky part is upstream.' Sims suggests that HFC will be suitable in the short term – which he characterizes as five to ten years – for cable-TV applications. Nonetheless, for consumers to benefit from truly interactive broadband functionality, where downstream and upstream transmission is virtually synchronous, switched digital video will ultimately have to be deployed.

Cable companies have a slight advantage on the transmission and distribution side, because they already have extensive coax deployment.

Telephone companies have the switching elements of the network in place and are now upgrading them with asynchronous transfer mode (ATM) adjuncts that can switch large amounts of data – say, a movie – all at once. Already, smaller ATM switches are being chased by businesses worldwide to support business services, including videoconferencing, that are bandwidth-intensive and have in the past required more expensive solutions such as leased lines. Sims ultimately sees the broadband network of the future supported by distributed ATM switches.

Most experts, including Sims, believe the earliest availability of services won't be until late 1996 or early 1997. Part of the reason is that many carriers are still unsure about the cost. Another, more technological reason is the question of which software and operating systems will support the sophisticated network transactions involved in broadband delivery.

Looking beyond the 'hype'

The ultimate goal of cable companies and telcos is not merely to provide easy, fast access to the Internet. Their ambitions go farther, and that's where some of the 'hype' enters the picture.

Perhaps the analogy of PC and hard drive is best. The basic operating programming and system software used by a PC is stored on the hard drive, as are applications like word processing, spreadsheets, games, etc. The more storage capacity on your hard drive, the more programming you can accommodate.

What carriers hope to do in the next five to ten years is to create very large hard drives in the network. So, rather than play Microsoft golf on CD-ROM with a selection of three or four golf courses, you can have a data base of hundreds just a broadband phone call away. Broadcast-quality video programming can be delivered on demand from huge data bases, all from the network. Anything that can be stored digitally can be made accessible.

Yet, just like the PC today, the network will require an operating system to manage itself.

DOS and Windows are examples of PC operating systems. They tell a computer how to run, how to process information and how to treat other software. They also provide an interface that allows users to navigate easily through and between applications. Extending the 'hard drive' into the Internet means the network will have to have its own operating system, one that instructs it how to run, where to route information and how fast, and how and whom to bill or credit.

To facilitate multimedia applications and services, software manufacturers such as Microsoft and Oracle are striving to extend familiar PC operating systems into the public network. But serious questions remain about how PC operating systems, which are notoriously buggy, can be safely and reliably expanded or scaled to serve the thousands of users who would be accessing broadband services.

'Reliability in the telephone market is job one,' says Tony Bawcut, telecom marketing manager for advanced technology at Microsoft.

As such, many software developers are forming alliances with mainframe computer manufacturers, especially those that have specialized in fault-tolerant computing. Tandem Computers, one such vendor, is planning to provide Windows NT, users with scalability and fault tolerance through its ServerNet architecture. As part of a license Tandem has with Microsoft, the computer company is trying to make some of the basic features of ServerNet part of Windows NT, so users can drop the Microsoft operating system into any ServerNet-compatible computer, according to William Heil Jr., vice president of product management for Tandem's systems products group.

Get to know multimedia

While it is true that the industry is just crossing the threshold of the broadband era and that it may be some time before real multimedia services emerge, there is no excuse for carriers to delay investigation and evaluation of the technology. Both telephone companies and cable companies worldwide should be learning the language of broadband today, from the hardware to the software. A good suggestion is to use the Internet and the World Wide Web. And as you do, think about their potential for your business and your customers. In terms of electronic delivery vehicles, broadband and narrowband, learn what's available now and do the best to get the most from it. And if carriers and users aren't satisfied, they should be willing to push for more. [7]

Source: © 1995 'Ericsson Connexion, The International Communications Magazine'.

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ZUSAMMENFASSUNG

Die Welt rückt näher zusammen

Der Traum des globalen Breitbandnetzes, der unlängst noch in weiter Ferne lag, ist jetzt in Reichweite – ein Netz, das die Leistung des heutigen Telefonnetzes mit der Kapazität von Kabel-TV vereinigt und jedermann überall zugänglich macht. Sprach-, Daten-, Audio-, Video- und Grafiksignale können über dieses Netz ins Haus oder ins Büro geliefert werden. Das Kabel-TV-, das Telefon- und das Personalcomputer-Geschäft verschmelzen zu einer einzigen Industrie, deren Ziel es ist, sogenannte Full-Service-Netze aufzubauen. Obwohl die Industrie erst an der Schwelle zum Breitbandzeitalter steht und es noch etwas dauern wird, bevor echte Multimediadienste verfügbar sind, besteht für die Betreiber kein Grund, weshalb sie die Technologie nicht unverzüglich evaluieren sollten. Sowohl die Telefon- als auch die Kabelgesellschaften weltweit sollten die Sprache der Breitbandtechnologie erlernen, von der Hardware bis zur Software. Ein gutes Mittel dazu sind das Internet und das World Wide Web. Denken Sie dabei nur an das Potential für Ihr Unternehmen und Ihre Kunden! Machen Sie sich vertraut mit dem, was auf dem Gebiet der elektronischen Transportmittel, Breitband und Schmalband, heute erhältlich ist, und wie man aus diesen den grösstmöglichen Nutzen ziehen kann. Wenn die Betreiber und Benutzer damit nicht zufrieden sind, sollten sie höhere Anforderungen stellen.