

Solving chaos. The new Mobile Positioning System (MPS) is creating new services for several target groups. Efficient traffic control is one such area of application. Transport companies, for instance, can easily keep track of the fleet. Foto: Lars Åström/Världsbilden

New technology guides the traffic

Ericsson's new technology for GSM-based positioning is providing mobile operators with the possibility of offering entirely new services. Conventional GSM phones can, for example, be used for efficient traffic control, for localizing emergency calls and for personal services such as the location of the nearest bank or restaurant.

9

Technical supplement

This issue of Contact is accompanied by a supplement packed with information about technical solutions and trends. Included in the supplement are details about the two main tracks being taken in the development of the next generation of broadband mobile systems.

NEWS

Many systems eliminated

In slightly more than two years, the majority of Ericsson companies in the world will have replaced their systems with R3. In total, the company is scrapping more than one thousand systems.

12-13

Hard-won Telfort

In the battle to win Telfort's latest order, Ericsson installed its equipment before the negotiations were complete. Adriana Boersma, customer account manager, took a major risk, but won the contract.

Adriana Boersma



20

TDMA network in Brazil

In just six months, the Telia consortium Tess has constructed its TDMA network in Brazil.

16-17

PKI supports security

With PKI technology, only one password is required for several data systems. This enhances security.

21

contact

The publication for Ericsson employees all over the world

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Miami – a link with Latin America



A typical view of the financial district in Miami. Many of the flights out of Miami are destined for Latin America. The city is a financial and commercial center for Latin America. Foto Mia Widell Örnung



Kenneth Boiardt, Bengt Forssberg and Lena Sköld moved to Miami in order to be in closer contact with market units and customers in the Latin America market area.



Ericsson has its Latin America market area offices on the fifth floor of this building, located on the island of Brickell Key.

LATIN AMERICA MARKET AREA

January 1st marked the launch of Ericsson's new global organization. Four market areas were created, including one for Latin America.

Executive Vice President: Bengt Forssberg

Market units: A total of 13. The Caribbean, excluding Cuba, forms one market unit and the

countries of Central America form another. The other market units correspond to the various countries within Latin America.

Telephone density: Wireline 12 percent, wireless 4 percent

Growth: -0.5 percent during 1999 according to the International Monetary Fund.

"Tres dolares, por favor." The cashier at a store in Miami's financial district addresses people in Spanish first.

Nor is he alone in doing so. Spanish is the native tongue of 60 percent of Miami's residents.

And it's here that Ericsson opened its Latin America market area office just over one month ago.

Miami, Florida teems with Latin American culture. The sounds of salsa music can be heard from the trendiest restaurants in Miami Beach, the city's banks have many Latin American companies as customers and a majority of the non-stop flights out of the city's airport head directly south. Miami is a point of contact, a commercial and financial center, for Latin America.

"Miami is unbearable when it comes to ease of air travel to most countries," says Bengt Forssberg, who heads the Latin America market area. Since his move to Miami, he has spent most of his time on the road in the Latin American countries.

Synergy comes easier

The Latin America market area will make it easier to generate synergies and provide better support to market units than in the past.

"It conveys a sense of belonging and allows better coordination and comparisons between market units in the region," says Kenneth Boiardt, who is part of the Latin America market area management team.

Through market area manager Bengt Forssberg, who is also a member of the corporate executive team, markets and customers are getting a stronger voice in corporate management.

"We've received very positive responses from our customers. I've already noticed that we're out among the customers more than before."

Monopolies disappearing

"It's also a response to the developments which are occurring. State-run operator monopolies are disap-

pearing more and more. In their wake, global operators such as Telecom Italia, Bell South and the other baby Bells, France Telecom and Telefonica are entering the market," says Bengt Forssberg.

He points towards the skyscrapers in Miami's financial and business district, which are clearly visible from his new office on the little island of Brickell Key.

"Telefonica, for example, has its regional office in the building over there."

Improved relations

Good customer relations are becoming increasingly important. Even though the Ericsson brand name is strong, there are certain indications that customer satisfaction has recently decreased somewhat.

"Any indication that a customer is dissatisfied needs to be taken seriously. We need to strengthen our KAM organizations for our key customers, and make sure that we have competent Key Account Managers. We've seen in Argentina, among other places, that a very dedicated and socially competent KAM can do wonders for customer satisfaction," says Bengt Forssberg.

Fast and accurate deliveries do, of course, play a big part in how satisfied a customer is.

As a result, the Latin America market area is now implementing a comprehensive Time-To-Customer program in cooperation with the business segment network operators.

Mia Widell Örnung

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Weak sales trend will be broken

The first six months of this year were tough ones for Ericsson, which also counts for the Latin America market area. First quarter earnings amounted to SEK 4.9 billion in Latin America, a reduction of 12 percent compared with the same period last year. Meanwhile, the economic situation in Asia has recovered somewhat and there sales have increased.

"This is mainly due to the economic turbulence in Brazil, which resulted in a devaluation of the real in beginning of the year. We have seen effects on a large number of countries in the region. Furthermore, the sales were very strong during the first quarter last year.

Sales were down in Chile, Argentina, Venezuela and Mexico. Last year, the biggest operator in

Mexico, Telmex, made major investments to upgrade its network and make it Y2K compliant. Despite devaluation in Brazil, Ericsson managed fairly well, increasing sales there by 12 percent. But major telecommunications investments have been postponed until the future.

"We need to increase our efficiency by an average of 10 percent. Ei-

ther through increased revenue or through reduced costs. The second quarter is already starting to look a little brighter," says Bengt Forssberg, Latin America market area manager.

The number of workers employed by market units in the region has been cut by approximately 20 percent, from 7,661 at the end of March 1998, to 6,236 at the end of March this year. This includes Brazil where approximately 700 jobs were outsourced last year.

"We're being very restrictive in our new recruitment right now."

Even as the market area needs to cut costs, it must be aggressive, especially when it comes to datacom

and IP products. The Internet is experiencing rapid growth in Latin America. In the region, the number of Internet users increased by 300 percent during 1998.

"We need to find more market unit enthusiasts who can sell these products. This is a new world for us. Don't follow your seniority rosters; choose the guy with green hair and an earring instead if he's the best for the job," suggests Bengt Forssberg with a twinkle in his eye, speaking to the 13 market unit managers who gathered in Miami this day for a market area meeting.

Mia Widell Örnung

Symbol – new IP partner

Ericsson's Enterprise Solutions business segment has reached an agreement with the American company Symbol Technologies Inc.

The agreement involves joint marketing and technical cooperation between the two companies in order to provide integrated wireless LAN for both telephony and datacom based on IP.

"Now we'll be able to combine Ericsson's expertise with mobility in the workplace, data networks and IP telephony with Symbol's expertise in wireless LAN and IP telephony solutions, including user terminals. Our mutual customers will gain access to groundbreaking technology from two industry leaders," says Richard Braveman at Symbol Technologies.

Supplying the new switch

Ericsson will supply its new IP-based business switch, WebSwitch, along with solutions for computer-controlled telephony and access solutions to Symbol Technologies.

Symbol, in return, will supply its NetVision IP telephones, hand-held computers and Spectrum 24 access nodes for wireless LAN.

"Working together, Ericsson and Symbol will be in a position to offer an entire product family and a shared marketing channel that will allow companies to view data and telephony as a single resource," says Haijo Pietersma, Executive Vice President, Enterprise Solutions business segment.

Both companies using open standards

Since Ericsson and Symbol plan to develop platforms and customer solutions based on IP telephony using their combined technological resources, both are using open standards.

Ericsson will, for example, offer flexible, wireless high-speed solutions for business and consumer applications based on the Hyper LAN2 standard. Symbol's Spectrum 24 and NetVision follow the IEEE's 802.11 standard and the ITU's H.323 standard.

"We're expanding our ability to integrate applications, improve our utilization of resources and reduce costs, while simultaneously assuring our customers productivity, profitability and competitiveness," says Haijo Pietersma.

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SYMBOL TECHNOLOGIES

Symbol Technologies Inc. is an international leader in mobile data systems based on wireless LAN using IP technology.

Symbol has an extensive customer base in the business, organizational and industrial customer segments. Symbol's wireless LAN solu-

tions have been installed at more than 40,000 customers. Items of Symbol equipment in use around the world currently exceed seven million units.



Preparation started for Telecom 99

There are plenty of telecom trade fairs out there. But the one being held this autumn in Geneva, Switzerland, promises to be one of the biggest. Its almost time for Telecom 99, which takes place every four years, so book October 10-17 now.

Many people are already working on preparations prior to the trade fair. In terms of floor space, the trade show is smaller than the famous CeBIT trade show in Hanover.

More specialized audience

But Telecom 99 has a more specialized audience which makes it at least as important

Telecom 99 will be held in Geneva this October. This photo is from 1995, when the last Telecom trade fair was held. Photo: Lars Åström

as CeBIT. The International Telecommunications Union (ITU) is the host for the show.

"We'll be focusing on datacom and third-generation mobile phone systems. We have to do a fairly hard sell of our products," explains Sten Yondt, who is responsible for Ericsson's participation in the trade show.

Lots of info about the show

Already, there is a great deal of information about the show and Ericsson's participation in it. Check out the intranet or go directly to the trade show's own web page. It's already possible to book hotel rooms and travel on the intranet. One good piece of advice is to make plans early. Event organizers are expecting 200,000 visitors. All exhibition space is already fully booked by more than 900 exhibitors.

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<http://www.itu.int/telecomwt99/index.html>

Off to a flying start

The work of integrating TouchWave with Ericsson has begun. Mats Victorin, of the Enterprise Systems business unit, is in charge of the project. It involves the quick release of the new WebSwitch product in the prospective IP telephony market.

"I was in Australia when the deal was announced," explains Mats Victorin. "When I came home, I simply repacked my bag and flew immediately to Mountain View, outside San Jose, California in the U.S., in order to meet the 27 new employees."

"We discussed the future from many different perspectives and I got to know the company's management, which is headed by Samir Lehoff."

Legally, TouchWave now belongs to Ericsson Incorporated in the U.S., but it is operated as a product unit within the Enterprise Systems

business unit. Effective immediately, the only name that counts is WebSwitch.

One of the most important questions to solve is how to adapt the WebSwitch to the European market. Alexander Grill, from the Small Systems product unit in Vienna, is assisting in this endeavor. A mutual expert exchange between the two product units has already been started. And contacts have been made with a number of larger operators and other distributors, who want to see a quick start-up of sales.

What's important now is to find a way to quickly start mass producing the WebSwitch. Negotiations are in progress with several potential contract manufacturers. A test manufacturing contract will be awarded to one of them in the near future.

"As the product continues to develop and the volume of sales increases, the organization in Mountain View will be reinforced," says Mats

Mats Victorin together with Ericsson's new WebSwitch, which is undergoing thorough testing at a lab in Stockholm.

Photo: Peter Nordahl



Victorin. "The most important thing now, however, is to retain the flexible business culture that exists by not implementing some sort of Ericsson bureaucracy."

In order to obtain the best possible communications between the WebSwitch product unit and the rest of Ericsson, IT services have already installed a connection to Ericsson's intranet.

IN BRIEF

Large GSM order to China

Ericsson has received an order worth USD 290 million to construct a GSM network in the Chinese province of Guangdong. The project will start in June and is scheduled to be completed by the beginning of the year 2000.

As a result of the expansion, the operator – Guangdong Mobile Communications Company, which is owned by China Telecom Hong Kong Ltd – will be able to double the capacity of its GSM network to 8 million subscribers. Ericsson has supplied mobile systems equipment to the operator since 1987.

New technology for mobile data

Mowic, a new Swedish mobile data operator, has chosen Ericsson's PMD 8000 system for the 450 MHz network it is constructing in Sweden.

The new Mobitex-based technology will be able to handle packaged data transmission at a speed of 8 kilobits per second and will function as a wireless extension of a user's business network. Mowic, which offers total solutions for mobile data customers, focuses on major metropolitan areas and major highways.

Users of the company's network will include the electricity utility Stockholms Energi, for the control of district heating to 15,000 properties.

Ericsson becomes satellite supplier

Telespazio SpA, a company within the Telecom Italia corporation, has chosen Ericsson to be a supplier for the new global satellite system, Astrolink. Ericsson will develop and deliver major portions of the ground-based infrastructure. The order is worth several million dollars. Commercial operation of Astrolink is scheduled to begin in 2003, with full-scale activity expected the following year.

Half the jobs can be saved

More than half of the jobs at the soon-to-be shut down plant in Norrköping, Sweden, could be saved, according to an employee-commissioned report from a consulting firm.

The solution involves another company taking over the operation. Potential acquirers mentioned include Flextronics and Solectron. The very best solution, according to the consultants, would be for Ericsson to continue operating it, but on a smaller scale.

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There is an enormous need for telecommunications in Kukes and Ericsson is to construct a mobile network, to help the refugees find their relatives.

Photo: Fredrik Jonsteg

Telephony for refugees

Ericsson is to construct a mobile telephone network in Kukes in northern Albania which will ease the reception of refugees from Kosovo. This is part of a cooperation project between the company and the Red Cross, in which Ericsson will contribute telecommunications equipment and labor with a joint value of almost USD 2 million.

"Every day we are reminded of the humanitarian disaster caused by the conflict in Kosovo. There is an enormous need for telecommunications, particularly in the efforts being made to find the families of refugees," says Fredrik Jonsteg, who is responsible for Corporate Citizenship projects.

Important to find relatives

"Families have been separated and it is incredibly important for refugees to find their relatives. If your child is missing, finding that child is all you can focus on. I found a 10-year-old boy in Kukes who was completely alone without his parents," says Lars Carlsson, head of refugee operations

with the Swedish Red Cross, who recently visited Kukes.

Ericsson is one of the major suppliers in the Balkans and has been present there for a long time.

"This, in particular, is one of the reasons why it feels important and natural that Ericsson should adopt a share of the social responsibility. It is part of our philosophy. Moreover, many Ericsson employees around the world have been in touch to ask whether there is anything we can do to help in the field of communications," according to Fredrik Jonsteg.

Telecommunications in Albania, which has received 430,000 refugees, are extremely primitive. There are only a handful of fixed lines to the town of Kukes. Refugees try other ways of contacting relatives, such as via various radio stations. The Voice of America and Radio Tirana, for example, broadcast short messages saying "I am alive. I am here."

"We travel around and set up small tables with satellite phones. Long queues form. People are allowed to make calls of one minute each, but the needs are far greater. It will help us enormously to have bet-

ter communications there," says Lars Carlsson.

Working against the clock

The mobile telephone network must now be installed as quickly as possible.

"At the moment, we are collecting the GSM equipment that is needed. In addition to the GSM equipment itself, one hundred wireline phones will be connected to the mobile phone network and be located in the various refugee camps in Kukes," says Fredrik Jonsteg, who has been in Albania twice in the past few weeks to make preparations.

Contact has already been established with the Albanian government, which is more than willing to cooperate. The Ericsson network will be connected to the state mobile operator AMC's network in Tirana and the port of Durrës, as well as Albania's national wireline network.

"It is quite an extensive task, but we hope everything will be in operation by the middle of June," explains Fredrik Jonsteg.

There are now some 430,000 refugees throughout Albania. Of the 120,000 in Kukes, 70 percent live out-

side the refugee camps with families, or in barns or abandoned buildings.

"And the flow of refugees is not slowing down – on the contrary in fact," says Lars Carlsson.

So the need will still exist in a few weeks when Ericsson's phone network is finished?

"Even if, against all odds, the war were to end tomorrow, it will be a long time before the refugees dare to return. The psychological aspect is

the most difficult. Virtually no men are crossing the border now. Many women have seen their husbands killed and many are in a deep state of trauma. I don't believe we fully comprehend the extent of the humanitarian disaster. It will be a long time before the refugees can return," says Lars Carlsson.

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CONTRIBUTION AIMED AT THE RED CROSS



Ericsson's contribution is aimed at the Red Cross and refugee work. It is a "fixed mobile concept" that includes a Base Station Controller, Micro Base Stations, MINI-LINKS and one hundred conventional phones which will be connected to the mobile network. The phones will be lo-

cated in the refugee camps. The project is being run by the Corporate Citizenship and Sponsorship Management group, whose responsibilities since the beginning of 1999 include the company's social investments.

Red Cross: Works like several other aid organizations with direct aid such as food supplies. The organization also has the task, in accordance with the Geneva Convention, of tracking down the relatives of refugees.

Read more about the Red Cross:

<http://www.ifrc.org>

Millions of Japanese use Ericsson networks

The economic crisis in Japan has not prevented an increase in the number of subscribers to Ericsson's PDC system there. The first quarter of this year saw SEK 1.6 billion worth of expansion orders, and subscribers now number around five million.

"Our PDC network is operating very well – during January and February it reached an all time high. PDC is the world's second largest digital wireless

system," explains Tomas Hilläs, the manager responsible for CMS 30 operations which are overseen from Sweden. CMS 30 is Ericsson's internal name for the PDC system.

Ericsson's six PDC customers operate wireless networks which, when put together, extend across large portions of Japan. Tokyo Digital Phone was the first operator to put its system into operation over five years ago.

All of Ericsson's networks in Japan have experienced rapid growth. Of Japan's 40 million mobile phone subscribers, approximately five mil-

lion of them place calls on networks with Ericsson-supplied equipment.

NTT DoCoMo, the world's largest wireless operator, controls 58 percent of the Japanese market, while Ericsson's other Japanese customers control about 12 percent. Ericsson has long been a supplier of MDB – a part of the base station – to NTT DoCoMo.

"The fact that we've been chosen by this operator to supply the first commercial WCDMA telephones and base stations is an important decision," emphasizes Tomas Hilläs.

Even though voice is still the most

important aspect of mobile phones, Japanese subscribers are becoming increasingly interested in other applications as well.

Ericsson's innovative customers were the first to provide Short Message Service (SMS) in Japan. Other applications have been added to the service as well, including one that makes it possible to utilize web solutions. SMS has, no doubt, helped Ericsson's customers capture market share during the first quarter of the year.

"The expansion orders that

we've already received are clear indications that PDC is far from having outlived its usefulness," explains Thomas Hilläs.

"The number of subscribers is increasing, the system is continuously being updated and new applications created. At the same time, marketing of 3G, third generation mobile telephony, to NTT DoCoMo and other Japanese customers, remains a very important task."

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Fibers secured with airgun

Ericsson Cables of Hudiksvall, Sweden, has developed an airgun to install fiber optic cables with.

With the equipment, part of the Ribbon system, an installer is able to shoot optical fibers directly into residential buildings, lowering installation costs considerably.

The system is also a time-saver. In only 15 minutes, it is possible to wire an apartment with fiber-optic cables. With this new technique, it will finally be economically feasible to invest in fiber-optic networks that run all the way to the end user, even in old buildings.

"The technique of blowing fibers into a pipe system has been in use for a long time, especially by BT in the U.K. But there we are talking about installing many kilometers of cable, which is an expensive and complicated operation," says Erik Bergkvist, designer and inventor of the airgun at Ericsson Cables in Hudiksvall.

Simple and inexpensive

"The idea behind Ribbon is the easy and cost-efficient installation of fiber-optic cables into homes. The equipment is very light and can be handled by one person. It's designed for short-distance installations of no more than 200 meters."

In residential buildings, a fiber-optic ribbon is blown into each apartment. This is done by first creating so-called microducts, special plastic pipes, each of which has a diameter about the size of a drinking straw, which are placed in guide channels. Via these microducts, the fiber optic ribbon is blown into place using the new tool.



Several apartment buildings in Hudiksvall have had optical fibers installed using Ericsson Cable's new airgun system. A new project in a residential area in Stockholm will get underway in June.

Photo: Jörgen Lorentzon

The Ribbon consists of optical fibers which are tightly packed, with two, four or eight fibers in one ribbon. Optical fibers are very thin glass rods, through which light impulses are transmitted. These can be modulated at a very high frequency, enabling a large volume of information to be transmitted in a given unit of time. Optical fibers are also less

sensitive to interference than copper cables.

New electronic services

Combined with Ericsson's previously released e-box, Ribbon will pave the way for new electronic services in the home. Tenants will, for example, be able to control their daily electricity consumption and book

communal facilities directly from their apartments.

In Hudiksvall, Ericsson Cables has initiated a joint-venture project with the municipality and a Hudiksvall real estate management company, to install optical fibers in residential buildings using the Ribbon technique.

The project encompasses 824

apartments. One of the buildings will open in June as a demonstration building.

The Ribbon will be on display at Telecom Days 99 at the Sollentuna convention center between May 26-28.

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Cleaning up the press releases

Last year, Ericsson issued approximately 350 press releases. A large number of those received very little attention.

"Ericsson issues too many press releases, and they are simply too difficult to understand," says Pia Gideon, Ericsson's corporate communications manager who is presenting new guidelines for how the company should formulate press releases.

"We must become better at describing the important, strategic factors. Otherwise we risk wearing people out with our daily press releases," explains Pia Gideon.

"We've done studies on the efficacy of our press releases in our ten largest markets and the results are not encouraging."

More discerning

Some press releases have received hardly any attention at all. A more discerning process is now being set in up.

"We've received complaints from

many quarters, including the London stock exchange, which say we issue far too many, often incomprehensible, press releases," says Pia Gideon. "We need to change that."

To start with, Ericsson has made a six-fold increase in the required reporting level for new orders. Now, only those orders which exceed SEK 1.5 billion (USD 180 million) need be disclosed.

While that limitation will clear out some of the potential offenders, there are other ways of dealing with the problem.

"Most likely, we need to make the texts less technical. In order to attract attention, the positive business ramifications need to be accentuated."

Make contact earlier

There has been a clear deficiency in adapting items for different recipients. It's important to contact the corporate communications department as early as possible, once the idea of issuing a press release is raised.

"If it isn't possible to provide a simple explanation in the first paragraph about what has occurred and

why Ericsson is issuing a press release, then one needs to reconsider whether a press release is warranted in the first place," says Helena Norrman, an employee in the company's corporate communications department.

In addition to intelligibility, another area of improvement is in the selection of the target audience to which press releases are sent.

Ericsson is contractually required to disclose certain relevant information to the stock exchanges where its shares are traded. This includes substantial business transactions, financial statements and major strategic decisions. Other than that, it is up to Ericsson to decide what else it wishes to disclose.

Targeted announcements

It's now possible to send out press releases to certain types of publications in selected countries. An announcement of an order received by Ericsson Components in Germany could, for example, be targeted solely to electronics media in Germany—even though the order would not qualify for a regular press release is-



Ericsson has a plan to improve its press releases.

sued to all stock exchanges and major press agencies around the world. By taking better advantage of the list of recipients, Ericsson can increase the effectiveness of every individual press release.

Many ways to reach out

"I believe that, internally, press releases have become too routine.

There are, in fact, many other ways of putting out the information about what we do," says Pia Gideon. "Direct contact with journalists, press conferences and other activities can have an impact of at least the same magnitude. Ericsson's press releases should strengthen the company's image, support its strategies and, of course, also contribute towards helping the company be viewed in a relevant manner. Routinely sending out press releases without first asking why can be more damaging than helpful."

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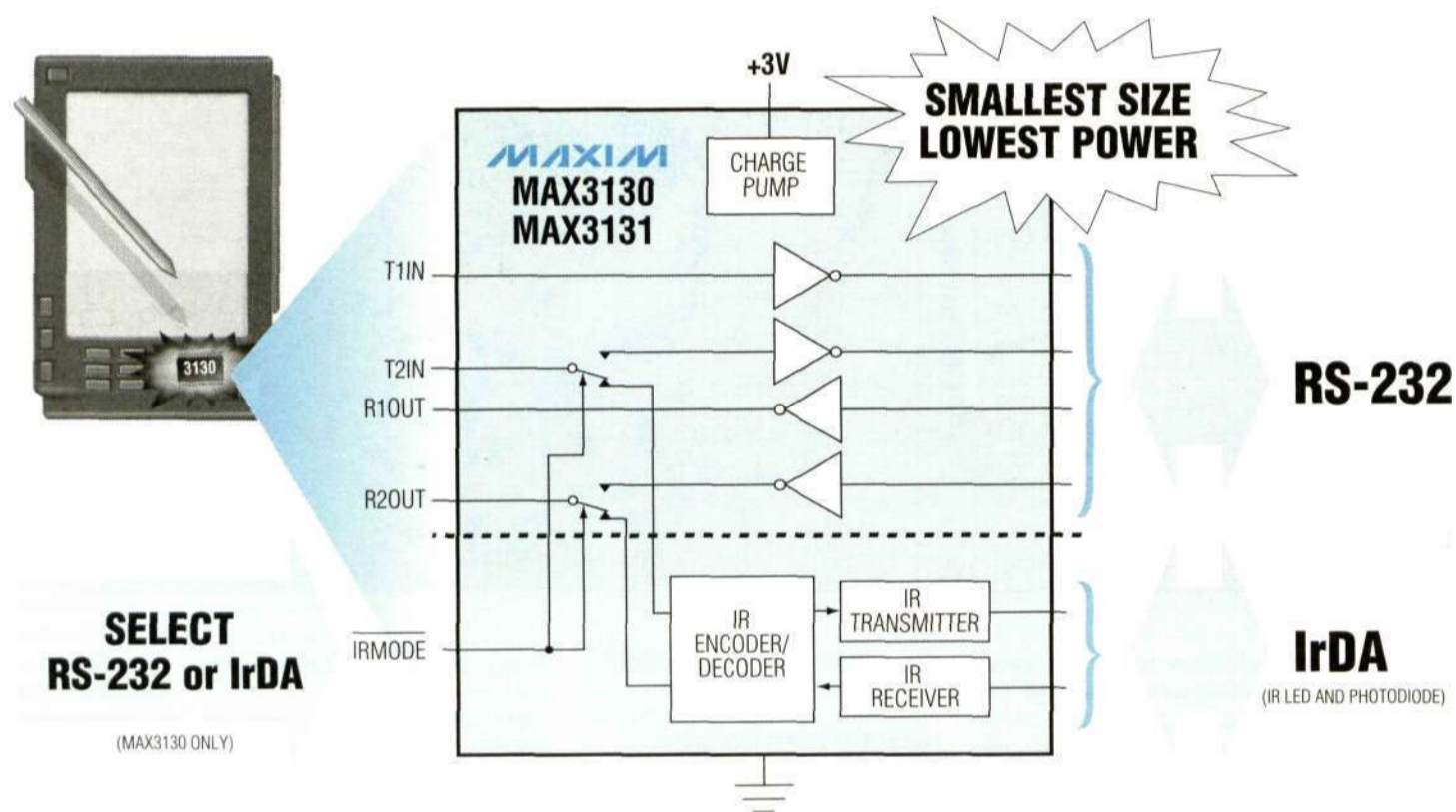
You can find the new press release directives on the intranet at:

http://www.lme.ericsson.se/LM-EvårDI/press. This site also contains information about how to write press releases. It's also possible to read recent Ericsson press releases on the web:

http://www.ericsson.se/press-room/

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The recent Internet World trade fair in the U.S. gave visitors the opportunity to familiarize themselves with the latest industry trends. Alliance-building is increasingly the key to success in this market. Photo: Lars Åström

Internet trends from California

Contact surveys the industry trends at the Internet World trade fair in California.

Wireless Internet, while still not a big trend, is a major focus for Ericsson in preparation for the future.

A few months ago, the portal company America Online (AOL) expressed an ambition to establish a presence in all types of Internet connections – traditional or via network-connected TVs, refrigerators or palmtops. Of this ambition, nothing has appeared to date.

AOL-competitor Yahoo, on the other hand, has grabbed the initiative in omnipresence. A few weeks ago, Yahoo purchased the newly launched Online Anywhere company. Yahoo has been cooperating with 3Com for some time to adapt its services to 3Com's Palm Pilot terminals.

Everything for alliances

AOL, Yahoo, Excite and other portal giants are doing everything possible to build alliances and establish positions that enable them to offer information services via a multitude of devices – TV, palmtops, pagers, computers, etc.

The competition for users includes children. 1st Net Technologies of San Diego conceived the business idea of creating software for children who want to surf the web. This means that among the younger set Internet Explorer now has a rival, in the form of Crayon Crawler, a web browser unlike any other. Mommy and Daddy can control which web sites their baby has access to, while giving the child an Internet interface that is more fun than anything that existed previously.

Increased bandwidth is important for corporate customers. Many exhibitors showed web hotels with DSL-connections, intended primarily for offering customers web sites for electronic commerce.

Concentric Networks is one of the players that sees great business opportunities in

responding to the needs of small and medium-size companies. For a few thousand Swedish kronor a month, a company can purchase everything it needs to establish a complete electronic department store.

Sandpiper Networks Inc. offers a solution to the problem of long waiting times on the web. Their Footprint service provides access to many different servers located throughout the U.S. From a master server, the customer's contents are continuously copied and updated on the various satellite servers. This moves the information closer to the users, and reduces the load on each individual server.



Internet enthusiasts from around the world could have their fill at Internet World.

Photo: Lars Åström

It was this technology that enabled the Los Angeles Times to publish the Starr report on Bill Clinton and Monica Lewinsky on the web – 200 Gbits of compelling reading.

Need for wireline Internet phones

While Ericsson, Nokia and others are working very intensively to develop wireless Internet devices, other telephone manufacturers have recognized the need for wireline Internet telephones. At Internet Spring, several more or less elegant web telephones were exhibited.

Among palmtop devices, 3Com's Palm Pilot dominated the scene. Sharp Electronics exhibited its TelMail, priced a few hundred dollars lower than the Palm Pilot. Both 3Com's and Sharp's solutions required access to a modem or wireline telephone, however.

Data giant IBM has taken the problem of personal integrity on the web seriously and recently shocked the U.S. Internet world by issuing a threat to retract all its Internet advertising from companies that lack an established and fair policy for guaranteeing protection for the integrity of the individual Internet visitor. IBM advertises on the Internet for USD 60 million per year.

American radio stations have turned their gaze to the Internet. In increasing numbers, they are launching web sites where visitors can listen to whatever type of music the station is known for – naturally while being entertained by print or audio messages from the station's advertisers.

Audio on the web is currently a hot issue indeed. Many commentators believe the technology is superior to video transmissions, from an information point of view. Sound files can be compressed so that they can be enjoyable by users on modem connections, which is seldom the case for video.

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The missing piece of MCI WorldCom

After the official approval from the Federal Communications Commission (FCC) in September 1998, MCI finally completed its 37 USD billion merger with WorldCom to become one of the world's largest operators that can provide local, long-distance, international, and Internet access to most U.S. cities and 65 other countries.

In addition to an extremely large network, MCI WorldCom is the first non-European operator with local networks set up in Europe. It holds roughly 50 percent of the Internet capacity. With the merger with MCI, the WorldCom empire has now acquired more than 68 companies over the last few years.

Now MCI WorldCom is well-positioned, but one piece of the jigsaw is missing – wireless capacity. The company acts only as a reseller for other mobile operators. Without offering wireless service, the company is still not qualified to be called a total service provider.

Major financial advantage

All other major U.S. operators, such as AT&T Wireless and Sprint PCS, offer such services. At the announcement of the merger, Bernard Ebbers, WorldCom's CEO, said the company recognized a significant financial advantage in getting into the wireless service market and he would look into partnering or purchasing its way into it.

Because the lack of facilities-based wireless service is the number one concern for MCI WorldCom, there have been widespread speculations that the company is going to acquire some PCS and cellular companies. There are various possibilities: acquiring Nextel Communications, Omnipoint, Ariel, Western Wireless Corp., Powertel, a broadband fixed wireless company such as Teligent, or merging with Vodafone.

On April 27, 1999, MCI WorldCom made its first move to buy CAI Wireless Systems for an all-stock acquisition valued at 476 USD million. Based in New York, CAI operates six analog-based multichannel multipoint distribution service (MMDS) subscription video systems that cover a total of 16.1 million estimated service area households. The acquisition also gives MCI WorldCom another alternative to reach customers without having to pay access fees to the regional Bell companies.

Nextel next?

Currently many people look at Nextel (20 percent owned by Craig McCaw) as the very next target MCI WorldCom will purchase. Headquartered in Virginia, Nextel provides a digital two-way radio based on Motorola's iDEN technology that runs a national network covering about 70 percent of U.S. The company has sold 2.96 million global digital subscriber units with consolidated revenue of USD 1.85 billion in 1998. Its new Nextel Online is a family of wireless Internet services to integrate voice, data and messaging. What's interesting is that the chairman and CEO of Nextel, Daniel Akerson, is the former president and chief operating officer of MCI Communications. Later this year, Nextel will introduce Motorola's i1000 plus phone with an Internet browser and Motorola i200 world phone to expand its customer base. Sounds like a perfect fit for MCI WorldCom? Not exactly.

Nextel's network is constrained to 15 MHz of spectrum for two-way radios, it does not have the capacity to offer next generation wireless services. In addition, Nextel's phones work only with Nextel's network. MCI WorldCom's customers would not be able to roam if they are not in Nextel coverage areas. Nextel is a highly leveraged company with a net loss in 1998 of USD 1.8 billion. This will heavily dilute MCI WorldCom's earnings.

Will MCI WorldCom finally dial "M" for a major wireless merger? Perhaps, but it might not happen soon.

Bobby Chang works at the company's business development unit as an industry analyst with responsibility for North America.

 <http://bic.ericsson.se>

Manufacturing sets new record pace

Come this autumn, a new transceiver (the transmitter and receiver portion of a GSM base station) will roll off the new production line every minute at the Ericsson plant in Gävle, Sweden. It will take only 55 minutes from the start of production to the finished product. Turnaround time for the current transceiver model is 75 hours.

Manufacturing will take place on a completely automated production line, where circuit boards are fed in at one end and finished transceivers emerge at the other.

"Our new production line is designed to handle large volumes," explains Peter Nilsson, who is the project manager.

The transceiver, or TRU as it is known internally, is the transmitter/receiver section of a base station. The current model contains five circuit boards and numerous components.

"This autumn, when we start up manufacturing on the new line, everything that was previously contained on five circuit boards will fit on these two," explains Peter Nilsson, holding up a prototype of the new transceiver containing a radio circuit board and a power circuit

board. "The components are half as big as on the previous transceiver – there's almost 2,000 on one board and 500 on the other."

Considering that half the number of employees will be able to manufacture twice the number of transceivers produced today, one can easily understand that something of a revolution is going on within production. The new transceiver has been adapted to a completely automated manufacturing process with an all surface-mounted assembly to save time.

Manufacturing costs have been lowered while the level of quality has increased. There are other advantages for customers as well. The new transceiver has a longer life span since the heat it generates is dispersed more efficiently.

The project to develop a new GSM transceiver began last September. Designers from Kista and Gävle in Sweden, and Nuremberg, Germany, participated in the project. The power stage circuit board was designed by workers at Ericsson Radio Access in Gävle.

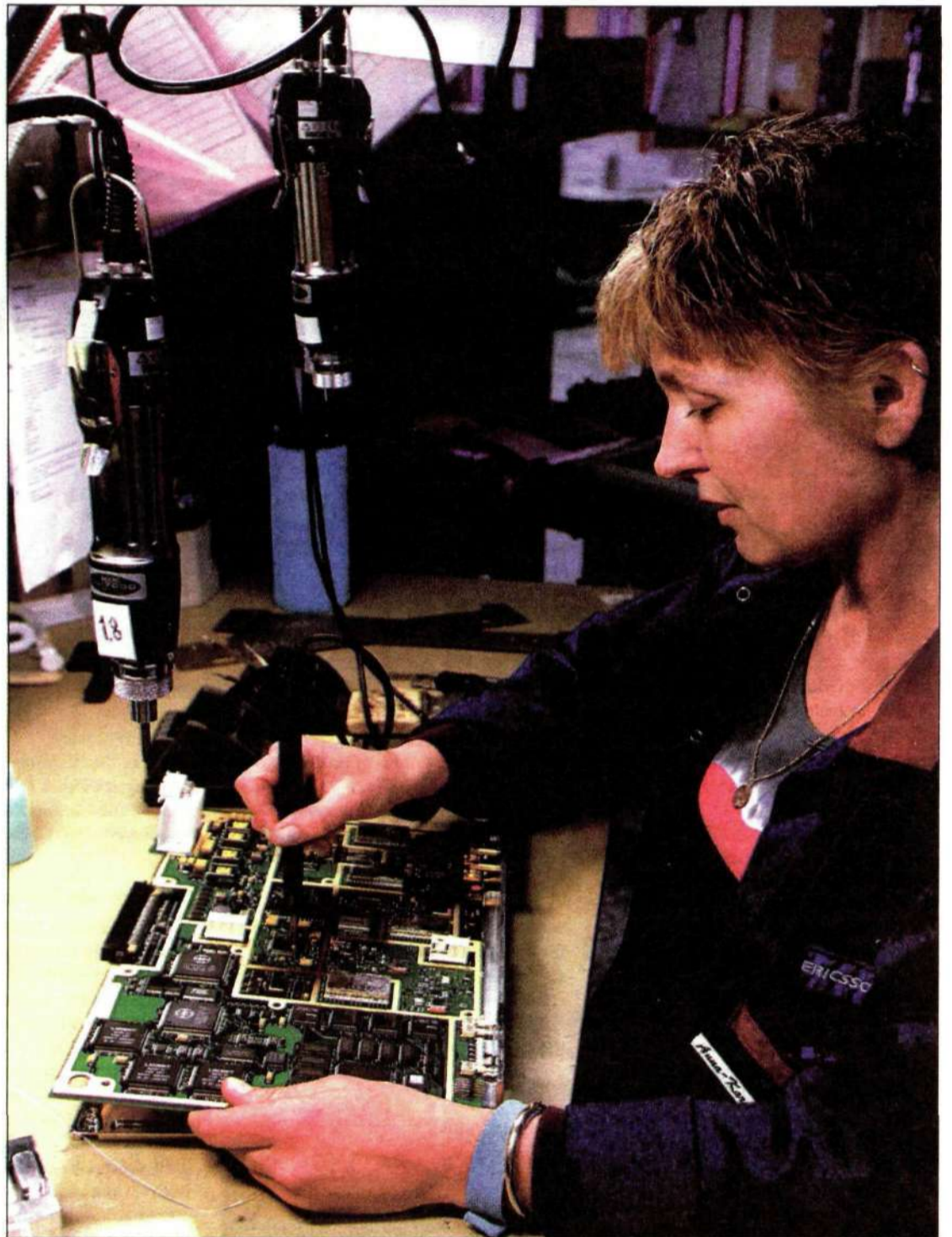
Currently, 40 people are employed in production and supply. By August that number will reach 140 and by the end of the year, 180 people.

Gunilla Tamm

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Peter Nilsson, project manager, with the new transceiver.



Anna-Karin Jonsson is part of the group that is working on the new GSM transceiver.

Photo: Leif Jäderberg

Pluto forms plant within plant

The new transceiver project, which goes by the name of Pluto, is much more than just a new product and a new method of production. An entire mini-plant has been constructed, operating as a completely independent unit within the larger plant.

Employees working the new production line will be responsible for numerous tasks including maintenance, servicing and quality, as well as making sure that the necessary materials are on hand. This will require more advanced skills, so in addition to the two weeks of training, there will also be leadership training,

as the work will be conducted in teams.

With the new production line, it will be possible to manufacture products based on customer orders. This requires close coordination with suppliers, which will be fewer in number. Of the original 160 or so suppliers, of which there are now some 70, the plant will only be dealing with 30. Everything else will be conducted through two global distributors.

While simulations were only used for certain individual cases in the past, they will now become an important tool, used on a daily basis.

"Using Quest, our new software, it's easy to visualize what's occurring



Hasse Römer is in charge of simulations, an important tool for the new production line at the Gävle plant.

at every step of the manufacturing process, taking various factors into consideration," explains Hasse Römer, who is one of the project

managers and responsible for the simulations.

The entire production line is visible on the display and Hasse Römer shows what happens if a problem should, for example, occur during testing.

The palette, which will eventually become the transceiver, turns red and the entire flow is affected.

"Using the simulation, we're able to optimize production plans and determine the number of employees needed tomorrow or the day after. Everything depends on customer orders. The simulation is also used to train employees who will be working on the production line."

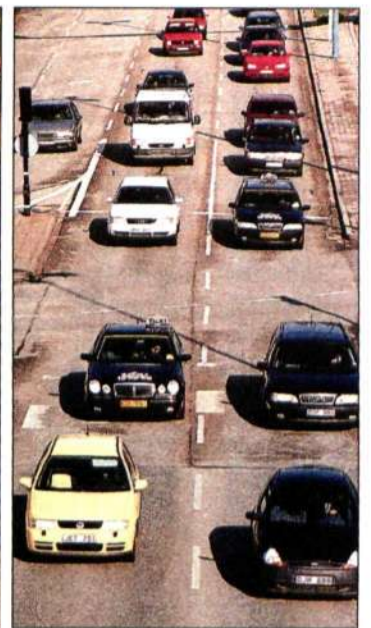
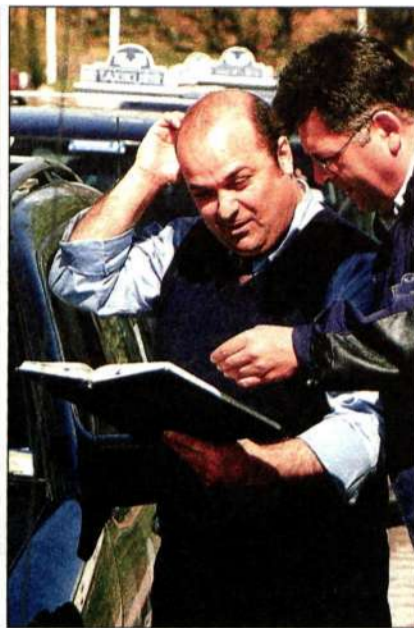
"Currently, we're working on pro-

totype number two," explains Peter Nilsson showing off the prototype workshop. "By August 1, the new production line will be in place out in the 'big' plant, and full-scale production will begin."

It's a difficult task to replace an old product with a new one in just five weeks. Last time it took 26 weeks. But Peter Nilsson isn't worried.

"We have an excellent team that has good cooperation among the design, design development supply and production aspects of the project. With the level of commitment that exists here, we'll be able to handle the challenges."

Gunilla Tamm



Ericsson's GSM-based positioning system can be used for all kinds of services – business applications such as traffic control, community services such as emergency calling, and personal services where mobile phone users can locate the closest gas station or a particular restaurant. The positioning system will prove useful for taxi companies, among others. Photo: Lars Åström

Mobile phone shows the way

A whole new market for positioning services is starting to emerge. Ericsson's new Mobile Positioning System (MPS) makes it possible to easily locate all mobile phones using the mobile phone network. The technique is now being launched on a broad scale.

"Mobility combined with a positioning function will open up a whole new realm of possibilities for personal services. This will be a very powerful way for mobile phone operators using Ericsson equipment to differentiate themselves in the market," says Christopher Kingdon, solution manager for GSM positioning systems.

The uses for MPS technology include localizing emergency calls and helping taxi companies and delivery services direct traffic, as well as such personal services as finding out where the nearest post office is.

This network-based solution

makes it easy to localize ordinary GSM phones. And existing phones do not require any new software.

New standard being developed

The European Telecommunications Standards Institute (ETSI) and its American counterpart, ANSI, are now jointly developing a GSM positioning standard based on Ericsson's system. The same basic principles can be applied to TDMA mobile phone systems.

"We're way ahead of our competitors. Already by next year we'll be in a position to sell the system to operators who use mobile phone equipment from other suppliers," says Christopher Kingdon.

Mobile phone operators will be able to offer positioning services by



Christopher Kingdon

installing new software into their networks and adding a Mobile Positioning Center (MPC) server. The node was developed by Ericsson Software Technologies in Karlskrona, Sweden.

Under the current system, only one radio base station is required to take measurements (a method known as Single Call Timing Advance). It is accurate to within a sector of approximately 1,000 meters from a base station. The use of measurements from several base stations (using the Uplink Time of Arrival method) significantly boosts accuracy.

"By using measurements from several base stations, we can increase accuracy to within 40 to 125 meters," says Christopher Kingdon.

Localization required

According to U.S. Federal Communications Commission (FCC) requirements, all emergency calls placed from mobile phones in the

U.S. must be able to be localized to within 125 meters by October 2001.

The level of accuracy needed in localizing mobile phones varies between services. Trucking companies, for example, usually only need to know which town their truck is close to. For many applications, the degree of accuracy currently offered by the MPS system is sufficient. Satellite-based positioning using the DGPS technology sharpens accuracy to within 10 to 20 meters but only works outdoors and requires a direct line of sight to a GPS receiver.

"For specialized applications which require the highest degree of accuracy, the DGPS positioning technique provides a good complement to our network-based solution," says Hans Ternbrant, business



Hans Ternbrant

developer at Wireless e-solutions for GSM.

An open Internet TCP/IP HTTP interface for applications means will make it simple for all software companies to construct positioning services. Ericsson has plans to launch a web-based simulation system with which companies can easily test new services.

Snowball effect expected

"We're negotiating with several operators and companies regarding the MPS technology. I believe that there will be a snowball effect," says Hans Ternbrant. "Once one operator puts a system into operation, others will quickly follow suit in order to get a piece of the market."

"Operators can also use the system to see which parts of their networks have poor reception. That is good news for radio network planners."

Nils Sundström

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Fastest way to people in distress

Several field tests have demonstrated the usefulness of being able to quickly localize an ordinary mobile.

Most recently, it proved invaluable for the emergency services in Dalarna, Sweden, for dispatching an ambulance to an accident.

"This kind of a tool is incredibly important in accidents, especially in sparsely populated areas where distances between wireline phones can be quite far," says Åke Kjellin, operational manager for emergency services in Falun, which tested Ericsson's MPS solution for a few weeks this spring together with Swedish telecom company Telia.

"Dalarna is a popular tourist destination, and in many cases people who place emergency calls don't know where they're calling from. During one specific traffic accident, the system was decisive in establishing the correct direction for the emergency vehicles. That's very important in cases where



The emergency services in Dalarna, Sweden, tested the new MPS technology this spring. It enabled them to quickly localize emergency calls from GSM phones.

every second counts," says Åke Kjellin.

With the simple push of a button, emergency services employees are able to look at a monitor and see where a person is calling from on their GSM phone. The test system

has shown positions to within 1,000 meters. Even in rural areas with few roads, it is possible to fairly accurately figure out where a mobile phone is located.

"We're very enthusiastic about it. Of course we hope for further refine-

ments and that it will become possible to locate all GSM phones automatically, regardless of operator," says Åke Kjellin.

However, regulations regarding positioning differ from country to country. In the U.K., operators need authorization from the subscriber concerned before localizing telephones, even during emergency calls.

As a result, Ericsson is developing several different ways for users to disconnect the positioning function without shutting off their mobile phones.

"Technically speaking, users will do this by dialing in a numeric code or calling a certain number."

Sweden's Birka Energi electrical utility company tested other services using the MPS technique this spring, primarily personal safety and traffic control systems.

The company has employees who work throughout the country, maintaining power stations and dams.

"Since this work is conducted by people who travel alone and who are

also on call at night, this is a good tool in efforts to increase employee safety out in the field," says Göran Johansson, who is responsible for MPS trials at Birka Energi. "The system also helps us plan our work and utilize our resources more efficiently."

Using a computer monitor, a supervisor is quickly able to see which employee is the closest and which one has the necessary skills or equipment to solve a certain problem.

Birka Energi has also tested other techniques for communicating with employees in the field.

"In my opinion, GSM technology has provided the most rapid advances in terms of new services," says Göran Johansson.

"It also simplifies things for us, since we don't have to operate our own private radio network. Positioning and GSM Pro are an interesting combination of services that enables supervisors to quickly communicate with their employees in a certain area."

Nils Sundström

"Cooperation with Ericsson has been one of the contributory factors behind rapid development," says Zeth Nyström, vice president of Tess in Brazil.



The Telia consortium Tess is now in operation in Brazil. After considerable delay to the granting of a license, Tess is expanding itself and its network at record pace - from zero to launch in six months!

"We could never have done it without Ericsson," says Zeth Nyström, vice president and head of operations at Tess.

Quick start for new operator in

Very small mistakes can cause great damage. Do you remember the comma that almost cost Telia its B-band license in São Paulo? The competition discovered that Telia had made a mistake in its figures in the bid and claimed that the company was offering SEK 9 instead of SEK 9 billion. A rather stupid formality that delayed the transaction by more than six months.

Now the 50-percent Telia-owned operator Tess is on the air with its TDMA network.

"Tess was built in record time," says Zeth Nyström satisfied.

"When we received the go-ahead, we worked at incredible speed."

At the beginning of June 1998, Tess employed ten people.

"We decided to launch the network on December 1. From the beginning, that was more

just an expression of will, but we actually managed to keep to our deadline!"

By then, the workforce had grown from ten to 500 in just 176 days.

"We expanded as the network expanded," says Zeth Nyström.

Launch in four cities

The launch took place in four cities: Tess' hometown of Campinas, a university town with one and a half million inhabitants, the vacation resort Santos, which has two million inhabitants during vacations, Sorocaba with a population of one million, and the Dutrana area around Sao Paulo with its large car plants.

Tess had a modest 4,000 customers at the time of its launch. Today there are 75,000 subscribers and this number is expected to swell to half a million by the end of the year.

"One of the factors underlying for this rapid growth is our positive cooperation with Ericsson,"

states Zeth Nyström. "It is crucial to have a good supplier, when there is so much pressure. We also receive finance via Ericsson because it is not always possible to borrow money in Brazil these days, when the rate of interest is almost 40 percent."

Another vital factor is expertise, particularly in the field of technology, which Tess has received from Telia.

"We have about 40 experts from Telia occupying key posts within "hard" areas. The "soft" areas, such as marketing, sales and personnel, are best managed by the Brazilians themselves."

Great market

The market that Tess and Ericsson have at their feet is fantastic. Tess' license incorporates the region outside the city of São Paulo, which has the highest GDP in South America. A large proportion of Brazil's 40-million-strong mid-

dle class live in this area. Telephone penetration is low, for both wireline and mobile telephony, and there is an acute need for modern telecommunications.

No real flying start

Nevertheless, Tess has not had quite the flying start that had been hoped for. The economic crisis in January, the results of which included a fall of 40 percent in the currency value, is one of the explanations.

"A crisis makes people more cautious with their money," Zeth Nyström agrees. "But as soon as jobs are created again, something that is already happening, a mobile phone is very close to the top of many shopping lists."

Another inhibiting factor is the matter of coverage. The A-band operator in the area, Telesp (owned by Portugal Telecom), has had many years in which to establish its network and is not obliged to open it for roaming agree-

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Brazil

ments with competitors. This means that Tess has to do things the long way and expand its own coverage.

A welcome problem for Ericsson, however.

"Yes," smiles Lars Jehrlander, vice president of Ericsson in Brazil. "For us it means delivering even more equipment."

Coinciding interests

Otherwise, Ericsson's interests coincide with those of the operator in most cases.

"What is good for Tess and our other customers is also good for us. Our contribution is to ensure the operator's success by delivering the right products at the right price and at the right time," Lars Jehrlander explains.

In the geographic area in which Tess operates, Ericsson has no other customers.

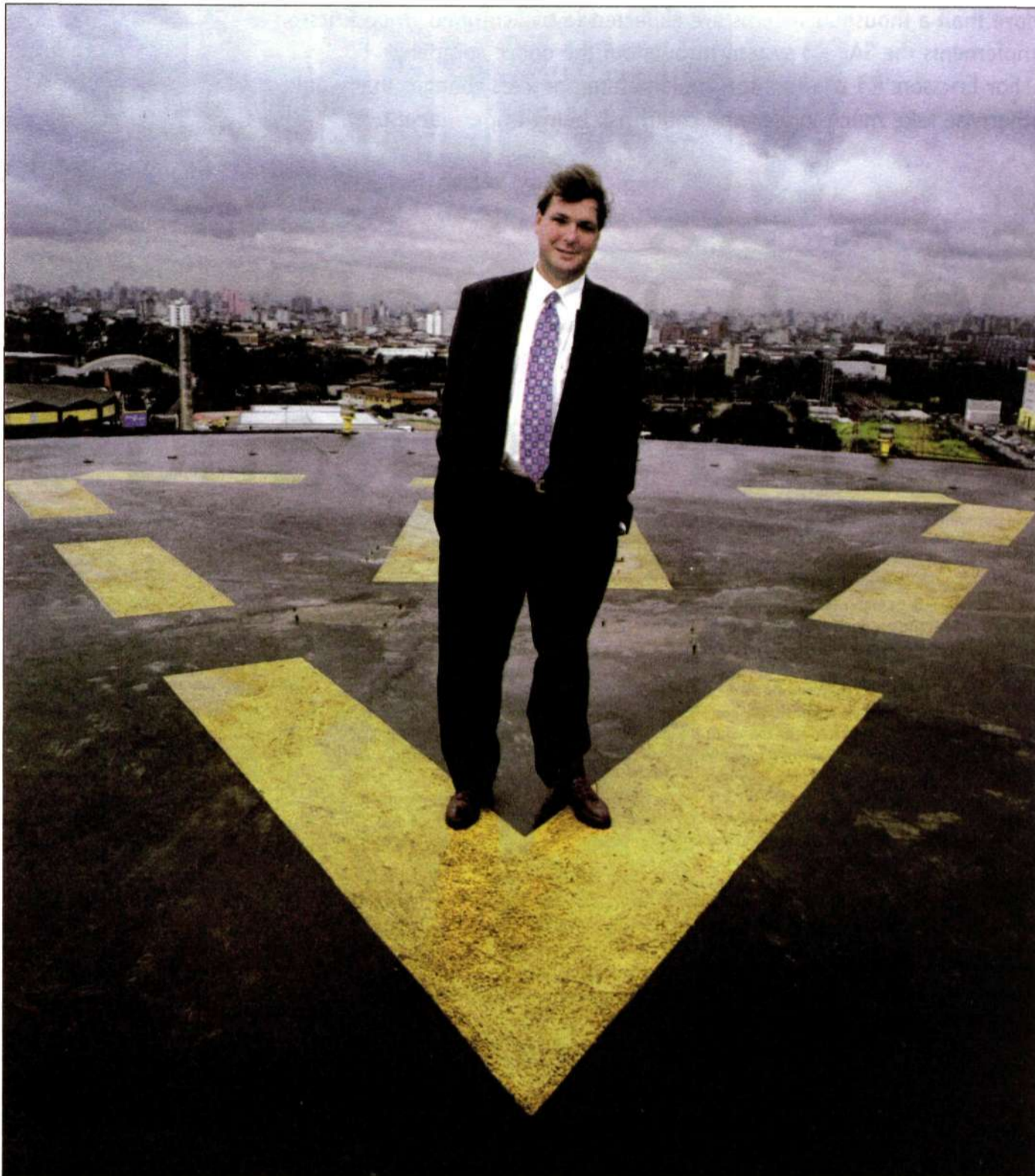
"But in other places in Brazil, we supply competing operators. It's a phenomenon we live with all the time, requiring us to build up customer confidence, so that they do not believe that they are receiving worse conditions or treatment than the competition. In practice, this means that we have different teams for different customers," says Lars Jehrlander.

Continuous expansion

Ericsson has contacts with a total of four major B-band customers in Brazil.

All of these networks have been in operation for a few months and, as a result of the considerable flow of customers, they are in a continuing expansion phase.

Margareta Jonilsson



Lars Jehrlander, vice president of Ericsson in Brazil, has good reason to be satisfied. Mobile telephony is progressing rapidly in Brazil. Ericsson has contracts with four of the major B-band customers, who are all expanding their networks to meet the demands of the growing customer base.

Photo: Thomas Carlgren



Lars Jehrlander hopes that Ericsson will deliver a lot of equipment to Tess in Brazil.

GROWING MOBILE MARKET

In 1997, the world's largest bidding competition for mobile telephony took place in Brazil. Nine licenses for B-band operations were bought for many billions of dollars by international telecom consortiums.

In March 1998, Ericsson received an order from the mobile operator Tess for the construction of a TDMA network. The order was valued at USD 360 million. In Brazil, there is currently a total of 5.4 million subscribers to the AMPS network, 2.5 million to the TDMA network and 680,000 subscribers to the CDMA network. In 1998, Brazil was Ericsson's fourth largest market.

Faster freight with DHL

Ericsson's American customers will now be able to get back their repaired products considerably more rapidly than previously.

Through a cooperation agreement with DHL, the time required for freight between these countries and Ericsson's repair centers can be reduced by up to 70 percent.

"This agreement offers major opportunities for saving money and, particularly, for offering the customer better service," according to Anders Mellström, sponsor and manager for this part of the project.

The project is based on reducing lead times for hardware supplies needed for repair work. Defective components, circuit boards and other parts of radio base stations are often sent for repair to service centers in Mexico City and Dallas in the U.S. Today, Ericsson itself takes care of much of the work involved in organizing freight and customs documentation.

"We have discovered that it can take up to 120 days before the market unit gets the repaired product back. That is far too long when



Brazil constitutes an enormous market for mobile telephony. The telecom consortium Tess, which includes Swedish Telia, has constructed a TDMA network in the region around the massive city of São Paulo. Tess now has 75,000 subscribers and expects to have half a million by the end of the year.

it is seen in terms of the fast delivery expected of suppliers by their customers nowadays."

Our pilot project in collaboration with DHL for the market units in Argentina and Chile shows that we have succeeded in reducing lead times by between 40 and 70 percent.

The project was run within the TDMA business unit, American Standard, in cooperation with Ericsson Distribution Council, a competence center for logistics and distribution, as well as Ericsson in Argentina, Chile, Mexico

and the U.S. It is now being expanded to include the entire region.

"There is huge interest in the project. Several other units have been in touch and are interested. I believe that this could result in a professional distribution chain that can considerably improve customer satisfaction and cut costs," says Anders Mellström.

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More than a thousand systems are expected to be scrapped when Ericsson implements the SAP R3 system throughout the entire company.

For Ericsson, R3 is a tool for implementing process changes that would otherwise take much longer and could risk being permanent.

SAP R3 scraps over a thousand systems

This is Sweden's largest R3 project. So far, companies in 24 countries have introduced the system and ten more are expected to do so during the year. Ericsson's largest and most important companies, including mobile telephony are located in these 34 countries. By the half-year point, about half of the work will be complete. However, Ericsson is active in 140 countries worldwide, and aims to have its companies in almost all of these countries using R3 within two years.

One of the most important goals of Ericsson's R3 project is to scrap as many old systems as possible. Initially, R3 is being introduced in ordering, finance and human resources, and in these areas the company will be able to scrap many old systems.

Throughout the company, Ericsson is discard-

ing a total of more than a thousand systems. Many of them are also installed in a number of different countries, so that the total number may turn out to be much higher.

"We have an enormous amount of business systems, including internally developed systems and systems purchased externally. In a global perspective, you can find pretty well every type. Now, however, we are in a position to scrap a great number of systems. For every R3 system we install, we expect that up to 30 old systems will be discarded," says Jan Henriques, in charge of the R3 project for the entire company.

Phasing out some, discarding some

In personnel administration particularly, there are many systems that can be phased out, since they affect all companies.

But accounting and order/warehouse/invoicing systems, which most companies are replacing, and especially their associated peripheral systems, are being discarded.

Integration a main advantage

Jan Henriques stresses that the particular system selected is of secondary importance. For Ericsson, it was important to enhance efficiency by integrating the organization and using information more efficiently throughout the company. In this case, R3 will serve as an aid and foundation on which to implement change," he believes.

"This type of system tightens up the organization, providing a common focus for all operations."

Jan Henriques has previously worked extensively with process management, and he sees R3 as offering a way to integrate processes in all the companies' operations.

"When an organization introduces such a system to manage key processes, individuals are forced to reassess their entire work process."

A major advantage in Ericsson's implementation of R3 to facilitate company processes is that dependency on key personnel is reduced, ensur-

ing that the new routines continue to prevail. As long as the system operates, the new routines will continue to be used.

But would it not have been possible to implement changes without R3?

"No doubt we would have been able to find solutions without having a system underlying everything, but it would have taken longer and there would have been a greater risk of changes not lasting."

"This is an extensive change program, that reaches beyond the data area. Previously, each functional area was separate; when R3 is installed, however, they will all be integrated. The important thing now is for the employees to accept the concept and change their ways of working," says Jan Henriques.

Will take a lot of effort

"It won't happen automatically," he believes. "Considerable effort will be required from company management, middle-level executives and the organization as a whole. And this type of change is not always welcome with employees. There is much tension and drama when people's work habits and roles in the organization are spotlighted. This type of change creates an openness in which all sectors of the organization gain insight into everyone's work, and some people think that is unpleasant," he says.

"In order for employees to accept the new routines, management must involve the people who will be affected at an early stage, so that they can feel they are an important part of the change process."

Everyone is affected by the change

Introducing R3 into the company affects all of Ericsson's 100,000 employees in some way, according to Jan Henriques.

"While not everyone is actively involved in all modules, everyone is affected by the new methods of time reporting and travel expense accounting, for example."

Jan Henriques does not want to specify how much the enormous project is costing. Previous estimates, however, have suggested SEK 5 billion.

Karin Karlén

This article was published earlier in Computer Sweden on April 16 and is here reprinted in its entirety with the permission of IDG.

R3 AT ERICSSON

Ericsson companies in 24 countries have installed R3. Ten more countries are expected to finalize their installations in 1999.

Within two years, most of the companies in the remaining 106 countries in which Ericsson is active will have implemented the system.

All Ericsson companies will use the R3 system for personnel administration, and most will also use R3 for order/warehouse/invoicing and financial management. The number of people involved in the R3 project varies; currently,



The company-wide R3 business system eliminates the time-consuming work of compiling reporting lists. Elaine Viklund, Tord Enerstrand and Ingalill Pettersson at the order-processing section of the Power Modules production unit do not miss the old data systems. Photo: Nils Sundström

Holistic approach to data cuts paperwork dramatically

Before R3, compiling order books, processing invoices and managing precision delivery was very time-consuming. Now, all the data is stored on computer, where it is always up to date.

"The R3 business system has given us a better overview of our work, and made the job more fun," says Ingalill Pettersson, at the order-processing section of the Power Modules production unit of Ericsson Components.

Working with colleagues in Stockholm, Swe-

den she then inputs orders from all over the world into R3 which has been developed by the German company SAP. The system database integrates all information - from customer orders to production supply and sales. This creates greater scope for coordination.

All information at once

"Now, we have information on the entire delivery flow at our fingertips. This means it feels safer to promise a customer a certain delivery time," says Ingalill Pettersson.

"If a customer asks about a certain delivery, with a simple maneuver I can see which plane the goods went on, the invoice number and when the goods are scheduled to arrive. Before, I would be forced to make several calls to obtain such data."

With the old routine, Ingalill Pettersson and her colleagues would compile weekly or month-

ly lists for order bookings, invoicing and delivery precision. Those tasks have now been eliminated, since the management team and sales offices can now obtain data directly from the R3 system.

In total, R3 has replaced some 30 computer systems at the Energy Systems business unit, which includes the Power Modules product unit. Several of the old systems are poorly integrated with each other and not Y2K compliant or capable of coping with very strong growth.

Some computer systems will be kept, however, and interfaces are being constructed toward such systems and directly toward customers.

"R3 is a great help toward enabling us to offer more customers better service and special delivery agreements involving customized logistics," says Louis Masreliez,

manager of the Power Modules production unit.

"A successful implementation of R3 is undoubtedly a competitive tool. Still ahead is a period of fine-tuning the system, which will affect our work routines and processes.

Higher standard of data correctness

To be utilized effectively, the new work tool requires a higher standard of data correctness. It makes it easy to obtain an overview, to follow up market units, products and customer segments, for example.

"Soon I will be able to easily obtain daily follow-ups of delivery precision and see if any deviations have occurred, and their causes," says Louis Masreliez.

"This is very helpful in increasing and guaranteeing delivery precision. I can also quickly obtain a picture of how much we sell to a certain customer segment - which would have been virtually impossible before."

Nils Sundström

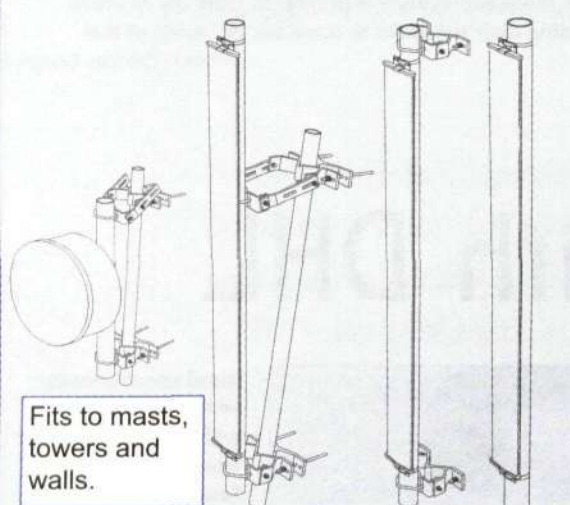
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"For every R3 system installed, up to 30 old systems are discarded," says Jan Henriques, in charge of the R3 project. Photo: Peter Nordahl



"My customers are important, but my colleagues mean just as much," says Adriana Boersma, who is responsible for the Telfort customer account.

Photo: Lena Widegren

Globetrotter puts things straight

A few months ago Adriana Boersma took over the Telfort customer account in Rijen in the southern part of the Netherlands. Soon after her arrival she made sure Ericsson landed a strategically important contract with Telfort. It has become her signature to quickly streamline operations and bring in major contracts for Ericsson.

When Contact visited Adriana Boersma at her home in the Netherlands, the house was full of relatives and guests from afar. She dismissed the suggestion that it might be inconvenient to hold an interview on this particular day, which was her birthday: "I'm not fussy about that kind of thing. My job is my hobby and I don't make any great differentiation between work and play."

Likes to put things in order

Her enthusiasm for work is one of her main strengths. "I am good at winning the support of my colleagues for what I want to do. I like my job and I love people."

After four years spent at five different Ericsson units, she is known as a person who likes to clean up and put things in order. A recent one-and-a-half-year stint in the U.K. to stir up business in transport networks resulted in a profit in these operations, which had been sluggish for several years.

"I like to be thrown in at the deep end and come out with a lucrative contract. It's the challenge that gets my adrenaline going. Give me a complete mess and I'll soon tidy it up."

Adriana Boersma says it's a matter of getting the employees to take the right steps. What tends to happen first when she takes over, is that positions get shuffled. That is what hap-

pened when she came to Rijen to take charge of the Telfort customer account. "I concentrate on identifying and gradually eliminating employees' weaknesses. By listening to and observing my colleagues, I discover how we can best define our task together."

Adriana Boersma thinks there is a scarcity of managers who are interested in people at Ericsson, and that as a result employees are given tasks they cannot manage. "You can't tell people they're good at everything. People become frustrated if they can never improve their ability in a particular area."

At home anywhere

Adriana Boersma was born and raised in Mexico. With a father who traveled extensively in his work, the family was often in transit. Since her early childhood, she has lived in 17 countries. In working for Ericsson, she has maintained this type of lifestyle. During the past few years, she and her husband have lived in the Netherlands. Before that, she held positions in Sweden and the U.K. "My childhood has helped me to understand that people are basically the same all over the world. I feel at home everywhere. Ericsson can send me to a new company anywhere in the world. I can pack my suitcase and leave at any moment."

Lena Widegren

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Contracts more difficult to secure

"I never assume a contract is ours before the money is safely in the bank," says Adriana Boersma, customer Key Account Manager for the British-Dutch operator, Telfort. "The harsh reality is that contracts tend to be viewed nowadays more as promises than as completed deals."

Ericsson was awarded in March 12, 1999 a GSM order for 1 billion SEK that includes also the delivery of GPRS (General Packet Radio Services) systems. It is an important contract that enables Ericsson to continue as Telfort's sole supplier of GSM mobile systems. Competition for the contract was unusually intense. Ericsson's primary competitors, Nokia and Motorola, were in the running and tried very hard to get a foot in the door at Telfort.

"Nokia was extremely aggressive," says Adriana Boersma. "Even when Telfort called them to announce that we had been given the contract, they refused to back down. That same afternoon, five people were flown down from Finland with instructions to get the customer to tear up the contract. For Nokia, apparently,

'No' does not mean 'No.' In that respect, we have a lot to learn."

Ericsson is working hard to maintain its favorable position in the Netherlands. Telfort, which is 50-percent owned by BT and 50-percent by Dutch Railways in one of the most influential and aggressive new operators in the Dutch market and BT's largest joint venture outside the U.K. Few of Telfort's 1,800 employees are older than 35. The low average age colors the character of the company.

Telfort and Ericsson have cooperated for three and a half years. Adriana Boersma was appointed customer Key Account Manager three months ago. She spends much of her time developing the Ericsson-Telfort relationship. "Customer contacts must be attended to

every day. We opened an office on Telfort's own premises, so that we can keep up to date with the customer's requirements."

Customer confidence stands to increase considerably now that Ericsson operates closer to the customer on all levels. "I consider it one of my most important tasks to have my boss meet with the Telfort president more frequently. The fact that we have enjoyed a long-term relationship with a customer does not mean that relationships can be taken for granted."

"When I ask customers what I can do for them, they are often surprised! That is not a good sign. We must learn to listen better to the customer. These days, nothing can be taken for granted. We must teach people in the company that such an attitude is no longer acceptable."

Also, the latest Switching contract signed in March 30, 1999 with Telfort exemplifies the exacting business climate. The customer's requirements regarding delivery time and the pressure from the competition drove Ericsson

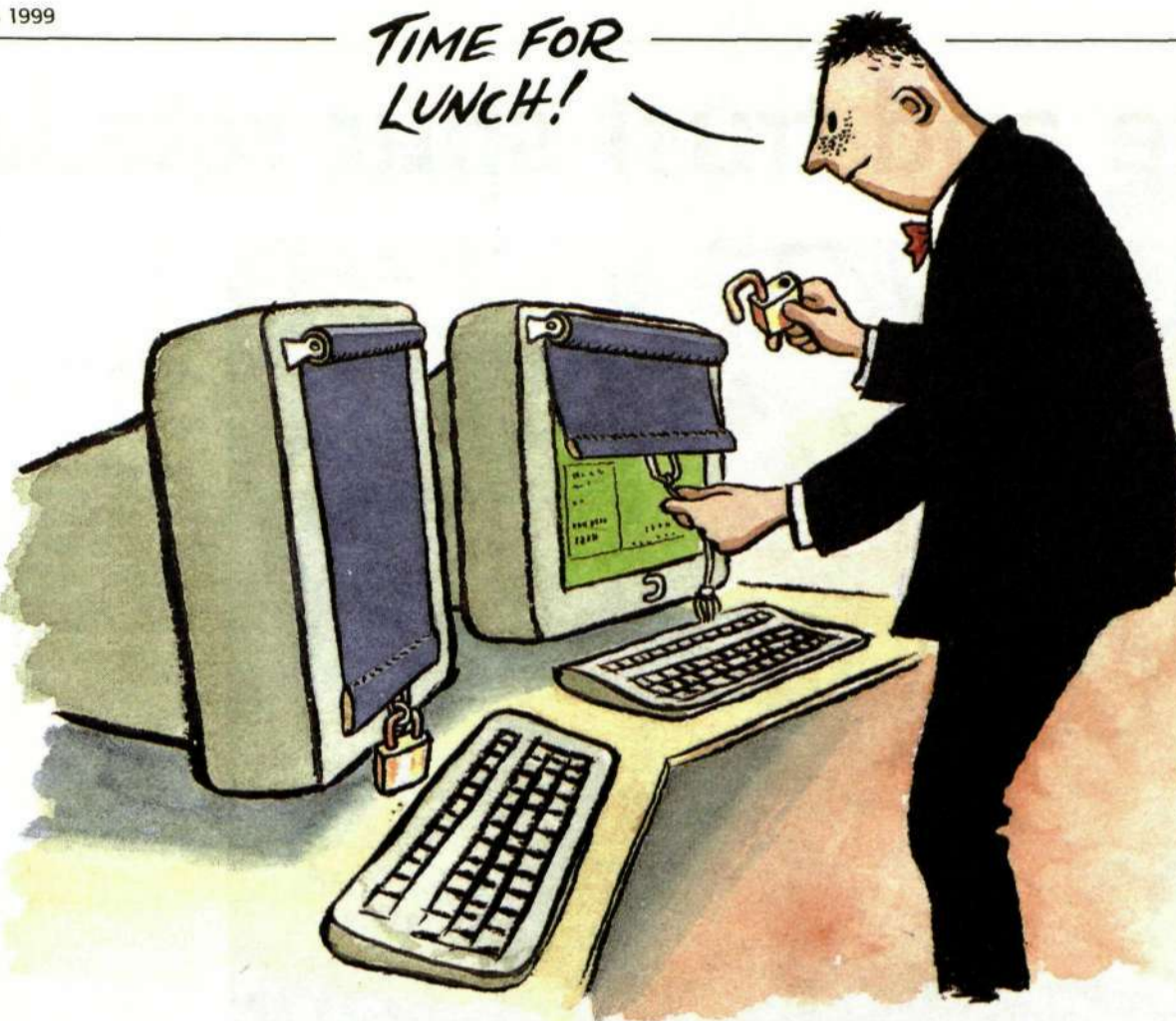
to try new methods. Equipment was installed before the negotiations were finished. This meant Telfort's switching equipment was on the site, ready for operation, the day after the contract was signed.

"We took a considerable risk, of course. But because of it, we won the deal. Only Ericsson was able to meet the customer's delivery requirements."

It took a month to install the new system. The new Switching order also includes customer support as well as system operation and maintenance. Ericsson will operate the network for Telfort for the first six months, until they can take over.

"Base-station and Switching margins are steadily falling. We must find other ways to achieve profitability - new types of services, for example, which is an area where Ericsson can improve even further," says Adriana Boersma.

Lena Widegren



By taking simple security measures, you can help increase the level of computer security within the company.

Illustration: Ulf Ragnarsson

You can stop industrial espionage

Do you log off your computer before leaving your workplace? Do you keep your passwords in a secure location? It's important for computer security at Ericsson that those things become a regular habit. Ultimately, it's about protecting against unauthorized access to the company's computer system.

The Melissa virus recently affected e-mail traffic at several Ericsson companies. E-mail servers were overwhelmed and some traffic had to be shut down for a day or two.

"That was the first time we've been affected by that kind of a virus," says Bo Eklund, head of computer security at Ericsson. "The Melissa virus, which affected many users, was discovered by Ericsson systems operators."

PIN code important for security

Computer security is a broad field and includes everything from programs run by systems operators that monitor computer systems, to procedures for individuals' work in front of their computers.

What should you, as a user, be doing to maintain a high level of computer security?

The most important factor is the way in which you handle your password or PIN code. This is an important component of security since the codes are keys to information.

"Every aspect of accessing electronic information is personal and passwords play an integral part. They shouldn't be shared with anyone," according to Bo Eklund. "You should definitely not write down your password and leave it lying on your desk. PIN codes are valuable information and should be treated as such."

Lock your office door

Another general piece of advice when it comes to computer security is to log off your computer as soon as you leave your work area. Also, lock the door to your office at the end of the working day.

"Another general rule is to not talk about company information with outsiders or share information with unauthorized individuals."

Computer security is something that needs to be adapted to the needs and requirements of your work. There are different methods available to meet various security requirements, depending on your work assignments and habits.

All of this is laid out in a set of rules for the entire company. There are five different levels of security within Ericsson. Before beginning a project, the manager in charge needs to determine whether project information is confidential and to what degree. Generally, the higher the level of security classification, the stricter the handling of information.

"That means, for example, that you need to be clear about who you can send this kind of information to and who is allowed to see the information. Are you allowed to fax the information? Can you talk about the project over the phone? — and so forth," says Bo Eklund, who explains that directives for all of the security levels can be found on the intranet.

Don't leave papers on your desk

"If you're working with confidential information, then you shouldn't leave papers lying visible on your desk when you go to lunch, and you also need to lock your door."

"We'll probably implement the PKI technique in stages, starting with areas that deal with sensitive information," says Bo Eklund, head of computer security at Ericsson.

Encrypt and sign information

With the aid of smart cards, users can both encrypt and sign electronic information. The card contains, among other things, various pieces of information that tie the card to a particular person through a certificate. The technique means that users only need to log

Special rules apply for telecommuters. The first requirement is that users need to use equipment that is owned by Ericsson and connect to the intranet in a certain manner, partly with the assistance of single-use passwords.

"You need to be connected to the company's network and not work with information that is just stored locally. Information becomes very vulnerable if it sits unprotected on a local hard drive. In addition, we have special rules for local hard drives which require all information to be encrypted," says Bo Eklund.

More requirements for laptops

Is it possible to maintain a high level of computer security even when using laptop computers?

"Being mobile and located outside Ericsson's facilities, places greater demands on security. One should be careful and not handle confidential information at home or in a hotel room, for example," replies Bo Eklund.

There are also rules for backing up laptop computers.

Users are required to make back-ups on the local network themselves. When travelers return to the office, they need to connect their

computers to the local network. Another goal in this regard is to encrypt the hard disks of all laptop computers.

Before traveling abroad, you need to check the country's data encryption laws to see whether they allow you to bring your laptop with you.

"We're now putting together an alphabetical list of Ericsson countries which details which countries allow encrypted computers. The list will be regularly updated."

"A general word of advice is to never leave your computer unattended, but keep it in sight at all times. The information inside a laptop computer should be protected in the same way that you guard your wallet," says Bo Eklund.

Computer cases being switched

Computer thefts occur in places such as airports, especially in conjunction with baggage inspections. Computer cases are frequently switched for similar looking ones.

"We usually recommend that people don't carry their laptops in a computer case, but rather in some other type of bag that doesn't reveal its contents," says Bo Eklund.

Ulla-Karin Höynä

New technique improves security

A new technique that simplifies the log-on procedure to computer systems is currently being tested. Testing of the Public Key Infrastructure (PKI) technique is in its final stages. Following that, there are plans to implement the technique within the company.



Bo Eklund

onto a computer system once, and will eventually make it unnecessary for people to keep track of one or more passwords. The PKI technique also increases security.

It is based on a secret key that only exists within the card and works together with an open key that is published in a catalog. In order for the technique to work, both keys must be used, meaning that whoever signs or encrypts

an electronic document cannot be anonymous.

So far, a hundred or so users have tested the technique, in order to check internal routines as well as the card's three products: authentication (verification of the card holder), encryption and digital signatures. The PKI technique requires a Certification Authority (CA).

New type of business card

"We'll be our own CA," says Bo Eklund.

The card can also be used as a new type of business card. The decision to implement the PKI technique at Ericsson will probably be made soon.

Ulla-Karin Höynä

Knowledge and trust spur retailers

What motivates a retailer to promote Ericsson's products? Likely factors include knowing what's good about them and being able to rely on Ericsson as a supplier.

In recent years, Ericsson's Consumer Products business segment has focused on so-called Channel Marketing – a way to both increase its marketing efforts and improve service towards the retail sector.

The idea behind Channel Marketing is to listen to retailers and provide the assistance they need in order to sell as many Ericsson products as possible. Retailers, who are an extension of Ericsson, are essential in efforts to reach customers.

It's important to establish mutual respect with these key people. A retailer who is informed about and likes Ericsson products, will sell Ericsson phones.

Ultimately, it's about establishing a name and building up brand loyalty among those who interact with customers.

Remaining flexible

To assist this marketing effort, a "toolbox" has been developed, consisting of almost 40 Channel Marketing tools, including sales materials, intranet access for stores, and sales training along with various promotional campaigns and events. Depending on the maturity of the market, different tools can be applied. By remaining as flexible as possible, various solutions can be found to fit the needs of all of the 80 or so markets.

"It's important that the tools used reflect Ericsson's brand name," says



Regular communication between Ericsson and its retailers is essential. Responsiveness and support are key concepts.

Photo: Kamerareportage

Jörgen Berg, manager for Ericsson's Consumer Products' global Channel Marketing work.

Tools can help

"By having a toolbox available, good ideas can easily be shared with several markets."

Uniformity is the key word, according to Jörgen Berg.

It's important that everyone speaks the same language in terms of brand concept and that everyone

“ The new retailing concept will create an environment that is consistent all over the world, despite differing conditions.

is working towards the same goal.

It is important to always remain attentive to the retailers. Every year, studies are conducted to find out about the retail industry's opinion of

Ericsson and how successful the company has been at providing support through its various marketing activities.

Fresh info

Regular two-way communication

between Ericsson and its retailers is essential. One way to provide the retail industry with fresh, consistent information is through the Partner Network. This extranet supplies au-

thorized partners with relevant product information, retailing advice and advertising campaigns. There's even the possibility of ordering brochures electronically and creating advertisements together with Ericsson.

Access to the facts

Retailers who offer telephone repair services in their stores also have access to important technical product information. Our partners can, in turn, ask questions or submit opinions through the network.

"We're continuously developing the Partner Network in order to ensure that, like our products, it will be a modern, easy-to-use tool for communication between us and our partners," says Jörgen Berg.

Database established

In order to better plan Channel Marketing activities and to always have an up-to-date picture of what the 100,000 or so stores around the world are doing, Ericsson has established a database. It contains all the essential information such as type of retailer, type of store, and which Ericsson products are sold, as well as a large amount of other information.

In order to further unify the Ericsson brand name, a new retailing concept is now also being developed.

"Even if stores around the world differ significantly in terms of size and layout, customers should be able to get the same feeling for what Ericsson stands for."

"The new retailing concept will create an environment that is consistent around the world, despite differing conditions," says Jörgen Berg.

Gisela Zeime

Lillie Lin created her job

"I've got a job that I actually created myself," explains Lillie Lin at Ericsson Taiwan Ltd. She believes that she is a good example of the opportunities for job rotation that exist within Ericsson.

During the seven years that Lillie has worked for the company, she has been an executive secretary, administrative manager and is now responsible for contract administration in the marketing department.

It was in January 1992 that Lillie Lin came to work for Ericsson in Taipei, leaving a job with a European trading company. She worked as a secretary in various departments until 1997 when she became manager of the administration unit, overseeing five employees.

"I don't like being in charge of employees which is why I didn't care much for that job," says Lillie. She left the position after a year and became a contract administrator. "It's



Lillie Lin, at Ericsson in Taiwan, believes that there is a lot that can be learned from the company's web site.

Photo: Gunilla Tamm

actually a job that I created myself. Before me, there was no particular person responsible for these tasks."

Lillie explains her job as being an interface between various units at Ericsson Taiwan, keeping track of old contracts and making sure that payments come in. She was able to define her job responsibilities herself and thinks that they are both fun and instructive.

Lillie's ambition is to learn more about Ericsson and the company's products. It is her belief that people

can learn a lot by asking questions and that a huge amount of knowledge can be found on the web sites. She has also participated in some courses and has plans to take more.

"These are my sons, ten and four years old," says Lillie, pulling a photograph out of her wallet. She has been married for eleven years and lives in a suburb of Taipei. It takes her an hour to get to work by bus.

When the conversation turns to child care and housework, Lillie explains that her mother is the baby-

sitter and cooks dinner on weekdays. Cooking is one of her hobbies and on weekends she is able to devote time to that.

Lillie enjoys reading, an activity which she finds time for late at night. This year, Lillie will have 21 days of vacation. Some of those days are devoted to various activities at the boy's schools, while the rest of her vacation is spent with her whole family in southern Taiwan at the home of her parents-in-law.

The company has grown rapidly

during the years that Lillie has worked at Ericsson Taiwan Ltd. Even though she sometimes misses the family atmosphere that once existed, she is very content with her work.

"The company shows respect for its employees and we enjoy freedom in our responsibilities. I'm in touch with former work colleagues who still praise Ericsson, although they no longer work here," she says.

Gunilla Tamm

gunilla.tamm@era.ericsson.se



An IT certificate printed out on a color printer.

Get your own IT driver's license

Are you as good as you think you are when it comes to operating everyday IT tools, or do you overestimate your abilities?

A study shows that about 40,000 Ericsson employees do not have sufficient IT skills. Regardless of who they are, there's now a chance to document the current state of affairs.

The Ericsson IT certificate, a sort of IT driving license that most of us will soon be carrying in our wallets, is now being launched. Within a year, 70,000 employees worldwide are expected to have obtained one.

Test in different areas

In order to receive an Ericsson IT certificate, different tests covering the following seven areas have to be mastered: general IT knowledge, Windows, Word, Excel, Power Point, Outlook and a web browser (either Explorer or Netscape).

The program was kicked off on May 7 at the Kumla plant in Sweden, where Jesper Skoog became the first person to successfully complete all the tests for his IT driver's license.

Naturally, the tests are conducted on the web, using the WebLearn intranet channel.

The program was masterminded by Lennart Lysén, from Corporate IT, and Thomas Jerpseth, Business Consulting. Together with a 12-person working group, they created the contents and the educational model for the IT certificate.

They drew inspiration for the project from the European Computer Driving License (ECDL), and they hired WM-data to design the program.

Praise the opportunities

Lennart Lysén and Thomas Jerpseth praise the opportunities that the web has provided, as well they



Thomas Jerpseth, left, and Lennart Lysén are the minds behind the IT driving license project. Photo: Thord Andersson

should. In just one year, WebLearn has become a huge success at Ericsson. The web-based school allows people to choose their own course work and educational programs, depending on the skills they feel need reinforcing, whatever those may be. The student decides the time and the place.

WebLearn is accessible from over 70,000 Ericsson PCs in 140 different countries. The most active users are found in the U.S., China, the U.K. and Sweden.

Testing for the IT certificate is a matter between you and your computer.

The tests can be taken by connecting to WebLearn and answering the test questions posed. At least 75 percent of the questions need to be answered correctly in each test area in order to pass.

Once you have successfully completed all of the tests, you can print out your IT certificate yourself.

Thord Andersson

thord.andersson@ebc.ericsson.se

To receive your certificate, go to the following intranet address:

<http://weblearn.ericsson.se>

Giant jubilee phone

Now, some time after the huge CeBIT trade show in Hanover, it is perhaps a good time to reflect on another exhibition, which was also impressive for its time.

We're referring to the jubilee exhibition held in Gothenburg in 1923, in conjunction with the city's tercentennial.

Gothenburg was founded by Gustavus II Adolphus in 1623, and was then one of Sweden's most important strategic western outposts. The anniversary of the founding of the city was celebrated during the summer months in 1923 with a jubilee exhibition, in which Swedish industry displayed its best products to crowds of international visitors.

The LM Ericsson stand was domi-

nated by a giant telephone of the most modern type of the time, equipped with finger dial to enable automatic connection of calls. The telephone displayed was 8,000 times the size of a real phone and stood at the center of the stand where it was the unrivaled center of attention. Inside there was a fully automatic telephone station for 500 lines. This was a station of the newer type, with a "500 switch." All workings could be observed through the glass casing of the phone.

Several phones were connected to the switch, to allow the public to test-dial. The connection process could be observed from the movements of the switch as the caller dialed each number. The exhibition helped to create demand for automatic telephones.

Visitors were amazed by the giant phone exhibited at the jubilee exhibition in Gothenburg, Sweden, in 1923.

Photo: Ericsson's archive



For several years, the finger-dial from the exhibition phone hung in the LM Ericsson building in Stockholm. Where it is now I cannot say.

Readers' tips would be greatly appreciated.

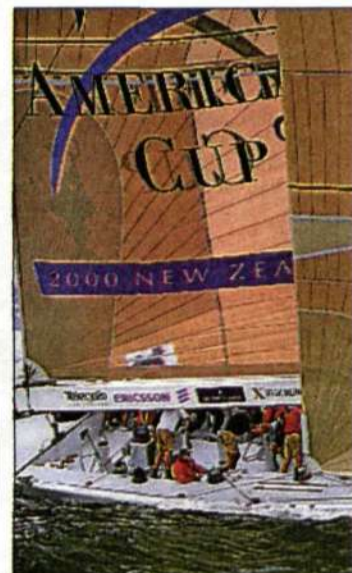
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ERIC & SON



NOTEWORTHY



Ericsson is one of the main sponsors of the America's Cup 2000 sailing race to be held in Auckland. Photo: Patrick Trägårdh

Ericsson visible during America's Cup

The sailing races leading up to the America's Cup 2000 in Auckland, New Zealand, begin in October. The final race will be held in February of the year 2000, when New Zealand will defend its title.

Ericsson is one of the main sponsors. Ericsson will also contribute communications equipment for the competitions - everything from mobile phones to PBX solutions. Ericsson-customer Telecom New Zealand is also a sponsor, creating ample opportunity for Ericsson to demonstrate its capabilities together with the customer.

Spectator-friendly

Ericsson is also providing a wireless-data solution to enable the spectators to follow the races more easily from land. There will be a large video screen showing the boats' relative positions. This will make the sport of sailing considerably more spectator-friendly.

Great opportunities

The first eliminations will begin as early as mid-October, and the deciding race will be held at the end of February. This will provide excellent opportunities for Ericsson to offer customers an experience beyond the ordinary. There are challenger boats from the U.S., France, Switzerland, Japan, Italy, Spain, the U.K. and Australia.

Patrik Lindén

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<http://www.americascup2000.org.nz>



America's Cup provides good visibilities for Ericsson.

Vacancies

AT ERICSSON

■ This is a selection of vacancies within the Ericsson corporation. They are published in the electronic News system, which is being updated once a week.

For further information about advertising here, send a memo to LME.LMEJOB.

Contact No. 7 1999

Updated April 26

IN SWEDEN

ERICSSON RADIO SYSTEMS AB, SUNDBYBERG

Business Management & Support Middle East & Asia-Pacific ERA/LO is responsible for business operations for products based on GSM standards. LO consists of 46 people in Sweden and about 20 expats in Asia. Today our workplace is Sundbyberg but before the summer we will move to Kista.

Director – Business Management

● You will lead our team of business managers responsible for region Pacific Rim. (Australia, Philippines and Taiwan) You will be part of the unit's Management Team.

You will have the consolidated business responsibility for your region together with the market unit. Your key task will be to expand our business with existing customers in a profitable way.

To be successful you should have extensive knowledge of systems marketing and sales and preferably experience as key account manager.

The position will give you international exposure and travelling in Asia is an integrated part of this work.

We are looking for a business oriented person who works independently and is open to different cultures.

Contact: Uldis Zervens; phone +46 8 757 03 12 Eva Fransson; phone +46 8 767 57 38 Application: Ericsson Radio Systems AB SG/ERA/LOH Birgitta Skott 164 80 STOCKHOLM birgitta.skott@era.ericsson.se

ERICSSON RADIO SYSTEMS AB, KISTA

Manager, Product Management UMTS Packet Switching Systems

Product Group UMTS Packet Switching Systems has the mission to provide profitable and competitive UMTS packet switching products to mobile operators all over the world. The unit has bottom-line product responsibility and consists of product management, system management and design departments. UMTS packet data is about bringing together two of the most exciting and fast-growing areas of technology: wireless communication and Internet based services.

● As a Manager you will be responsible to manage and develop the Product Management department which currently consists of about 5 persons. The product portfolio comprises the GSN nodes as well as products in the area of Internet interworking.

Your organisation is responsible for defining the UMTS products, working out business cases, and taking part in product marketing and tender work. Another important part of the work is to define and motivate product requirements, and to order and follow-up development work. Since the UMTS standard is not ready yet, setting directions for standardisation is vital.

You have a M.Sc degree or equivalent and experience of product management in the field of telecom and/or datacom. You are business- and result oriented and have excellent leadership capabilities. Good communication skills and fluency in English are also important. The position is located in Kista.

Contact: Magnus Fransson, phone +46 8 757 14 85 magnus.fransson@era.ericsson.se or Bo Danielsen, phone +46 8 404 81 67 bo.danielsen@era.ericsson.se Application: Ericsson Radio Systems AB KI/ERA/LK/HS Susanne Holmene 164 80 STOCKHOLM susanne.holmene@era.ericsson.se

ERICSSON RADIO SYSTEMS AB, KISTA

Manager, BSS Evolution

● We are looking for an enterprising and forward striving manager to an expanding unit within BSS System Design, in the Product Unit Base Station Systems.

The unit is called BSS Evolution and will be responsible

for BSS architecture and infrastructure solutions. The emphasis will be on future solutions but also cover the products we currently have in the field.

The job is very outward, which implies that an important part is to establish and maintain personal and organisational contacts, both internally within Ericsson, and with our customers world wide.

We think You have substantial GSM experience and an interest in new technologies. We also think You have an interest in leadership and of course that You like challenges and to take on responsibilities.

Contact: Mattias Karlberg, phone +46 8 404 4789 Application: Ericsson Radio Systems AB LV/HS Kerstin Almblad 164 80 STOCKHOLM Sweden

ERICSSON BUSINESS NETWORKS AB, SUNDBYBERG

Manager, Market Operations Middle East & Africa

Ericsson Dedicated Networks, an important cutting edge area within the Ericsson Group, is looking for a Manager for our Market Operations Middle East & Africa. Our business is planning, projecting, installing and maintaining communication networks for voice, data and image. Our customers are primarily in the enterprise segment and are spread across the globe.

We are currently in a build-up phase and we quickly need someone who can energetically shoulder responsibility as manager for Market Operations Middle East & Africa.

● As manager for Market Operations Middle East & Africa you will be a member of the management team and report directly to the head of Dedicated Networks. The unit you will be responsible for has consolidated profit and loss responsibility for business in the Dedicated Networks' area for Middle East and Africa. You will have an important role in our co-operation with the market units. The department has 15 employees and the main tasks are: Marketing and sales, both in co-operation with Market Units and to direct customers. Support to Market Units in their build-up of Dedicated Networks business. Commercial responsibility from sales to implementation of our turn-key projects.

For this position you should have a solid experience in marketing and sales. We appreciate experiences from the Middle East and Africa regions. You are a result-oriented businessman with managerial skills, are people oriented and have good communication skills. Good command of English both verbally and in writing is required, further languages are a merit.

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ERICSSON RADIO SYSTEMS AB, KISTA

Manager, BSS Evolution

● We are looking for an enterprising and forward striving manager to an expanding unit within BSS System Design, in the Product Unit Base Station Systems.

The unit is called BSS Evolution and will be responsible for BSS architecture and infrastructure solutions. The emphasis will be on future solutions but also cover the products we currently have in the field.

The job is very outward, which implies that an important part is to establish and maintain personal and organisational contacts, both internally within Ericsson, and with our customers world wide.

We think You have substantial GSM experience and an interest in new technologies. We also think You have an interest in leadership and of course that You like challenges and to take on responsibilities.

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ERICSSON RADIO SYSTEMS AB, KISTA

Strategic Marketing

● We are a new unit at Business management Europe and Africa Which is being established to market and launch our products as well as Ericsson at our markets. We are now looking for one

Market Analyst

● You will conduct, analyse and drive, end-user-studies, competitor, customer and market studies in order to get a profile of the market and its needs. Increase the knowledge of each market place in order to develop the right marketing strategy and approach.

Marketing Managers, 2 persons

● You will drive and initiate marketing activities, make the marketing strategy into a saleable and understandable message, and sell this into the account teams and to our customers. You will further make preparations for market launches, e.g. make time schedules, launch plans and sales material. Adapt the market messages adapted to the specific market place. Gather experiences from markets when it comes to launches and outcomes from them and make this information usable to other markets.

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ERICSSON RADIO SYSTEMS AB, KISTA

Consulting Sales Support Manager, Network Operators and Service Providers

Customer Services Region EMEA (Europe/Middle East/Africa) for segment Network Operators and Service Providers are looking for determined and enthusiastic people to drive and improve the sales of ND/NPI services within the EMEA region. The position includes task such as initiating and co-ordinate Marketing & Sale plans and activities, e.g. visits, seminars, customer presentation and promotions.

● Build and maintain excellent relations within the region is also vital, since you will be actively working with the local Marketing & Sales Units throughout EMEA. You will also work close together with the Regional Sales Management and SAU (Product Management) for ND/NPI in Stockholm.

Interested candidates should have excellent communication and marketing skills, alongside experience in our business area (ND/NPI services for mobile and/or wireline systems) as well as a good knowledge of Ericsson in general. Further, the candidate must be capable of working individually as well being an important link in the team.

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ERICSSON RADIO SYSTEMS AB, KISTA

Business Manager for GSM Europe

The RMOG business continues to expand rapidly. We at Business Management, Europe and Africa (ERA/LG) are therefore looking for additional senior Business Managers. We would like to get in touch with you who like speed, meeting people, learning about other cultures and last but not least, Doing Business!

● You will be responsible for one more customer accounts within Europe, the unit works with accounts in Belgium, Holland, Switzerland, Spain and some other countries. Your main interface will be the local Ericsson companies and their management. Together you will build relations, set short and long-term objectives, drive the business and follow up on results.

You will also play a key role in bringing new solutions to the market that means that conducting Business Development is a part of your work as well. We want to emphasize the focus on sales of solutions rather than boxes.

As a Business Manager you work in a team of 5-6 persons and to your assistance you have units for Operational Support and Business Development. You will report to the Business Director. The job is related with frequent travel within Europe.

Your formal education and experience consists of Academic degree and at least 10 years of working experience whereof 3-4 years from the IT industry. Telecom experience is of course a plus. You are fluent, written and oral in English, other languages are beneficial. As individual you like to do business and have developed a good social skill and understanding in doing business with other cultures. Other key words to you are Initiative, Drive, Ambition, Quality and Fun.

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ERICSSON RADIO SYSTEMS AB, KISTA

Consultant – Venture Analysis

TDMA Systems-BMOA is one of the fastest growing business units within Ericsson Radio Systems. We are the market-leader for cellular telephone systems and services based on TDMA standards. Our mobile telephone system, CMS 8800, is the most sold system in the world and our markets around the world are growing rapidly. We are now looking for a Venture Analysis Consultant to join our team.

● As a Venture Analysis consultant you will ensure that the taskforce sales activities are based on knowledge and understanding about the operators, investors, and the end-customer market. You will also secure the sales force targets and convince the right executive decision-makers with a business model based on relevant commercial and market information.

Your tasks will include developing business cases and market plans to be presented to potential customers based on general and specific information for the individual mobile operator. You will be in close cooperation with the customer and with a third party expertise further develop and adapt these business propositions in order to prove that our solution will deliver superior value to the customer. You will also work as an interface for internal and external specialists/consultants within all applicable Specialist fields such as marketing, market segmentation and financing when creating business models.

Working as an interface towards investors, banks and Ericsson internal financing specialists in close cooperation with the Business Lobbyists when pursuing the sales work is also a part of the job. You will even, in close cooperation with Business lobbyists, develop the usage of business plans and business cases in the sales work and utilize and adapt available tools for creating business cases.

We are looking for a person with a Masters Degree in Business and/or Economics and who is fluent in English. You should preferably have at least 5 years of experience working for an operator, within the fields: market strategies, mergers and acquisitions, financing, or new license opportunities. You should also have at least 5 years of experience within sales and marketing, preferably within systems sales. Good knowledge of mobile telephony and excellent presentation skills are a must and you should also be used to working with financial models.

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ERICSSON BUSINESS NETWORKS AB

Enterprise Customer Services is one of the fastest moving and growing parts of the Enterprise Segment. We are today structured as a Product Unit, which promotes entrepreneurship and gives us the total flexibility to work with the whole Enterprise Segment.

Pricing Manager

● The Product Unit Customer Services is looking for a Pricing Manager. Your responsibilities are to define and continuously develop our pricing strategy, and implement the pricing strategy in the MU. Secure a global up to-date price list and keep track of competitors pricing models and strategies is also a main responsibility.

As a Pricing Manager your work will include: Life cycle pricing management. Feed our configuration / Quote tool with accurate prices. Building price models for our service portfolio. Handling regional pricing issues.

We believe that you have a postgraduate level within the areas of business administration or finance and experience in the customer service industry for tele- and/or data communication.

You should have a basic knowledge about Business Communications products, specific knowledge on the products within the service business area. You should also have negotiation skills, good communication skills and financial understanding.

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ERICSSON RADIO SYSTEMS AB, KISTA

System Market Introduction Manager

Business Strategy and Support (KI/ERA/LG/S) is a unit within Business Management Europe and Africa, GSM Systems. We are responsible for Business Strategy, Business Intelligence, Marketing Support, User group Management and System Market Introduction towards existing customers.

The mission for the System Market Introduction team is to plan and support the introduction of new systems (products/services), fulfilling the commercial requirements specified by the Business Management Unit.

● We are now looking for a new person to join the team. Your main tasks will be: System Market Introduction, i.e. on regional level to plan the rollout of new SW and HW products with the focus on deliveries.

This includes: Prepare basis and recommendation for regional prioritisation of SW and HW deliveries. Prepare commercial basis and recommendation of Trial system, FOA and exemption candidates. To support the marketing and sales work in the introduction of new systems or cross PU products, i.e. where applicable: Establish cross-functional teams (PU - BM - KAM), enabling easier competence build-up in the organisation. You will work closely with the Business Manager at ERA and the KAM organisations at our Market Units. You will also work close to the Product Units and the Regional Supply Offices.

As a person you have good social skills, a good driving ability and an open leadership style. Preferably you should have experience from working at a MU as Product Manager or Project Manager within the customer Supply / Support flow. Documented technical / commercial understanding, presentation skills and highly developed skills in English, both spoken and written, are prerequisites.

You have a university degree in engineering/economics or equivalent work experience and a minimum of three years experience in the telecom industry.

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TELEFONAKTIEBOLAGET L M ERICSSON, STOCKHOLM

Communications Manager

The mission of the Corporate Sourcing organization is to support Ericsson's long- and short-term profitability through effective sourcing of technology, products and services.

The strategy is focused on: alliances with key Suppliers managed by Corporate Program Managers, common Processes, toolbox and measurements to ensure one message to the Suppliers, develop a First Tier structure to continue up in the value chain, when feasible, competence development through utilization of best practices, integrate our suppliers as early as possible in the development of Ericsson Products, be the preferred customer for our suppliers, cross functional and cross organizational networking, optimize the supplier base.

● We need to strengthen our organization with a Communication Manager. Within the responsibilities of Corporate Sourcing Development and Support contribute to the positioning of Corporate Sourcing and Technology Sourcing and enhance the units' capabilities in handling the relationships with all relevant stakeholders (customers, suppliers, management, employees, etc).

Responsibilities and main activities: Branding of Corporate Sourcing and Technology Sourcing. Information strategies and implementation of various kinds of information activities, as: reverse Marketing (Suppliers), internal Marketing ("Customers" and Employees), webmaster and editor, newsletters, weekly management letters. Information process development. Specific focus on information about Click-to-Buy.

In accordance with the current specified "power of attorneys", budgets and Ericsson specifics. Qualifications Your professional background is from marketing communications in an international business environment. You have experience of leading people in line- and project

roles. You must have a strong interest in interacting with people, empowerment and coaching is natural for you as of course a strong orientation and business drive.

You should have excellent skills in writing and speaking English, and be skilled in the use of IS/IT tools such as Microsoft Office, Publisher programmes as well as web tools. In addition, you should be business-oriented, efficient, flexible and well-structured but at the same time you should be service-minded and find it easy to communicate with people from different cultural backgrounds.

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ERICSSON RADIO SYSTEMS AB, KISTA

Professional Services within the segment Network Operator and Service Providers - For a successful Partnership

Professional Services (BOPS) is an Ericsson Business Unit that delivers business solutions and consultancy services to network operators and service providers around the world.

Professional Services offers: Business Consulting, Telecom Management & Systems Integration (Billing & Customer Care, Service Activation, Network Management, Fraud & Security), Managed Services (Operation of customer network, support systems and IT environment), Quality Improvement Solutions. Solutions for Internet Service Providers.

The Professional Services Marketing Department is responsible for Business Management within two of our direct markets, China and Japan and therefore we need a:

Service Marketing, Manager, China & Japan

● The Service Marketing Manager will ensure that the selected Market Unit (China & Japan) works in a focused way to sell and deliver Professional Services (PS) in order to generate highly profitable business with high customer satisfaction.

This entails supporting Product Units and Market Units in their efforts to be successful in their competence areas within the selected market with the goal to increase business (and market share) in a profitable way. You will also be responsible for following up Market Unit progress and reporting back to Professional Services management.

Important activities include: Ensuring that the Market Units create a business plan for Professional Services and that they allocate resources to execute the business plan with help (if needed) from the different Product Units. Increase knowledge of PS Service & Product portfolio at the Market Units at different organizational levels. Organization of Marketing Seminars and other Marketing Activities. Co-ordinating cross Product Unit offerings and solutions towards the Market Unit and the end customer when needed. Follow up of the business plan, service sales and service delivery together with the Market Units and the Product Units. Creation of a good atmosphere and cooperation between the Market Unit and PS (relationship building).

Your profile: We believe that you have good knowledge of the business framework of Ericsson, preferably also from the cultures of China and/or Japan. We also believe that you understand the difference between consulting services and products and are able to communicate this. You are perceived as a senior person within marketing and sales. And we know that you are prepared to travel extensively.

What's in it for you? Opportunities for advancement. Responsibility - personal development. New, service-minded organization. Dynamic working environment. International contacts with management and specialists at all levels.

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ERICSSON RADIO SYSTEMS AB

International Business Consultant

Customer Business Development has been created to support customers by helping them to improve their business. This new area helps our customers to increase their market share and profitability by knowing what makes a wireless business successful in a rapidly growing competitive environment. We are working in close cooperation with local Ericsson companies all over the world.

● SCOPE OF RESPONSIBILITY: The goal for this position is to assist our customers, the wireless-operators, in becoming more successful in their business. The Consultant shall gain a good working knowledge of our customers and their success criteria. The Consultant will support our customers to increase their cutting edge competence by enhancing their strategic direction, marketing, segmentation, packaging, distribution etc.

BACKGROUND: Extensive experience from working as a wireless operator or as a Business Consultant is a prerequisite.

Business and Marketing skills are necessary, combined with a documented ability to establish and deepen business relationships and partnerships. Fluency in English is essential and Spanish preferable as well as willingness to travel extensively.

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ERICSSON RADIO SYSTEMS AB, KISTA

Market Introduction Manager

TDMA Systems - BMOA is one of the fastest growing business units within Ericsson Radio Systems. We are the market leader for cellular telephone systems and services based on TDMA standards. Our mobile telephone system, CMS 8800, is the most sold system in the world, and our markets around the world are growing rapidly.

● Within our business unit, TDMA Systems, we are looking for competent Market Introduction Managers to ensure professional product launches of the total BMOA product and service offering.

This function resides on the business unit level with the "Market Introductions and Solutions Marketing" unit.

This position requires extensive commercial as well as some technical competence. The successful candidate will be able to formulate clear, concise commercial arguments based on the various new products launched by the different Product Units. As market introduction manager you will strengthen the commercial competence and value awareness of our business solutions worldwide. Value based selling, segmentation and the use of business cases as sales and marketing tools will greatly help you carry out the market message and sales strategy based on our customers needs.

An extensive and successful market introduction requires clear marketing messages, a good value communication and a well-thought marketing campaign consisting of press releases, trade press articles and promotional material.

Parallel to the market introduction tasks you will also be responsible to market commercially important solution areas for the business unit. These solution areas consist of cross Product Unit offerings that no single Product Unit will take the responsibility to market. In order to accomplish the above-mentioned you should enjoy traveling, building relationships on a high level and working in an international environment.

These positions require co-ordination of different functions, both within the parent company and subsidiaries. It is therefore essential that you are outgoing, independent, creative and a driver with interpersonal and communication skills that will allow you to convey a very positive and professional image in this highly visible position. You should have several years' experience working with marketing in an international business environment. Fluency in English is required. For the right person the future is bright!

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ERICSSON RADIO SYSTEMS AB, KISTA

Area Manager - New Products Sales

The wireless communications field is one of the most dynamic and expansive industries of this century. Today, Ericsson's TDMA (IS-136) products and services support 50% of the world's wireless subscribers. New and dynamic applications such as PrePaid, Wireless IP (via CDPD) PCS and Wireless Office, are forging new frontiers within the TDMA (IS-136) wireless world. With its strong entrepreneurial spirit, the TDMA Systems business unit has established itself as a leader within the Ericsson group to meet challenges of today and tomorrow in this dynamic wireless communications market.

New WIN based applications are becoming an increasingly important part of the BMOA portfolio and are today constituting a very big part of the total sales. The new products and service sales unit is the driving force to continue this growth. We are now looking for experienced, energetic and ambitious individuals that are ready to take up the challenge as Area Manager- New Products Sales for either North America, Latin America or Asia.

● Main responsibilities and tasks: Meet the goals for sales of new products in the region. Actively drive sales of new products in the region directly towards our customers and through the local sales organizations. Frequently handle customer presentations and negotiations in the relevant markets.

The candidate should preferably have the following qualifications: Documented sales experience. Completed university degree, M.Sc., MBA or similar. Five years working

experience from the datacom or telecom industry. Strong perseverance and "drive". Fluency in English and good command of other relevant languages. Experience from the region in question.

This position will offer you the possibility to work in a stimulating international environment, with a high degree of own responsibility, as well as the chance to build up an extensive contact network.

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ERICSSON RADIO SYSTEMS AB, SUNDBYBERG

Manager - Strategic Product and Business Management

Do you believe the future lies in convergence between fixed and mobile, telecom and datacom? Do you believe that services, in all aspects, will drive the new telecoms world?

We have taken the best of the two worlds, the former Network Intelligence organization at BN and Value Added Services at BR, and merged them into PVAS: Product unit Value Added Services. With a broader product range, and truly converging services to offer, we are ready to conquer the minds of the telecom community.

● Looking for major and mind blowing challenge? then, you are welcome to join us at the Product Line Applications. Product Line Application is a newly build organization responsible for Intelligent Networks (IN) Applications for the Mobile and Fixed telephony systems. This unit has the full profit and loss responsibility!

We are looking for a strong manager as the head of a unit within this product line, responsible for setting up the visions, strategies, business plan and roadmaps for the Product Line Applications. A major focus for this unit is to set up the focus areas for IN Applications leading to achievement of continuously increasing profitability.

This position requires a strong manager with visions, and ability to achieve results. This position offers an enormous challenge which opens doors to the world of end-users business and market needs, an exciting international environment, plus much much more. Sounds interesting?

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ERICSSON RADIO SYSTEMS AB, KISTA

Strategic Product manager for Radio Network O&M

The product unit Radio Network Products provides competitive Radio Network Products for TDMA, i.e. the American Cellular Standard. Strategic Product Management has the overall profitability Responsibility for the product portfolio. We are now looking for a product manager within the area of Operation and maintenance within the radio network.

Strategic product management has the overall task of defining profitable TDMA radio products. Typical task is to define customer related requirements on products, define product strategies, create business cases and initiate and follow up design together with system management and design organization. To keep close contact with customers and together with the customer define requirements on new products, define prices and be involved in early marketing activities.

● We are looking for a Product Manager within the area Operation and Maintenance. The main focus will be on 3rd generation TDMA system based on EDGE but since we are migrating from today's TDMA system, also existing platform must be considered. We offer you a challenging position including opportunity to interact with customers both for defining requirement and making product presentations. Since these tasks cover both market competence and as well as system competence we put strong requirement on you. We hope that you are person that have good social skills, a good driving ability, a pragmatic approach. You are not afraid of trying new ways of doing things. M.Sc. or B.Sc and at least 5 years of experience of telecom /IT solutions are prerequisites.

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ERICSSON TELECOM AB, TELEFONPLAN

Strategic Product Manager

Ericsson lives in a new reality where telecom and datacom industries are converging at a rapid pace. Nowhere is that

convergence more apparent than in the access area. Within access we see an increasing demand for greater bandwidth, lower cost of ownership and the provisioning of new services.

Product Unit Access has been created to meet future needs for access solutions. The Product unit has a broad product portfolio of both narrowband and broadband access products.

The product area Access Solutions is responsible for turn-key solutions within PU Access. We also integrate and demonstrate PU Access products together with other Ericsson products (ATM switch, Access Router, SDH etc) as well as sourced products (routers, servers, backbone network equipment and end user equipment).

● We are looking for a Strategic Product Manager that can help us with the work of creating a product portfolio that match future needs for total solutions. You will define strategies and put short and long term requirements on what access solutions we need to develop. Visiting customers and keeping track of what our competitors are doing is part of your work.

We need a person that has a good understanding of the technologies we are working with in the access area. You need to understand the implications of the convergence of datacom and telecom in fixed networks. Your ability to create network solutions is important. We believe that you have a M.Sc. degree or 4-5 years of experience in the Product Management area. You should have good communication and teamwork skills and take pride in sharing and spreading competence. You are open minded, goal oriented and have a good ability to see the overall picture.

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ERICSSON RADIO ACCESS AB, KISTA

Project Manager

Antenna Near Products is a product unit within Ericsson Radio Access AB, providing base station components to all major for cellular such as GSM, DCS, PCS, D-AMPS, E-TACS, NMT, WCS and PDC. Our product range contains products based on microwave technology and RF amplifiers analogue and digital HW, mechanics and software. The development and implementation of new products are performed in close co-operation with all the business units of Ericsson Network Operators. ANP is the competence centre for microwave filters, linear RF power amplifiers MCPA, combiners, power amplifiers, lownoise amplifiers, multicouplers, radiotest loops etc.

● As a Project Manager within the Purchasing Department you shall manage 3 sub-project for global sourcing of suppliers within the product area Aluminium Castings. You will also drive specific activities and/or support our Product Units (ANP) activities to establish local manufacturing of our CDUs in China and the local sourcing material.

You should be graduated from university, have very good knowledge in English, Chinese (Mandarin) and preferably also Swedish.

You also have good experience of Project Management and managing personnel. It is important for you to have knowledge of the Ericsson Cellular systems and experience of the Ericsson business in China and excellent commercial experience working with complicated/advance contracts and negotiations.

You should have a strong personality, determined but easy to communicate and co-operate with others. Focus on objectives, initiate, analyse, act.

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ERICSSON RADIO SYSTEMS AB, SUNDBYBERG

Tender Support

Network Build is the GSM- and Wireline Systems answer to the customer's turnkey request. The Network Build Management (NBM) unit, LY/N has the profit and loss responsibility globally for the services Project Management, Civil Works and Site Acquisition. The Units obligations are to support the MU's and BM's in the tender and implementation phase of the three services. The unit also co-ordinates the inclusion of other service area unit products to create a complete service solution for our customers.

● Due to the enormous demand for our services we need to strengthen our tender support team. We are looking for ambitious and self-motivated individuals who can support local Ericsson companies with sales and marketing activities, tender preparations and contract negotiations for Network Build Solutions.

We expect that you have participated in tender work. We have an extensive training program even for new

starters, but the emphasis will be placed on experience.

Irrespective of where you will be based, at our ES-RO:s, Ericsson Services Regional Offices or in Sweden, we are looking for individuals who are prepared to travel and to prepare service officers at the local premises.

The work demands that you are able to solve problems by yourself and can motivate and involve other service units, and product units, within Ericsson to produce offers of the highest quality.

Since the team today only consists of male employees, we gladly see female applicants.

Can you sell yourself to us? Send us your CV and explain how you can help us.

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ERICSSON RADIO SYSTEMS AB, KISTA

Manager, Project Office

The Product Unit Packet Switching Systems is a part of Ericsson Radio Systems AB in Kista. We develop and market packet data solutions for GSM and the next generation mobile telephony system UMTS.

Japan goes Wireless Datacom with PDC

● To meet present and future demands on Internet oriented services for wireless, our customers in Japan have decided to introduce new capabilities in their present PDC network. The plan is to upgrade their PDC network with Packet PDC in time for a full commercial service year 2001.

For us at Product Unit PSS this means providing new infrastructure (packet switches, O&M support and backbone).

We are looking for a project manager who also can act as a line manager for a project office, housing not only project management support functions, but also product management and technical expertise. Our prime design centre for the task is Ericsson Mobile Data, ERV, in Gothenburg. We will also work in close cooperation with colleagues at AR and LX as well as NRJ in Japan.

This is an ideal chance for you who wish to develop yourself in a multi-functional unit.

You have 5-10 years of experience from management in various forms.

You have experiences from business (product management, customer projects or technical sales support).

You are result and goal oriented, full of initiatives, good at feedback, an appreciated team member and outspoken.

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ERICSSON RADIO SYSTEMS AB

Implementation Project Manager to Greece

Ericsson Hellas has recently being awarded with a strategic mobile IN contract for the greek GSM operator Stet Hellas. The contract include many strategic VAS and mobile IN products and applications, as well as future phases of additional product deliveries.

● To succeed with the implementation, delivery and commercial launch of the system, we are recruiting an experienced project manager for a 12 months assignment to be located at the Ericsson Hellas (ETG) office in Athens, Greece. You are self going, driving, customer and result oriented. Your experience in previous technical or implementation project management and preferably various GSM and VAS products and applications are highly appreciated. Our preferred starting date for this assignment is June 1 1999.

Contact: Nikos Lainis, tel +301 9697 149, or GSM +3093 275 6754 Memo: ETG.ETGNLS, e-mail: Nick.Lainis@etg.ericsson.se or Bo Fahlén, tel +301 960 1411 ext 463, or GSM +3093 290 3694 e-mail: Bo.Fahlen@era.ericsson.se

ERICSSON RADIO SYSTEMS AB, LINKÖPING

Customer Care, Traveling and High Technology Solutions!

The operation Support System (OSS) is a part of the GSM system. OSS offers the customer a centralized operation and maintenance service of the GSM system.

The number of operators, subscribers and GSM OSS systems in service are increasing rapidly. To be able to meet the customer demands we need two support and installation engineers to our unit Supply and Support, within the GSM OSS node.

● Your main tasks will be: to trouble shoot on problems experienced by our customers. to prepare for and perform installation of GSM OSS systems. to assemble, verify and deliver correction packages.

We are looking for You with experience from OSS systems or other UNIX based systems, preferably form verification or installation.

You will work closely with other Ericsson support and design organizations towards the customers, why fluent english is necessary. In position traveling abroad and within Sweden might be included. You should also be openminded, flexible and customer oriented.

Contact: Henrik Ljungzell, +46 13 284746. Application marked 99:27: Ericsson Radio Systems AB LVA/FH Ulla-Britt Johansson Box 1248 581 12 LINKÖPING

ERICSSON RADIO SYSTEMS AB, KISTA

GSM RADIO AND DIGITAL PLATFORM DESIGN

GSM radio development for base stations in Kista consists today of two sections of 15 people each, responsible for developing receivers and transmitters with the frequency range of 900 MHz - 2 GHz (GSM 900, 1800, and 1900). We have designed the platform for the most sold GSM base station in the world and are now focusing on the next generation GSM called EDGE, which requires a new radio platform. We also work closely with an Analog-ASIC design section. We share the main responsibility for developing the GSM radio platform used in all base station products (macro, micro, pico).

Receiver Design

● We are looking for two radio designers to join the section for developing receivers. The section develops receivers with the frequency range of 900 MHz - 2 GHz (GSM 900, 1800, and 1900). We are also responsible for developing frequency synthesizers (IF and RF) for both receivers and transmitters.

Main duties will include: Designing receivers in the frequency range 900 MHz - 2 GHz. Carrying out simulations using methods including Pspice, ADS, Matlab. Carrying out technical studies for future radio solutions and new methods of building radios. Carrying out measurements in the lab environment manually and/or automatically (HP-VEE). Producing design, schematic, and production drawings. Supporting production when production begins.

The successful candidate will have a degree in civil engineering and/or experience within radio design. Knowledge of digital design such as digital filters VHDL, etc., is helpful. Cellular phone design experience is desirable.

Contact: Fredrik Landberg, tel +46 (8) 757 17 38 Email: fredrik.landberg@era.ericsson.se

Transmitter Design

● We are looking for radio designers with a focus on transmitter design or RF-power amplifier design to join the section for developing transmitters. The section is responsible for transmitters and power amplifiers with the frequency range of 900 MHz - 2 GHz (GSM 900, 1800, and 1900).

Main duties will include: Designing radios in the frequency range of 900 MHz - 2 GHz. Carrying out simulations using methods including Pspice, ADS, Matlab. Carrying out measurements in the lab environment manually and/or automatically (HP-VEE). In charge of production drawings in connection with new design. Carrying out technical studies for future radio solutions and new methods of building radios. Be present during production start for personal designs.

The successful candidate has previous experience with analog technology design at higher frequencies/microwave technology, and is interested in advancing within the field of digital radio. Experience of linearization methods in the field of power amplifiers is desirable.

Contact: Stefan Cederblad, tel +46 (8) 757 10 44 Email: stefan.cederblad@era.ericsson.se

Digital Electronics Design

● We are looking for digital designers to join the section for developing circuit cards used in digital signal processing, transmission, timing, and switching for macro radio base stations for GSM 900, 1800, and 1900. There is also potential for development within the field of radio hardware design, which also belongs to this section.

Main duties will include: Designing circuit cards. Carrying out simulations. Carrying out measurements in the lab environment. Producing design, schematic, and production drawings. Providing support during production start.

The successful candidate will have a degree in engineering and/or experience within digital design.

Contact: Fredrik Landberg, tel 757 17 38 Email: fredrik.landberg@era.ericsson.se

Radio Component Coordinator

● We are looking for a radio designer to join the section for developing receivers and transmitters in GSM radio base stations to design and develop new components.

Main duties will include: Creating and maintaining supplier relations on a technical basis. Working closely with

the units for component technology, purchasing, and production. In charge of component coordination with regard to technology between different development departments for GSM bas stations. Carrying out measurements in the lab environment manually and/or automatically (HP-VEE).

The job includes considerable travel, particularly to the United States and Japan, as well as within Europe. The successful candidate will participate in multiple projects simultaneously. At times the job will be fast-paced and intense. The candidate will also function as department spokesman regarding component issues. This will include presenting lectures and participating in various component forums. The job requires thorough knowledge of transmitter and receiver designs.

The successful candidate will have a degree in engineering and experience within radio design. Cellular telephony design experience is desirable. The candidate will enjoy simultaneous involvement in multiple projects, as well as working both independently and in groups.

A general interest in business is a requirement, as commercial aspects must always be considered. Personal traits should include an outgoing personality, as well as a good command of Swedish and English, both verbally and in writing. Knowledge of foreign cultures is also desirable.

Contact: Fredrik Landberg, tel +46 (8) 757 17 38 Email: fredrik.landberg@era.ericsson.se

Radio Product Manager

● We are looking for a product manager to join the sections for developing transmitters and receivers. The unit is responsible for developing circuit cards for macro radio base stations used in GSM 900, 1800, and 1900.

Main duties will include: In charge of design, schematic, and production drawings. In charge of PRI handling. In charge of the product's error reports. Provide support during production start.

The successful candidate will have a degree in engineering and/or experience in radio development, as well as previous experience of Ericsson's documentation system. Knowledge of PRIM and MSS is desirable. The candidate should be motivated and accustomed to working in a dynamic environment involving frequent interaction with people.

Contact: Fredrik Landberg, tel 757 17 38 Email: fredrik.landberg@era.ericsson.se Application: Ericsson Radio Systems AB LR/HS la Pettersson 164 80 Stockholm email: ingegard.pettersson@era.ericsson.se

ERICSSON RADIO SYSTEMS AB, KISTA

We are part of Product Unit BSS and work with system design of our GSM BSS (Base Station System). The Base Station Controller (BSC), Base Transceiver Station (BTS) and Operation and Support System (OSS) is included in BSS. Our responsibility is operation and maintenance of BSS. We now look for an engineer ready for new challenges working with early system design.

System Designer BSS System Management & OEM Management

● Would you like to join us and develop future operation and maintenance functionality for the GSM network, including support for the operator processes using latest technology?

The job includes travelling, customer presentations, pre-study leadership, requirement definition and co-ordination between different Ericsson companies. Previous operator and software design experiences are considered an additional qualification. An extensive educational program is included.

Contact: Hakan.Toll @era.ericsson.se, +46 -(0)8-404 47 91 Maria Pousette, Human Resources, +46 -(0)8 585 34501 Application: Ericsson Radio Systems LV/HS Kerstin Almbad, 164 80 Stockholm

ERICSSON RADIO SYSTEMS AB, KISTA

The Product Unit Packet Switching Systems is a part of Ericsson Radio Systems AB in Kista. We develop and market packet data solutions for GSM and the next generation mobile telephony system UMTS.

Product Group UMTS Packet Switching Systems has the mission to provide profitable and competitive UMTS packet switching products to mobile operators all over the world. The unit has a bottom line product responsibility and consists of product management, system management and design departments. UMTS packet is about bringing together two of the most exciting and fast growing areas of technology: wireless communication and internet based services.

Software Design, Packet Switching System

● As a software designer you will be part of a small and creative team, with ambition to make the ever best wireless connection, for the future datacom networks. Our goal

is to design a UMTS system that efficiently support Web browsing, Vertical applications Voice over IP, and Multimedia. We are now in the process of building an organisation for design, with the aim to have designers with broad IP-competence as well as with an interest in not only design but also system aspects. The design organisation will work with development in a state of the art design environment.

You will work with, for example, implementation of the protocols needed to "connect" the radio network with the Internet, mobility management, charging etc. The development is made in the languages C and Java. We do promote job-rotation in order to broaden the competence of our colleagues and also to minimise the barriers between the different functional areas such as system management, design and verification.

Contact: Pär Sörme, phone: +46 8 757 14 83 par.sorme@era.ericsson.se or Bo Danielsen, phone: +46 8 404 81 67 bo.danielsen@era.ericsson.se Application: Ericsson Radio Systems AB KI/ERA/LK/HS Susanne Holmene 164 80 STOCKHOLM susanne.holmene@era.ericsson.se

ERICSSON TELECOM AB

System Engineers

● Systems management within Node&Network Solutions at Wireline Systems has got new challenges to fulfil our mission to enable introduction of Infocom solutions into our systems and platforms. The first steps have already started through the NGS projects. AXE 10 is still one of the leading systems for public telecom operators.

The market changes fast and the competition between traditional and new operators force us to comply with ever increasing demands on lower cost, easier handling, better In Service Performance and increased capabilities. Introduction of ATM technology, in the backbone networks, has also started.

This work is done in close co-operation with our partners at the Application Core Product Unit and UAB. We represent Wireline Systems in the common efforts to evolve AXE to a multi platform system through the system 108 and AXEOpen projects.

Architecture

● We define our strategy for the evolution of the AXE architecture, to continue to be an efficient base for successful launching of new network applications also for our customer segment into the next century, e.g., in the area of support for IP/Datacom.

System Control

● We apply our strategy in projects and design proposals by taking on the responsible for system level requirements. We are system responsible for AXE for wireline applications, and thus represented in common AXE product committees such as PC-AXE 106 and STEG. We also take active part in Ericsson wide system management networks and fora.

Characteristics

● Our systems must fulfil demanding customer requirements on capacity and reliability. We write the system requirements and define the strategy to meet the requirements. We are also responsible for characteristic activities in development projects.

You have an interest in any of the work areas above. You may already have a broad generic system competence, have been working within design or specification, and is willing to get responsibility to be part of the future evolution of our systems. All positions will give you an excellent opportunity to gain competence within a demanding area. We are also interfacing worldwide product-units and mobile partners giving you an excellent contact network for your future career.

We are situated at KX1 in Kungens Kurva, Stockholm

Contact: Ingemar J A Persson, phone +46 8 719 2531, e-mail: ingemar.j.a.persson@etx.ericsson.se Pontus Tibbling, phone +46 8 719 0652, e-mail: pontus.tibbling@etx.ericsson.se Application: Ericsson Telecom AB Ingemar J A Persson KX1/ETX/X/NS 126 25 Stockholm or E-mail: ingemar.j.a.persson@etx.ericsson.se

ERICSSON TELECOM AB

Test Expert/Trouble Shooter

The business Unit Wire Line Systems consists of three Product Units. One is Access which has been created to meet future needs for access solutions. The Product Unit has a broad product portfolio of both narrowband and broadband access products.

The Product Unit Access performs third line support for all Access products. The support includes trouble shooting on-site/ at-home in close co-operation with the Global Response Centres in the world. The work is performed close to the design department, which means that queries will come from design to.

● We are now looking for an experienced person to work as Trouble shooter mainly for AXE 10 products, RSS. You

will be one of the persons that the units customer and product development projects will turn to with difficult problems and support. You will also be part of investigations and project planning. Travelling will be needed for this position, all around the world to meet customers and support on site.

To meet this demands you probably have a long experience of AXE, mainly in testing. If you are familiar with V5 that's an advantage. We believe you have an B.Sc. in engineering or equivalent.

As a person you need to be able to see and implement opportunities for improvements. Your communication skills, both spreading your knowledge to your colleagues and communicating with customers is something we stress.

Contact: Bengt-Olof Hultman +46 8 719 01 97 etxbohu@tntatp.ericsson.se or Eric Näsman +46 8 719 67 99 eric.nasman@etx.ericsson.se or Human Resources: Gunilla Lundborg-Regner +46 8 719 10 60 gunilla.lundborg-regner@etx.ericsson.se Application: Margareta.Bringby@etx.ericsson.se or Ericsson Telecom AB, TN/ETX/X/AH, 126 25 STOCKHOLM

INTERNATIONAL

LM ERICSSON LIMITED DUBLIN, IRELAND SOFTWARE CENTRE

The Software Centre (SWC) is part of a programme within ETX Wireline Systems (formerly Public Networks) to rationalise the handling of AXE software deliveries to our customers. The centre builds, verifies and delivers the Market Application Systems to Wireline Systems customers globally. The centre is located in Dublin, Ireland. We currently have vacancies in the following positions:

Section Manager Market Projects (2 positions)

● We are seeking people to lead sections who have responsibility for verification and delivery of AXE application systems to customers.

The duties of the section include software verification of Market Application Systems and MAS rollout support.

Applicants should have at least 5 years experience gained in similar positions on projects involving AXE. The positions require a high degree of technical knowledge of AXE and may suit AXE testers or trouble shooters seeking a change of role. The position also entails dealing with the representatives of end customers and Ericsson local companies and therefore requires skills in communication. Ref - 0224

Section Manager GAS/MAS Upgrading

● We are seeking a person to head a section who have responsibility for provision of upgrade paths.

The duties of the section include, design, verification and maintenance of upgrade paths, liaison with Design units, and development of upgrade methods and tools.

Applicants should have at least 5 years experience of AXE in a supply or support environment, preferably with experience of upgrade methods. Ref - 0225

Section Manager GAS Maintenance

● We are seeking a person to lead a section who have responsibility for central GAS maintenance for the Product Lines 12.3, Local 4 /Translocal 2, Local 5, Local 6 / Translocal 3, Local 7 /Translocal 4, Transgate 3 and Transgate 5.

The duties of the section include selection, verification and packaging of CN-G's comprised of Approved Corrections and/or CN-I's.

Applicants should have at least 5 years experience of AXE in a support environment. Ref - 0226

Section Manager MAS Maintenance

● We are seeking a person to set up and head a section who will have responsibility for support of Ericsson local companies on AXE maintenance issues.

The duties of the section will include, tracking the maintenance status of MAS's in service, relating In Service Performance statistics to GAS maintenance and devising remedial programmes, improving the market focus of GAS maintenance strategy and methods.

Applicants should have at least 5 years experience of AXE in a support environment. The position also entails dealing with the representatives of end customers and Ericsson local companies and therefore requires skills in communication. Ref - 0227

Section Manager Product Line Consolidation

● We are seeking a person to head a section who have responsibility for provision of maintenance packages (AC's and CN-I's) during the consolidation phase of a GAS.

The duties of the section include selection, verification and packaging of CN-G's comprised of Approved Correc-

tions and/or CN-I's, and the provision of rollout support to market projects.

Applicants should have at least 5 years experience of AXE in a support environment. The position also entails dealing with the representatives of end customers and Ericsson local companies and therefore requires skills in communication. Ref - 0228

AXE Texters & Trouble Shooters

● We are seeking a number of AXE Testers and Trouble Shooters to supplement our existing staff. Applicants should have at least 4 years experience in AXE 10 software verification or support. Customer focus will be an important attribute of the Software Centre. Ideally, the experience will have been gained in an environment involving regular contact with end customers.

The duties will include software verification of Global and Market Application Systems, design and verification of GAS/MAS Upgrades, MAS rollout support, GAS maintenance, GAS/MAS information publishing, and development of SWC's automated testing capability.

The Software Centre represents a unique opportunity to work on AXE software from the latter stages of the Design phase, through market customisation and rollout and into the support phase. Ref - 0229

Project Managers

● We are seeking a number of Project Managers to lead customer projects. Applicants should have at least 5 years experience gained in similar positions on projects involving AXE. The positions require a high degree of technical knowledge of AXE and may suit AXE testers or trouble shooters seeking a change of role. Ref - 0230

Test Configuration Management Engineer

● We are seeking someone to maintain and control the network of SWC testplans, traffic generators and tools. The applicant should have at least 4 years AXE experience and should possess sufficient trouble shooting in AXE hardware and software to be able to prepare and maintain testplans for use by SWC projects. Knowledge of TMOS systems would be an advantage.

We invite applications from personnel internally and externally who believe that they have acquired sufficient expertise in the relevant areas to undertake this task. The positions listed may involve foreign travel. Ref - 0231

Application: Debbie McCurrie, Human Resources, LM Ericsson Ltd, Beech Hill, Clonskeagh, Dublin 4, Ireland (Please quote reference numbers with all applications). Email/Memo lmidmce@eei.ericsson.se Tel +353 1 207 7100

LM ERICSSON LIBYA BRANCH, TKX

Personnel & Administration Manager

Ericsson have been active in Libya for more than 30 years. At present we are 110 employees, whereof 20 expatriate staff. All expats live in our well-maintained camp 25 km south of Tripoli.

● You will develop Human resources issues incl recruitment, salary revisions, Compass; support the line organisation in training & development of local staff; support for expatriates being on assignment in Libya. You will also manage the Administration section, responsible for company registrations, permits, visas, and other general relations. Finally, the job also includes responsibility for the Camp department, including maintenance, restaurant, security guards, reception and office service.

The successful candidates should have at least 7 years experience from the HR field and also management experience. English is our working language and must be very good.

Contact: Tommy Frederiksen, tel +218 22 308 00, ext 421. Fax: 308 05.

CIA ERICSSON DE CHILE S.A.

System Expert 3rd Party Products FSC GSM Systems

● Would you like to have a NEW INTERESTING and CHALLENGING assignment in South America?

Ericsson Chile can offer you this!!! We are looking for a system expert for our 3rd party-products in our Field Support Center.

We are a hard-working team providing 1st line support to Latin Americas 1st GSM customer, in one of the worlds most diverse networks. The nodes we support are OSS, SOG, BGW, SMAS, Prepaid, SMS, VMS, ILR and EIR, and you will report your work directly to the FSC Manager.

You will be involved in our daily support activities incl. Emergency assistance, handling of customer enquiries, interface towards 2nd line support, SW rollout etc.. All of these activities are made on equipment in commercial service. Previous experience from one or several of the above mentioned nodes is expected, as well as a good working

knowledge on UNIX (Sun Solaris or Digital Unix), X25, and TCP/IP. Important skills are the ability to transfer knowledge to our local staff, to understand needs and communicate solutions to our customer, and to contribute to improvements in the units own work practices.

System Expert AXE Products FSC GSM Systems

● We are looking for a system expert for our AXE-products in our Field Support Center.

We are a hard-working team providing 1st line support to Latin Americas 1st GSM customer, in one of the worlds most diverse networks. The nodes we support are MSC, BSC, HLR and IN-SCP, and you will report your work directly to the FSC Manager.

You will be involved in our daily support activities incl. Emergency assistance, handling of customer enquiries, interface towards 2nd line support, SW rollout etc.. All of these activities are made on equipment in commercial service. Several years of previous AXE knowledge, with at least some in GSM in particular is expected. Important skills are the ability to transfer knowledge to our local staff, to understand needs and communicate solutions to our customer, and to contribute to improvements in the units own work practices.

English, both spoken and written is essential. Spanish is a big merit.

Contact: CEC/O/S/G Andre Gustafsson Phone: +56 2 440 5623 office +56 9 821 8699 mobile E-mail: andre@ericsson.cl

ERICSSON AUSTRIA AG, VIENNA, AUSTRIA

A world class challenge in the Alps-

For the 4th GSM license in Austria, roll-out speed is the key to success. Ericsson is well positioned to be the system supplier.

In order to show commitment and capability to the future customer as well as to meet an aggressive roll-out program, we have started project activities prior to the license being awarded, which is expected in early May. This will demand the fastest network roll-out ever performed for a GSM system. It will also include site acquisition and civil works beside the normal implementation and integration of thousands of Radio Base Stations and the Switch sites. Network design and surveys will be performed by Ericsson!

We are looking for key individuals to take on the challenge and help make this project a successful one!

Total Project Manager

● Your responsibilities: Fulfill the scope of work of the total project. Overall responsibility for Site Acquisition, Civil Works, Installation, Integration, Network Design and Surveys. Co-ordinate all activities in whole of Austria including the different regions. The successful candidates experience and background should include a long experience as a Customer Product Manager, experience of Site acquisition and Civil Works, excellent managerial skills. Good command of German language.

Regional Product Managers

Several positions open

● Your responsibilities: Total responsibility for all activities in a region. Site acquisition, Civil Works, Installation and integration for your region. Besides a long experience as a Customer Project Manager the successful candidate should have an ability to be responsible for a project in a remote regional office, has experiences of Site Acquisition and Civil Works, possess excellent managerial skills and have a good command of the German language

In addition to these positions we also require the following experienced colleagues:

Overall Radio Network Design Manager

● In this highly interesting position you will build up and maintain an RND organisation with resources, processes and infrastructure. A minimum of 5 years relevant experience is required and a competence equivalent to RMOG certification level Senior Consultant. You will have well proven technical experience in the field of ND/NPI as well as international experience, preferably from a similar position. The job will put high demands on you as an engineer, since you will face the customer in many technical discussions.

You should be able to demonstrate leadership skills, team building and motivation to succeed. You are a good communicator and possess presentation skills to facilitate a customer-facing role, relationship building and selling competence. You will be based in Vienna.

Regional Radio Network Design Manager

● As one of 4 regional managers you will be responsible for 5-10 RND Engineers. A minimum of 2.5 years relevant experience is required and a competence equivalent to RMOG certification level Senior Consultant. Apart from taking on tasks as an RND Engineer you will also build up and

maintain the regional organisation. You should be able to demonstrate leadership skills, team building and motivation to succeed. You will lead the optimisation/integration of the regional sites into the operational network. You will be based in one of the cities Vienna, Graz, Linz or Innsbruck.

Radio Network Engineers

● A minimum of 18 months relevant experience is required and competence equivalent to RMOG certification level consultant. Activities will include Nominal Cell Plans, Site Visits, Frequency planning, CDD-preparation, Initial Tuning and Acceptance Test. You will be based in one of the cities Vienna, Graz, Linz or Innsbruck.

National Build Manager

● As National Build Manager your primary responsibility will be to liaise with Civil Works site inspectors and external sub-contractors. Successful candidates for this position should possess several years experience of Civil Engineering and Construction, have excellent people management, motivational and negotiation skills and be goal orientated. Fluent English with strong German language skills is a requirement as is willingness to travel extensively throughout Austria.

National Logistics Manager

● As the National Logistics Manager you will support the Project Manager in managing logistical matters such as procurement, importation/exportation, warehousing and site delivery of materials/equipment such that the project implementation schedule and cost can be satisfied.

Successful candidates for this position should be a University Graduate in Business Administration/Industrial engineering/ Electronics (S1) or equivalent with minimum of 3 Years of directly applicable experience related to materials and equipment procuring / handling aspects. You should be self-motivated, have the ability to work independently and cooperate with others; be able to take an overall view, analyse situations, identify problems and develop solutions. You should also possess good Interpersonal and communication skills.

National Site Acquisition Manager

● Working as part of the Programme Management Team the Site Acquisition Manager is responsible for the national site acquisition process, recruitment and line management of site acquisition staff, external acquisition consultants and solicitors employed in the regional site acquisition projects for deployment of radio base stations.

For these positions candidates will need to have a strong knowledge of GSM fundamentals particularly radio base station deployment. You will need to have extensive contact networks at Bundesland and community level, have excellent knowledge and experience of project management techniques. While possessing excellent interpersonal, communication and negotiation skills, language skills are also a pre-requisite for this position.

In addition, we require expertise in the following areas, Regional Site Acquisition Manager, Core System Implementation Manager, Transmission Network Design Manager, Transmission Engineers, RBS Implementation Manager, RBS Installation & Test Supervisor, RBS Integration & Acceptance Manager, BTS Installation Engineer, Switch Implementation Co-Ordinator, Switch Network Engineers, Network Design Engineers, Human Resource Manager, Project Support Manager, Project Planners

Successful candidates for all positions need to be proactive, experienced and a team player. An ability to establish excellent relations and drive for results will be essential within your work. Some of these positions will require fluency in German. If you fit this description and would like to be part of our team here in Austria please submit your CV to the following:

Contact: Barbara Doyle (barbara.doyle@sea.ericsson.se)
Tel: 43 1 811 006910 Fax: 43 1 811 00 116910 Ericsson Austria AG Pottendorfer Strasse 25-27 A-1120 Vienna Austria

ERICSSON TELECOMMUNICATION B.V.

Within the Business Line Telecom Solutions is a vacancy for a:

Senior Project Manager

● Goal/Challenge: As Senior Project Manager within the Business Line Telecom Solutions you will be working on complex telecommunication projects. You are able to manage these projects in such a way that goals, set at the beginning, are met within the available time and budget.

Tasks: Drawing up project specifications and project plans by mutual arrangement with the internal and external organization and with our customers. Reaching agreement on planning and budget with the internal organization and our customers. Negotiating on project staffing internally and externally Controlling, directing and reporting progress of projects (on time, quality and financial). Keeping up communication with steering group, project team, our customers and the internal organization. Carrying out internal and external project evaluations. Supporting sales activities.

Required competence: Academic way of thinking and working. At least 5 years of experience in a same kind of position. Knowledge of and experience in project management models and tools. A deeper understanding of the latest telecommunications developments. Ability to think and work with a clear customer focus. We are looking for a decisive team player who can handle stress and who is able to motivate and convince people.

Contact: Maria Briaies, Manager Solution Management, ext +31 161 249791 or Pieter Ricken, Manager Human Resources & Competence, ext. +31 161 249141.

ERICSSON WIRELESS, SEATTLE WASHINGTON, USA

Customer Support Specialist – OSS

● Support in-service UNIX based products including-CMOS (OSS), Adjunct processor, Jambala, MXE, in the Western US. Primary function is Troubleshooting and maintenance of customer systems. Open and track trouble tickets to second line support organization. Monitor quality and accept handover of new systems from implementation group to support coaching and hands on training to other RTAC engineers. Responsible for software configuration management of customer systems. Interface with 3rd party vendors and Ericsson customers. Attend customer meetings.

Requires BSC or equivalent in computer science. Minimum 3 years experience in UNIX/OSS. Knowledge of AXE and SS7 signaling. Excellent technical ability. This person needs to be self motivated, and able to work with minimal supervision. Good communication skills are required, willingness to carry a pager and work after hours if necessary. Travel mainly throughout Western US.

Contact: Joe Compton, EUSIOCO,
joe.compton@ericsson.com or fax to 925-737-5957

ERICSSON LTD, MARKET SUPPORT OFFICE GUILDFORD, UK

Project Manager

● Key responsibilities: The MSO Project Manager is responsible for the execution of SW Supply Projects from business Sector or mail order through to customer acceptance and live network implementation.

Key tasks include preparation of assignment responses, project planning, securing resources, budgeting, risk analysis, reporting and escalation. The role involves close customer contact in order to gain agreements on test network configuration, verification scope, demonstrating/acceptance and live network implementation.

Qualifications / Experience: Ideally from a verification/customer acceptance background either as an engineer or project manager.

Skills/Competencies: GSM, AXE 10 SW Handling, complementary products ie OSS, MXE, SOG, SMAS, SSMSC etc Effective communicator, able to represent the MSO towards internal and external customers as well as the product units. Ability to motivate project members.

Contact: Recruiting Manager, Stefan Toreld Email: etl.etlst-to@memo.ericsson.se

ERICSSON RADIO SYSTEMS AB, KISTA

Professional Services within the segment Network Operator and Service Providers - For a successful Partnership

Professional Services (BOPS) is an Ericsson Business Unit that delivers business solutions and consultancy services to network operators and service providers around the world.

Professional Services offers: Business Consulting, Telecom Management & Systems Integration (Billing & Customer Care, Service Activation, Network Management, Fraud & Security). Managed Services (Operation of customer network, support systems and IT environment). Quality Improvement Solutions. Solutions for Internet Service Providers.

The Professional Services Marketing Department is responsible for Business Management within two of our direct markets, China and Japan and therefore we need a:

Service Marketing Manager, China & Japan

● The Service Marketing Manager will ensure that the selected Market Unit (China & Japan) works in a focused way to sell and deliver Professional Services (PS) in order to generate highly profitable business with high customer satisfaction.

This entails supporting Product Units and Market Units in their efforts to be successful in their competence areas within the selected market with the goal to increase business (and market share) in a profitable way. You will also be responsible for following up Market Unit progress and reporting back to Professional Services management.

Important activities include: Ensuring that the Market Units create a business plan for Professional Services and

that they allocate resources to execute the business plan with help (if needed) from the different Product Units. Increase knowledge of PS Service & Product portfolio at the Market Units at different organizational levels. Organization of Marketing Seminars and other Marketing Activities. Co-ordinating cross Product Unit offerings and solutions towards the Market Unit and the end customer when needed. Follow up of the business plan, service sales and service delivery together with the Market Units and the Product Units. Creation of a good atmosphere and cooperation between the Market Unit and PS (relationship building).

Your profile: We believe that you have good knowledge of the business framework of Ericsson, preferably also from the cultures of China and/or Japan. We also believe that you understand the difference between consulting services and products and are able to communicate this. You are perceived as a senior person within marketing and sales. And we know that you are prepared to travel extensively.

What's in it for you? Opportunities for advancement. Responsibility - personal development. New, service-minded organization. Dynamic working environment. International contacts with management and specialists at all levels.

Contact: Stefan Johansson Phone +46 8 4043619 stefan.m.johansson@era.ericsson.se Application: Ericsson Radio Systems AB NH Towa Raak 164 80 STOCKHOLM towa.raak@era.ericsson.se

ERICSSON BUSINESS MOBILE NETWORKS, NETHERLANDS

Within the unit Business Cordless Telephony (BCT) we are currently seeking:

Software Design Engineers

● Goal/Challenge: BCT is responsible for the development of cordless mobile networks for business and industrial surroundings. In the position of Software Development Engineer you will be responsible for the design of real-time embedded software for our cordless telephone systems. You will be working in a successful and highly motivated group where teamwork plays a major role.

Tasks: to design, implement, integrate and test a software sub-system e.g. OAMP, DECT protocol stack, DCA, drivers etc. to initiate design reviews and pre-studies. to coach junior software design engineers. to contribute actively in Software Process Improvement.

Required competence: professional training on HBO or University level and several years of experience in the field of software development. outstanding knowledge of standards (like the C coding standard), the software life-cycle and the implementation in the Software Quality Manual. thorough knowledge of structured development methods, test techniques in verification processes. ability to work independently. strong analytical capacities. entrepreneurial attitude. assertiveness and perseverance. experienced in coaching and mentoring juniors would be an asset.

Contact: Douwe Rijpstra (+31 53 4505217) or Johan van de Hee (+31 53 4505210) Application latest 990524 : Peter Vossen, HR-manager Peter.Vossen@em.ericsson.se.

ERICSSON TELECOMMUNICATIONS, INC. MANILA, PHILIPPINES

We are currently recruiting for a GSM implementation project (SS and IN) in Philippines where we need to strengthen in the areas of project management, IN sub-project management, and migration/integration sub-project management.

The project comprises MSCs & HLRs with SOG & BGW plus an IN node (SCP) for, initially, PPS (Prepaid Super 3.0).

The project will be implemented in a "live" network today based on Nokia SS. For the sub-project manager candidates, a possibility to "roll over" into a support role with our FSC after implementation could be explored.

Project Manager

● Your responsibilities: To manage the entire project, being the main customer interface and overall responsible for a successful implementation on time, on budget, meeting customer's expectations. It includes coordinating all activities for installation, test, integration and migration within the different sub-projects.

Your profile: The successful candidate should have a background and experience in Customer Project Management that should be combined with excellent managerial skills and necessary GSM/CME 20 technical knowledge, specifically in the SS area.

The person should be goal-oriented, result-oriented, and self-driven.

Experience in multi-vendor integration projects and work in "live" networks is an advantage. Experience from international assignment is another plus.

Sub-project Technical Manager for IN

● Your responsibilities: To manage the IN implementation of the project, interfacing with the customer in pre-studies, HW and SW implementation and test, service creation, migration and evaluation. Initially the IN platform is for Pre-

paid but other service requirements are likely to evolve during the project.

Your profile: The successful candidate should have a background and experience in GSM IN implementation projects. Experience in multi-vendor integration projects and work in "live" networks is an advantage. Experience from international assignment is another plus.

Sub-project Technical Manager for Migration/Integration

● Your responsibilities: To manage the smooth migration of a "live" network to the new SS platform, interfacing with the customer in defining migration strategies, pre-studies, data conversions, BSC re-parenting, test and evaluation.

Your profile: The successful candidate should have a solid technical background and experience in GSM implementation projects. Preferably with experience in multi-vendor integration projects, ideally with Nokia, and work in "live" networks. Experience from international assignment is another plus.

Contact/Application: Mats Bjorkman, Director of Operations at Ericsson Telecom. Inc., Philippines. E-mail: mats.bjorkman@enp.ericsson.se Phone: +63 2 635 1854.

ERICSSON AUSTRALIA PTY, LTD.

The Global Response Centre (GRC) is located in three different timelines throughout the world (Australia, Netherlands and the United States) The GRC is responsible for second line support towards Ericsson's first line organisations. CSR's and other service requests are handled by the GRC or passed on to marketing or design. To deliver the technical services requested, we are looking for 4 additional engineers to join our team in Melbourne, Australia. These positions are open to both local and expatriate long-term contracts.

Help Desk Engineers

● Job description: Provide Help Desk assistance to end and internal customers. Technical support on fixed network elements. On line support. Provide technical advice/solutions to customer. Perform correction handling activities. Impart knowledge and experience to team members.

Previous experience: Minimum 5 years experience in an AXE environment in either testing or support including: Outage recovery handling. Trouble shooting (e.g. DT, SW-faults, Restarts, hangings). Creation of patches in blocks (With help of Plexview). Previous experience in customer service.

Key attributes: Overall understanding of Ericsson technology issues and trends. Service orientation. Strong communication skills. Good command of both written and spoken English. Focus on quality and delivery precision. Flexibility to work in a team and under pressure. Team orientation. Willingness to travel within the region.

The successful applicants can expect challenging positions towards Ericsson's growing Global Market. All positions are based in Broadmeadows, Melbourne.

Contact: Mikael Ekholm (memo EPAMIEM). Application latest 990601: Sue Holman EPA.EPASMH.

ERICSSON CARIBBEAN, SAN JUAN, PUERTO RICO

Field Support Center Engineer

● Job description: We are looking for an FSC Engineer expert" to work with AXE, AP, & Jambala troubleshooting and maintenance support for Puerto Rico, Jamaica, Grand Cayman and other Caribbean customers soon to follow. Will be part of the support team in our Caribbean FSC responsible for first line support to customers - Helpdesk activities. Interface to other (internal or external) parties when the reported problems need to be escalated. Solving CSR's reported by the customers. Monitoring of follow up of support requests escalated to the FSC.

Requirements: Must have at least 3 yrs knowledge and experience with AXE.

Knowledge of AP & JAMBALA is greatly appreciated. Experience with emergency corrections and trouble report handling. Able to work under stressful conditions at times. Must be a team player or able to work independently when required. Good knowledge of English language is a must, Spanish language will be appreciated.

Initial contract: 1 yr. Expat (negotiable for 2 yrs.) Excellent benefits. Will close position 8/99

Contact: Jerry L. Barrera, Director, Caribbean FSC jerry.barrera@ericsson.com

ERICSSON TELECOM AB, WIRELINE SYSTEMS GLOBAL SUPPLY CHAIN/ SYSTEM SUPPLY AND INTEGRATION.

Wireline Systems Global Supply Chain is a global organization working in a world of new networking paradigms where our ability to define and deliver complete network solutions is the key to the success of our customers as well as our own.

System Supply and Integration work with the toughest customers the telecommunication market has to offer, such as RSL Com and WorldCom. The customers are new operators who are expanding globally. We are working in a team-based organisation where different roles interact closely. Traditionally we have only been working with AXE products, now we are working towards Access, Intelligent network and integrating complete networks. For more information please visit our homepage: <http://www.hf.ericsson.se/osg>

A S Replacement Specialist

● As a specialist in A S Replacements you raise requirement handling towards product units as well as internally in order to secure continuous improvement and competence activities. You work with methods and support for upgrade of AXE exchanges in our customer solutions project. You also act as a trouble-shooter when required and support in planning and analysis phase both internally and towards marketing units and customers. You provide input to the strategic competence planning on what kind of competence the unit will require in the future.

You work together with A S Replacement specialists in other Ericsson companies in competence networks to develop and evaluate methods for upgrade of complete networks including various types of node elements like SCP, ANS, BMX etc.

We want you to have at least three years experience of AXE switches. Experience in upgrade and trouble shooting within the competence area is a requirement. You have proven skills, and you are interested in developing yourself as well as others. You are open-minded about giving guidance and assistance to others. Your Swedish and English are very good in speech as well as in writing.

Contact: Nils-Erik Bergström, tel. 08-719 9687, e-mail: nils.e.bergstrom@etx.ericsson.se

Network Integration Engineers

● As a Network Integration Engineer, your job is to integrate the different elements that the network is built up of. This can be both Ericsson equipment as well as other vendor equipment.

We work with AXEs, Airline systems, BMX and IN products, routers, DCME equipment, STH nets and much more. They should all work together and by the time the Network Integration is finished, the network should be ready for commercial operation. We want you to have a technical university degree (120p electro-engineer or equivalent experience).

The job will demand of you to be a team player, to have experience from AXE configuration and testing, preferably 1-2 years as a system tester, to have experience from customer relations and customer support is preferred, to be able to refer and relate to ETSI specifications, to have a good knowledge about network configuration and an ability to understand specific customer network solutions and that your English skills are very good.

Contact: Ulrika Strandgren, tel. 08-719 2959, e-mail: ulrika.strandgren@etx.ericsson.se

Customer Engineers

● As a Customer Engineer you will work closely to the customer. You will assist the project manager in the beginning of a project so that realistic time plans can be presented to the customer. You are responsible for the co-ordination of software and data transcript implementation, to develop and co-ordinate the demonstration and acceptance at the customer site.

We want you to have a technical university degree, at least 120 p and to have technical qualifications in telephony or data communications engineering, preferably 3 years as a system tester. Experience as a leader is an advantage. We want you to be a teamplayer and to have a genuine interest in other people and you like to solve problems in co-operation with others. Your English as well as Swedish skills are very good.

Contact: Mikael Forsberg tel. 08-719 9520, e-mail: mikael.k.forsberg@etx.ericsson.se

Data Transcript Engineers

● As a DT engineer, you collect information from the customer network/sites which you use to create, verify and implement Network Configuration Data. You will have direct contact with customers. The work is to be performed both in Sweden and at our customer sites around the world.

We want you to have a technical university degree (120 p electro engineer or equivalent background). Knowledge of AXE/telephony and/or network planning is mandatory and we would like you to have at least one year of experience within this field. You should also like to work with continuous improvements and try new ways of doing things in order to contribute to the development of processes and methods. Your English and Swedish skills should be very good.

Contact: Roger Johansson tel. 08-719 3038, e-mail: roger.s.johansson@etx.ericsson.se

System Testers

● As a System Tester you work with software testing and implementation. You work in a customer team with dedicated customers. You also handle STP:s and test equipment. You follow and develop methodologies and routines.

We want you to have a technical university degree (120p electro engineer or equivalent background). We also value knowledge of Ericsson products and procedures. As a person you like to work with others, are open-minded and like new challenges. You communicate well in English as well as in Swedish.

Contact: Magnus Schön, tel. 08-719 1293, e-mail: magnus.schon@etx.ericsson.se Applications: ERICSSON TELECOM AB, HF/ETX/X/XOH, Charlotta Åkerström, 126 25 Stockholm. E-mail: charlotta.akerstrom@etx.ericsson.se

ERICSSON LTD, UK

Business Solutions Manager

(4 positions)

● The Business Solutions Manager's role is to bring the New Public Operators of the UK (Telco and ISP) into the new Telecoms world using creative service solutions utilising all available technology at your disposal eg IP/MPLS/ATM, NGS, VoIP, VoATM, TeleinterNet, DWDM etc (Ericsson portfolio and third party). The focus is on the future evolution of our customer's businesses, supported by Ericsson quality solutions; there is an emphasis on Data Network technology and migratory strategies for existing networks.

Working in a dynamic environment, the Business Solutions Manager shall enter into discussions with existing and/or prospective NPN customers, in order to develop an agreed evolutionary strategy for the client's network, matching their business aspirations.

The degree level candidate will be self motivating and ideally have a good appreciation of the business issues in Telecoms as well as a sound understanding of telecomms technology.

Broad knowledge of key Ericsson products would be an advantage (eg ATM, IPTC, AXE, Tigris). Strong interpersonal skills and imagination are essential.

Location: Guildford (London 40Km), UK

Contact: Human Resources, Joanna Comber +44 1444 234547 FAX +44 1444 234787 Manager, Paul Norris +44 1483 305487 FAX +44 1483 305080 email - paul.norris@ericsson.com.

NIPPON ERICSSON K.K., JAPAN

Axe System Expert

● We have one vacant position for an experienced AXE System Expert at our head office in Shin-Yokohama.

Your work tasks will include advanced trouble shooting for International exchanges (Transgate 2), provide technical competence for resolving complex problems in network, provide emergency corrections and technical support to customers, analysis of TR's and participate in the 24h Emergency Service.

We expect that you have at least 6 years working experience in AXE 10 Digital Switching Application Systems as well as good knowledge of APZ/IOG 11, CCITT No 7 signalling/ISUP. It is an advantage if you have knowledge and experience of IN.

You also need to have the ability to transfer your knowledge and skills to our local staff by training them and working with them.

You have to be fluent in spoken as well as in written English.

We presume that you are open-minded, outgoing and that you can easily adapt to a culturally diverse working environment. We are ready to offer a 1-year contract to the right person and we expect the starting date to be in May, 1999.

Contact: Ingvar Feltborg, Customer Support Manager for the group Phone no: +81 45 475 0073 Memoid: NRJ.NR-JINF E-mail: ingvar.feltborg@ericsson.co.jp or Christer Elmqvist, General Manager, Support Phone no: +81 45 475 0010 or Thomas Ahberg, Human Resources Phone no: +81 45 475 0400

ERICSSON EUROLAB DEUTCHLAND GMBH

Core Product Unit Application Core (CAPC)

AMC and part of PN switching merged to CAPC. We are responsible for providing transit switching and network access functionality commonly used by all Ericsson's wireless and wireline systems and are heavily involved in system innovation initiatives. Our Core PU Application Core (CAPC) systems department is looking for a

Systems Group Manager

● The CAPC systems management groups are responsible for the system development of the Transit and Network Access products that are common for many of Ericsson's AXE based systems, both for wireline and wireless systems. This responsibility includes activities such as running

product committees, handling overall technical coordination in the CAPC projects, perform system studies and source system design. Present challenges are system work for ATM backbone solutions for the Universal Mobile Telecommunication System (UMTS) and the Next Generation Switch (NGS).

As group manager for U/OT you will be responsible for the PC-forums, Source System Design Characteristics and ISP. The group is also driving and participating in technical investigations in early phases of the projects. Currently the main part of our investigations are related to ATM, TCP/IP, AM System development, Signalling and Protocols, Data Communication, Intelligent Networks and O&M on different platforms.

We are looking for a manager that can drive these activities together with the group, and is interested in developing the CAPC systems management together with others. Experience from systems or product management, or leadership is required.

Contact: Human Resources Simon Seebass Phone: +49-2407-575-163 Memo: EED.EEDSIMS Email: eedsims@eed.ericsson.se or Ulf Henell Phone: +49 2407 575 256 Memo: EED.EEDUGH Email: edugh@eed.ericsson.se or CAPC System Hartmut Boehmer Phone: +46 8 719 9727 Memo: ERAC.ERAHBOE Email: Hartmut.Boehmer@ericsson.com

ERICSSON TELECOMMUNICATIONS BULGARIA LTD., SOFIA, BULGARIA

(Senior) Customer Support Engineer/AXE System Expert

ETB is about to sign a Service Agreement with the national fixed network operator. Under this agreement, the Customer Support Office shall deliver Network Support services - 24-hour emergency, help-desk, trouble report handling and hardware services.

The network is small, but expanding both in size and functionality. The supported systems are based on 12.3 and Local 6. The job position is open on a short-term (6-month) basis - with possibility for a later long-term contract - in order to gap the time until the CSO raises its local competence base to match the task. In the meanwhile though, the successful candidate shall be the main technical expert, not only organising, helping and supervising the work of 2 local engineers, but taking on a significant workload as well.

● Requirements: fluent verbal and written English, training in AXE HW/SW, O&M (incl. IOG 11, C7, ISDN, AM, HLPlex), experience in remote SW/HW troubleshooting in live sites, proven record for patch writing in Plex, ASA, RP and EMRP, experience with MHS, ACH, SRH, MS Office, C7/ISDN/CAS analysers, disciplined, initiative and customer-friendly attitude, ability and will to transfer knowledge to the local engineers. Knowledge about old type of analogue signalling systems is an advantage.

The position offers an opportunity to broaden technical competence, develop customer-handling and management skills, and earn a reputation for intelligent, effective and motivated work in a dynamic and challenging environment.

Contact latest 990515: Mr. Zoltan Nagy Customer Support Manager memo: ETB.ETBNAZO e-mail: etb.etbnazo@mesmtpse.ericsson.se tel: +359 2 955 9777 fax: +359 2 955 9051. or Mr. Leif K Larsson Key Account Manager memo: ETX.ETXLLSN e-mail: etx.etxllsn@mesmtpse.ericsson.se tel: +359 2 955 9777 fax: +359 2 955 9051.

ERICSSON INC. IN THE USA

GSM Solutions Manager, Radio Base Station Systems

● Key Responsibilities: You will be a part of the GSM 1900 Network Operator's Group Powertel KAM Organization. As the Solutions Manager for our Key Account, you will create total solutions that meet or surpass our customer's expectation. You will provide technical support during marketing, sales, negotiation and after-sales activities. You will be responsible for technical decisions relating to the Base Station System, coordinating the activities between the customer and the product units. You will take part in regular technical review meetings with customers. You will help customer to get more knowledge about Ericsson products and features by holding seminars, workshops and making technical presentations to customers as appropriate. You will act as prime technical interface towards the customers for product requirements, RF dimensioning and cell planning issues.

Benefits: You can expect a challenging position and will have the opportunity to work closely with an innovative customer in a highly demanding and dynamic marketplace.

Experience and Background: A degree in Electrical Engineering, Engineering Technology or Applied Science. Minimum 3 years with Ericsson, with at least 2 years in the Mobile Telephony Systems area.

Outgoing personality with good command of the English language, both oral and written. A real team player, strong presentation skills.

This job implies the opportunity to travel, sometimes on short notice.

GSM Solutions Manager, Switching Systems and IN

● Key Responsibilities: You will be a part of the GSM 1900 Network Operator's Group Powertel KAM Organization. As the Solutions Manager for our Key Account, you will create total solutions that meet or surpass our customer's expectation. You will provide technical support during marketing, sales, negotiation and after-sales activities. You will be the technical consultant within the Core-3 team

You will be responsible for technical decisions relating to the Switching System and IN, coordinating the activities between the customer and the product units. You will take part in regular technical review meetings with customers. You will help customer to get more knowledge about Ericsson products and features by holding seminars, workshops and making technical presentations to customers as appropriate.

You will act as prime technical interface towards the customers for product requirements, network dimensioning and expansion issues.

Benefits: You can expect a challenging position and will have the opportunity to work closely with an innovative customer in a highly demanding and dynamic marketplace.

Experience and Background: A degree in Electrical Engineering, Engineering Technology or Applied Science. Minimum 3 years with Ericsson with at least 2 years in the Mobile Telephony Systems area. Outgoing personality with good command of the English language, both oral and written. A real team player, strong presentation skills.

This job implies the opportunity to travel, sometimes on short notice.

Application: Daniel Ashitey, Manager, Business Solutions, KAM Powertel e-mail: daniel.ashitey@ericsson.com. Tel: +1 (706)-634-1627. Fax: +1 (706)634-1610

ERICSSON NETHERLANDS

Within the GCSO (Business Line Customer Services) ETM is a vacancy for a:

Customer Service Specialist

● Goal/Challenge: The Global Customer Service Office (GCSO) within the division Business Line. Customer Services has a leading role within Ericsson's Global Customer Support. The GCSO is the single point of contact for Global Operators to raise Customer Service Requests to Ericsson. The GCSO has 3 Hubs, located in three different time zones (Holland, United States and Australia) which enables continuous 24hr support to Global Operators. All activities are being executed in an international environment. Our organisation is characterised as challenging, dynamic, progressing and provides excellent opportunities for personal development.

Tasks: Responsible for managing internal relations from a technical point of view. Responsible for well functioning of the sold services. Solving CSR's reported by the customers. Monitoring of follow up of support requests escalated to the GRC. Advises Customer Service Manager regarding services. Report to the customer about delivered services. Guide colleague trainee engineers (mentorship).

Required competence: Education minimum HBO-level. Knowledge of AXE. 5 years experience on AXE within Ericsson as a SW trouble shooter. Able to work under pressure. Attention for detail. Team player. Good communication skills in English.

Customer Service Engineer

● Goal/Challenge: The Global Customer Service Office (GCSO) within the division Business Line. Customer Services has a leading role within Ericsson's Global Customer Support. The GCSO is the single point of contact for Global Operators to raise Customer Service Requests to Ericsson. The GCSO has 3 Hubs, located in three different time zones (Holland, United States and Australia) which enables continuous 24hr support to Global Operators. All activities are being executed in an international environment. Our organisation is characterised as challenging, dynamic, progressing and provides excellent opportunities for personal development.

Tasks: Responsible for first line support to customers - Helpdesk activities. Interface to other (internal or external) parties when the reported problems need to be escalated. Solving CSR's reported by the customers. Monitoring of follow up of support requests escalated to the GRC. Advises Customer Service Manager regarding services. Report to the customer about delivered services.

Required competence: Education minimum HBO-level. Knowledge of AXE. 3 yr experience on AXE SW within Ericsson (preferably as a SW trouble shooter). Immune to stress. Precise. Team player. Good communication skills in English.

Application: The home base is Rijen the Netherlands. Opportunities to work abroad both for training and work is possible. For more information regarding the vacancy, please contact Liselore Brabers, E-mail: Liselore.brabers@etm.ericsson.se

The development of mobile phones has been going on for a hundred years, but not until recently has the size become easy to handle.



100 years of mobile development

Nobody invented the mobile telephone. It has been slowly developing ever since the 1890s when experiments in radio communication first began. Half a century later, in 1946, the American company AT&T was granted permission to operate the world's first car-based mobile telephone network.

The year after AT&T was allowed to operate the first car-based telephone network, Bell Laboratories unveiled the cellular concept – the idea of operating multiple base stations, each of which covered one cell.

Sweden's first mobile telephone network, known as MTL, went into operation in 1956. At its peak, it had 125 subscribers and, at that time, a telephone operator connected all the calls.

It was Ericsson Radio Systems predecessor, Svenska Radioaktiebolaget or SRA, which developed the MTL system.

An important discovery

The mobile phone has been ranked by the Swedish technology magazine Ny Teknik as one of the most important innovations this century, ahead of the solar cell, the washing machine and the helicopter.

Development of modern mobile telephony began 30 years ago. At the time, the

Nordic telecommunications conference appointed a working group known as the Nordic Mobile Telephony group, otherwise known by the initials NMT. The concept was well received.

Commercial operation in 1981

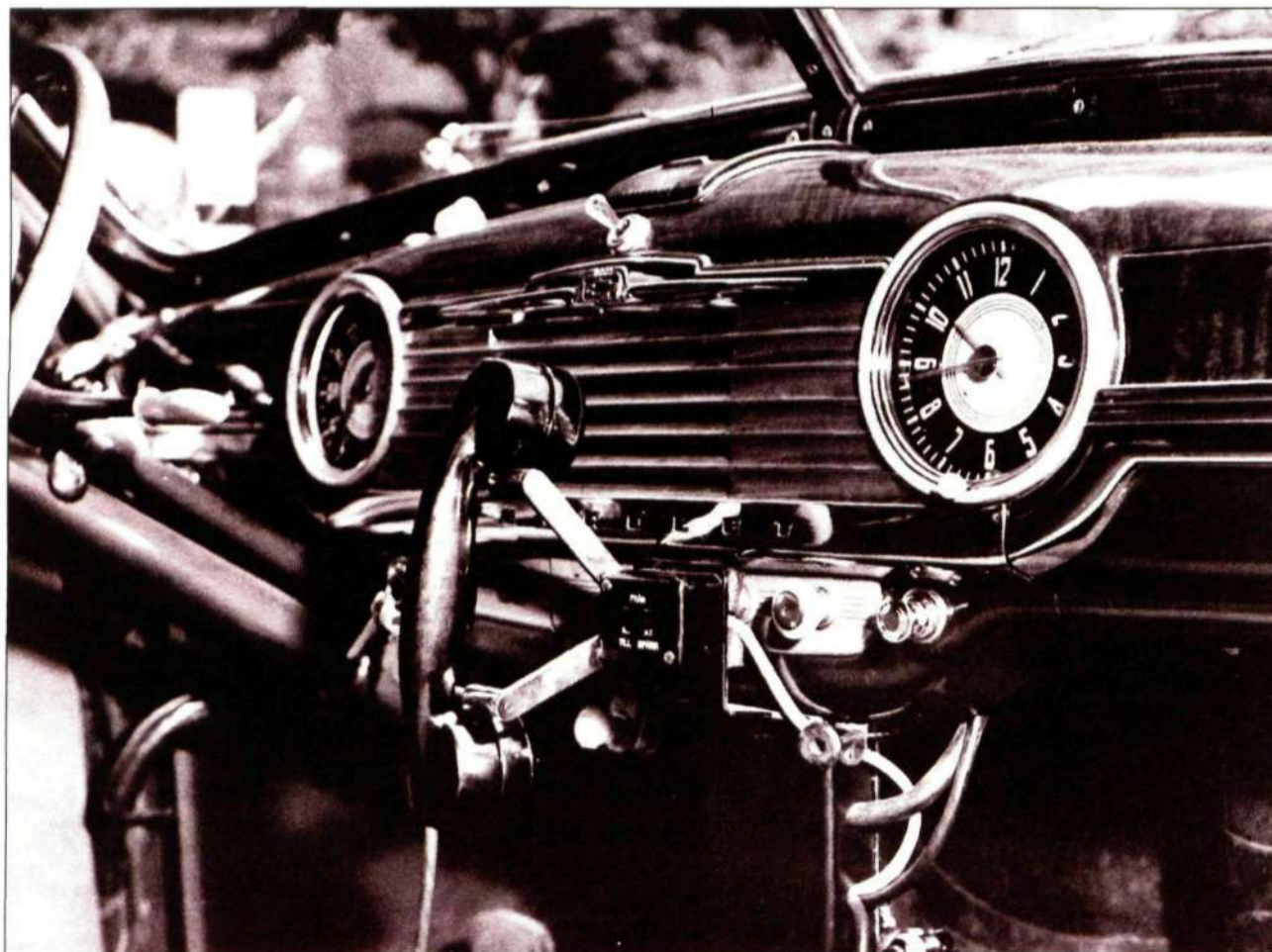
The NMT system was first demonstrated in 1978 and by 1981 the first commercial system had been installed in Saudi Arabia. Later that year, the Nordic countries received the same NMT system.

In 1982, a new digital standard known as GSM was proposed. The first GSM networks were put into operation in Finland and Sweden in 1992. The rest is history.

Patrik Lindén

patrik.linden@lme.ericsson.se

Source: The Swedish engineering magazine Ny Teknik



Now here's a real mobile telephone! Mobile phones have existed for a long time, but not until the eighties did they get portable.

UPCOMING

Tuesday, June 22–Friday, June 25: Ericsson is to participate in CommitAsia –99 in Singapore.

Sunday, October 10–Sunday, October 17: Telecom 99 trade fair in Geneva. The event is held every four years by the International Telecommunication Union. Contact will be there.

UPDATES

Ericsson in Spain, which was previously divided into several companies, has reorganized into a single unit. In other respects, the organization remains the same. Raimo Lindgren will remain the head of Ericsson in Spain.

May 11-13: The Network & Interop trade fair took place in Las Vegas, U.S. Contact was there and will have a report in the next issue.

May 7: The first Ericsson IT certificate was issued. The aim is that all employees will eventually pass the IT test. See page 17.

NEW ASSIGNMENTS

Olle Ulvenholm will become the new head of the Venezuela market unit, succeeding Stig Johansson when he retires this summer. Olle Ulvenholm is currently the head of Ericsson in Malaysia.

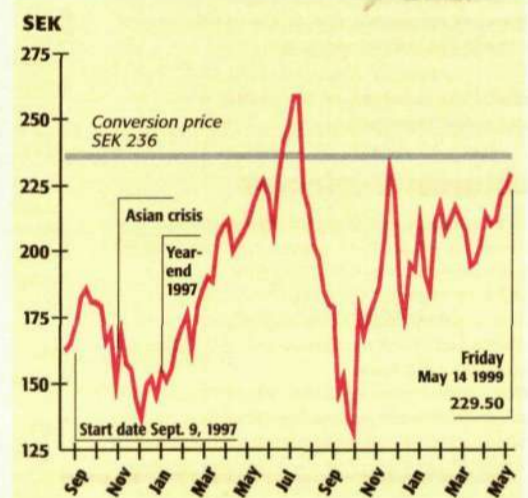
Stellan Andersson has been appointed manager of Ericsson's product support unit in Karlskrona.



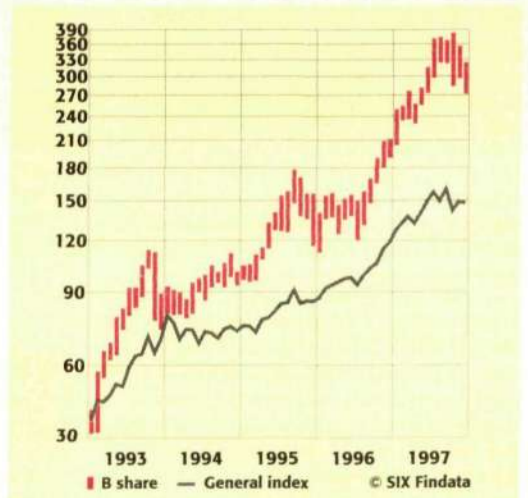
Roland Nordgren

Roland Nordgren has been named the new head of Ericsson in Mexico, succeeding Gerhard Skladal who will retire this summer.

THE ERICSSON B SHARE



An Extraordinary General Meeting of shareholders on September 9, 1997, approved a proposed convertible debenture program. The conversion period extends through June 30, 2003. For additional information, access the web site: <http://inside.ericsson.se/converti.htm>



contact technology

MAY 1999

The Epoc operating system is specially designed for smart phones and communicators. It will enable the creation of services that will open completely new markets beginning today.

Epoc-making opportunities

With higher data speeds, larger displays and more memory, tomorrow's wireless devices will support completely new data services. However, because today's operating systems rely on fixed communication, wireless Internet services require something new. The operating system must use the device's relatively limited memory and processing capacity more efficiently, while consuming less power. Epoc does this and more.

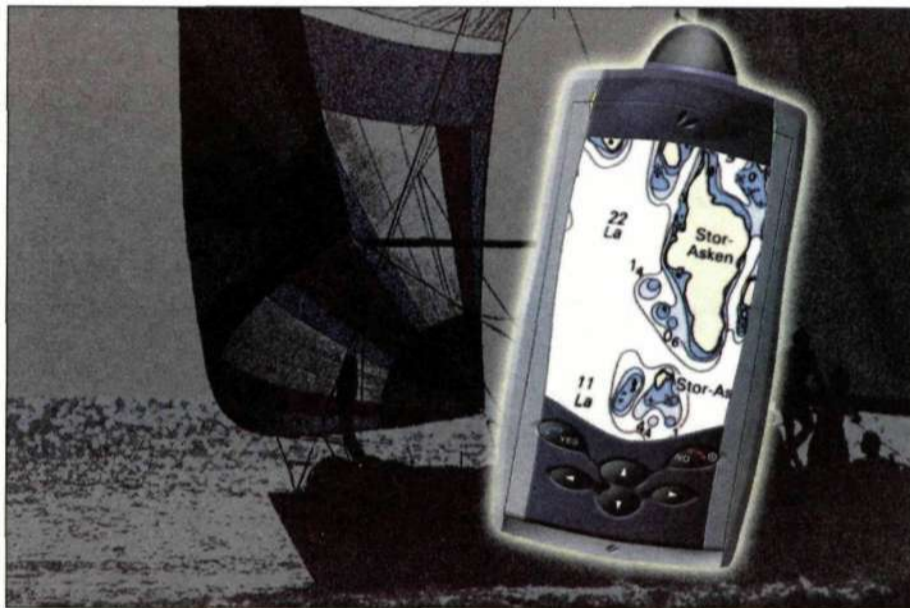
Ericsson, Nokia, Motorola and the British company Psion are developing Epoc in a joint company called Symbian. The company, which was started in June last year, has already established technical partnerships with a number of software companies.

Java interface supports services

An open platform allows software vendors to develop services for Epoc using a Java interface.

"Without this type of device and an open platform, such as Epoc, we will not be able to take advantage of the new capabilities that mobile networks will provide when enhanced with such technologies as GPRS, Edge and WCDMA," says Anders Waesterlid, who is responsible for Ericsson's technology and solutions for communicators and smart phones.

Simply put, the operating system determines what will appear on the display and what can be done with the new wideband mobile networks. The Epoc system contains three layers. The core is the system's platform with interfaces to all basic software. Above this is a framework for all applications which contains a graphics library and routines for starting and stopping applications. The third layer contains



With the small mobile devices of the future, the user will have access to many personalized services, such as navigation for sailors. This is made possible by the Epoc operating system.

the applications themselves, which provide the program logic and a user interface that adapts to different screen sizes.

Compact file conversions

Downloaded files, such as Word documents, can be easily read on an Epoc computer by converting the file to a specially designed format that conserves memory.

"Epoc provides an open interface to the Internet via WAP and an HTML web browser," says Anders Waesterlid.

"With Bluetooth technology, which can

wirelessly connect numerous different electronic devices, an Epoc terminal can create its own pico-net over which it can access external resources in its proximity."

The Symbian companies anticipate strong market growth for Epoc. According to their estimates, the market for Epoc-based devices will be between 40 and 60 million units over the next five years.

Nils Sundström

nils.sundstrom@lme.ericsson.se

www.symbian.com

MPLS standard due in summer

Multi-Protocol Label Switching (MPLS) continues to gain ground as a technique for sending packet data via IP. This summer, a global standard for MPLS will be approved. With products from the newly acquired company Torrent, Ericsson is developing its own complete MPLS offering.

MPLS provides a means of communication between routers that allows data traffic to be forwarded to the correct address in the shortest possible time. It directs traffic in an IP network so that no bottlenecks occur.

MPLS can be used for IP (Internet Protocol) traffic on different carriers, including ATM and Frame Relay.

MPLS has proven to be the best transport method for IP over ATM, since it helps the two protocols to work together. In so doing, MPLS transforms an ATM switch into a high-performance router.

MPLS is an important selling point for Ericsson's



Reino Martin and Kenneth Sundell are among those who will be developing the MPLS offering aided by Torrent.

Photo: Lena Widegren

son's own AXD301 ATM switch. With MPLS, the AXD301 can transport IP traffic and provide robust, quality-assured telephony and data services. This is a practical example of what Ericsson is doing to prepare for the new telecom world.

The MPLS solution with which Ericsson is working is based on partnerships with Nortel

and Bay Networks. Parts of this solution, however, will be replaced by products from Torrent Technologies, an American manufacturer of aggregate routers that Ericsson acquired a few weeks ago.

"Partnering with Nortel gave us access to a label edge router (a fast data switch) that enabled Ericsson to work with a competitive MPLS solution," says Reino Martin, who manages the MPLS unit in Älvsjö south of Stockholm.

Together with Torrent, Ericsson will now develop its own complete solution for MPLS networks.

This summer, the IETF (Internet Engineering Task Force) is expected to approve the first global standard for MPLS. This will be an important milestone for the commercial development of MPLS. Ericsson has participated in the MPLS standardization work since the start some two years ago.

Lena Widegren

lena.widegren@lme.ericsson.se

CONTENTS

WAP – more than mobile Internet

With WAP, the Internet will finally become mobile. This marks the start of a development the consequences of which are difficult to predict.

"Adding mobility to the Internet creates something much larger than we can conceive," says Joakim Nelson at Ericsson Mobile Communications.

To pave the way for the new technology, Ericsson has created the Mobile Internet, a portal with numerous services for mobile users. **2-3**

Two main tracks for IMT 2000

There are two main tracks for development of third-generation IMT 2000 mobile systems. One is a TDMA solution in which today's GSM and D-AMPS systems will be upgraded with Edge technology. The other consists of several wideband CDMA systems. Contact Technology explains the differences between the various systems. **6-7**



Soon to celebrate 25th anniversary

25th anniversary for MINI-LINK

Nearly 25 years ago, Ericsson sold the first microwave link called MINI-LINK. To date, 150,000 links have been sold to more than 105 countries. Contact Technology explains how the links work and how they are used. **5**

Searching for industry trends

Mikael Edhom travels the world analyzing industry trends for Ericsson. Contact Technology met him on one of his short stops in Stockholm. Mikael fears that Ericsson is not moving fast enough. **12**

WAP to start a mobile revolution

Over the short term, mobile telephone services will become more user-friendly. Long-term, however, WAP (Wireless Application Protocol) will change nearly everything. When the Internet goes mobile, predicting the next phase of development will be challenging. Joakim Nelson at Ericsson Mobile Communications talks about a revolution. "Adding mobility to the Internet creates something much greater than we can comprehend," he observes.

The first WAP-enabled mobile telephones will go on sale this autumn. With WAP, which is a simple standard for accessing web pages from a mobile phone, the Internet will become mobile.

Initially, WAP will be used to make the phone's functions more attractive and user-friendly. Applications now based on SMS (Short Message Service), including sending and receiving simple messages and information services for weather forecasts and stock prices, will be much easier to use.

A veritable revolution awaits

Further in the future, when use of WAP technology becomes more widespread and people become aware of its potential, a veritable revolution awaits.

"It's hard to grasp the scope of the developments waiting around the corner," says Joakim Nelson, strategic product manager at Ericsson Mobile Communications in Lund. "The Internet will undoubtedly have a greater impact when it escapes the limitations of the wireline network and goes mobile. Just think about how many more people have mobile phones than PCs."

Joakim Nelson believes that media companies will drive development and that advertising will provide the grease that speeds progress. When mobile telephones have an interface that offers jingles, text messages and images, they will become an attractive medium for advertisers and others wishing to convey a message.

Completely new billing model

"In the future, we will probably see a completely new billing model in the wireless market in which advertising bears a part of the costs. Examples already exist in the PC market," notes Joakim.

The sheer number of users and the ability to deliver personalized advertising to selected receivers will make mobile phones extremely attractive. Because mobile systems are able to track the user's location, it will also be possible to send local direct advertising. Passing a restaurant at lunch time may trigger a message about the daily special that appears on the user's phone.

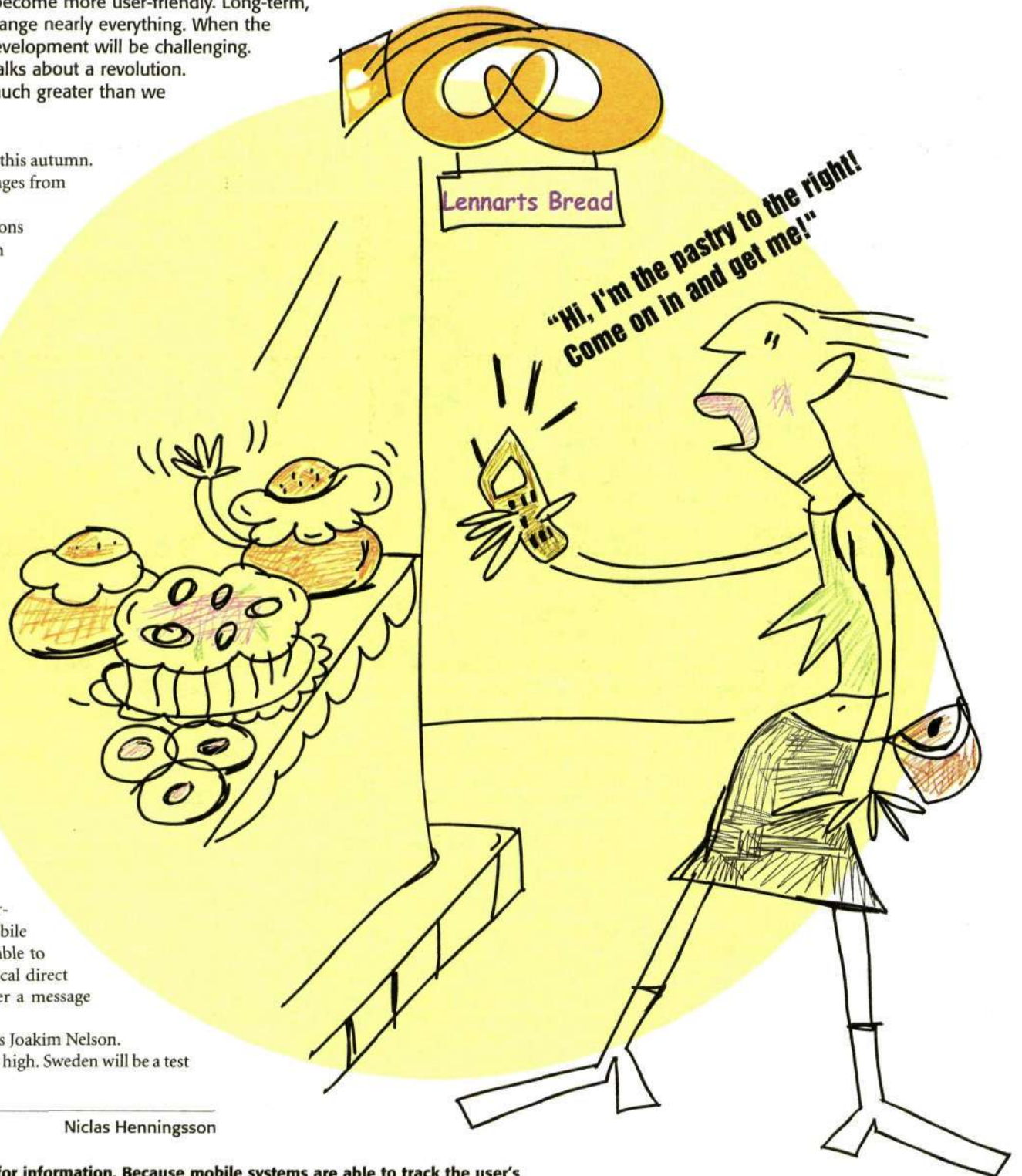
"Sweden will be at the forefront of development", predicts Joakim Nelson.

"Penetration of both PCs and mobile phones is extremely high. Sweden will be a test bed for the new technology."

Niclas Henningsson

WAP will give advertisers a new medium for information. Because mobile systems are able to track the user's location, it will be possible to send local direct advertising to the phone.

Illustration: Syster Diesel



Much more than wireless Internet

Using a WAP-enabled phone for surfing the web will not be like using a PC. Web pages will need to be adapted to the mobile phone's low-resolution screen. HTML will need to be re-coded as WML.

With WAP (Wireless Application Protocol) the Internet will be accessible from a mobile phone. WAP is a standard protocol that specifies how information should be sent from the Internet to the mobile phone. Just as in conventional surfing using a computer, web pages are opened using a special application called a browser. A WAP phone is thus simply a mobile telephone equipped with a browser.

WAP is also much more, however. Security functions included in the protocol will enable

secure electronic transactions via a mobile phone.

With push technology, it will be possible to receive some information automatically.

"WAP offers so much more than what is possible with today's Internet," says Mikael Jönsson, product manager for platform functionality at Ericsson Mobile Communications in Lund. "Using push technology, services can be created in which the users subscribe to certain information. One example is travel information. If a booked departure is delayed, the traveler will



Mikael Jönsson

receive a message on his or her mobile phone."

receive a message on his or her mobile phone."

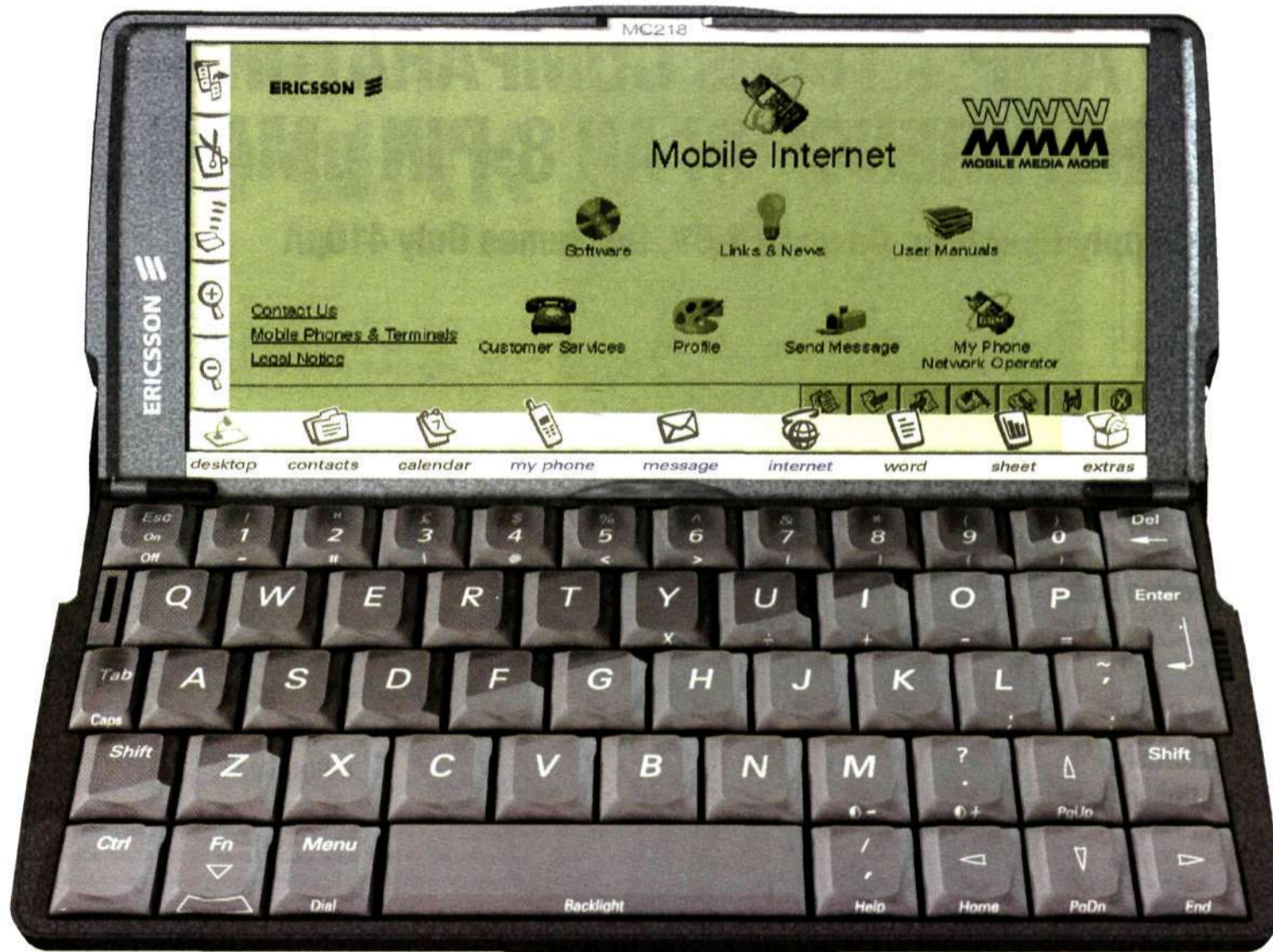
A WAP-enabled phone will not be sufficient for visiting web sites on the Internet. The web pages must also be adapted to the mobile phone's small display and low resolution, and HTML pages containing many colors and images will need to be re-coded in WML, Wireless Markup Language.

In addition to WAP phone and WML pages, a third component will be needed to make wireless web surfing possible. The mobile operator will need to invest in a gateway that provides a link between the Internet and the wireless network. Just as home users dial into their Internet service provider's modem pool, WAP surfers will connect to the operator's Internet gateway to access a web site.

A web session with a mobile phone begins by opening the WAP browser. One of a number of pre-defined bookmarks is selected. The telephone connects itself to the gateway, and after about 15 seconds, an Internet connection is established. Further in the future, when third-generation systems come on line, connection times will be significantly shorter.

How web sites appear will depend on the phone. The WAP protocol adapts the display to the size of the screen and the appearance chosen by the manufacturer. The same web page may be displayed somewhat differently, depending on whether it is viewed on an Ericsson or a Nokia phone.

Niclas Henningsson



Using the WAP portal, Mobile Internet, Ericsson plans to stimulate the development of content and applications for mobile Internet usage. Mobile Internet offers such services as daily news from CBS and Dow Jones.

Thousands of pages required

The major task of producing WAP pages is now getting underway. Only when there is substantial information, applications and thousands of WAP pages, will subscribers have any use for this new technology.

"It is crucial that Ericsson stimulate the development of applications, that we pay attention to the content and not only the technology. It is the content that makes the market for these products grow," says Staffan Pehrson, director of the Ericsson WAP program.

Staffan Pehrson directs a unit with responsibility for the WAP support in the network and WAP applications. The unit offers for example a WAP gateway and proxy and WAP consultancy. In order to stimulate the development of content and applications, Ericsson in Lund has started its own WAP portal called Mobile Internet. The portal has roughly the same function as a simple Internet portal, such as Torget or Yahoo. The difference is that the information is aimed at the mobile world and at mobile users in particular. The information is free of pretty, but bandwidth-hungry, effects and animations, and is published using the WAP protocol.

Access for all

Mobile Internet also acts as a support for companies that want to develop WAP applications or to publish WAP pages on the Internet. The companies can download Ericsson's WAP development environment free of charge and then start to create their own applications. It is not sufficient for a company to publish web pages on the Internet so that users of WAP phones such as the Ericsson R 380 can download information. A special WAP page must be created.

"This is in no way time-consuming or difficult. The basics already exist in that an Internet page has been published. But it must be done, nevertheless," says Joakim Nilsson, global product manager for Mobile Internet.

Ericsson has begun a series of cooperative projects with content companies. Some companies link their services back to Ericsson's Mobile Internet portal. For example, it is possible to read the news from CBS and Dow Jones. Ericsson has also initiated cooperation with SAS to develop such services as the purchase of flight tickets via a mobile phone, Dagens Industri for access to Swedish news and Interflora for ordering flowers using a mobile phone.

"It's local information and entertainment that will make the WAP world expand seriously. We will be able to receive information on commuter train departures and where the nearest restaurant is located, book cinema tickets on-line or play interactive games," says Joakim Nilsson.

In cooperation with other companies including Nokia, Ericsson is launching the term MMM, Mobile Media Mode. The three Ms indicate that a web site contains material that may be read using a WAP terminal.

Access to Ericsson's WAP portal is currently free-of-charge. No Internet subscription is required and, via the portal, the user can send e-mail free of charge. The user only pays the cost of the call to the mobile operator.

It is as yet unclear how payments for surfing on WAP pages will be made in the future. Some people believe that basic services, such as news, will be free and form a part of the basic package received when purchasing a mobile phone subscription. On the other hand, there will be charges for a route description or downloading some other type of specific information.

Stimulating development

The fact that Ericsson has its own WAP portal opens up the possibility of becoming a content company. Today's strategy is to try to stimulate the development of the WAP network by using, for example, Mobile Internet, but to avoid becoming an Internet operator or content company. But Joakim Nilsson believes, nevertheless, that it is important nowadays to be involved in the contents sector in order to guarantee success.

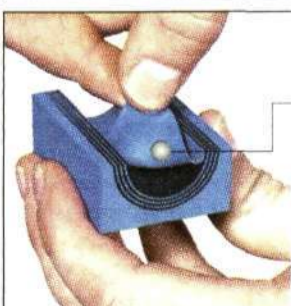
"Maintaining a WAP portal is an enormous task. But, personally, I believe that we must be part of this world. It is crucial to develop relations with contents companies, Internet operators and mobile operators."

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<http://mobile.ericsson.com/mobileinternet>



In cooperation with other companies including Nokia, Ericsson is launching the term MMM, Mobile Media Mode. The three Ms – an image of WWW upside-down – indicate that a web site contains material that may be read using a WAP terminal.



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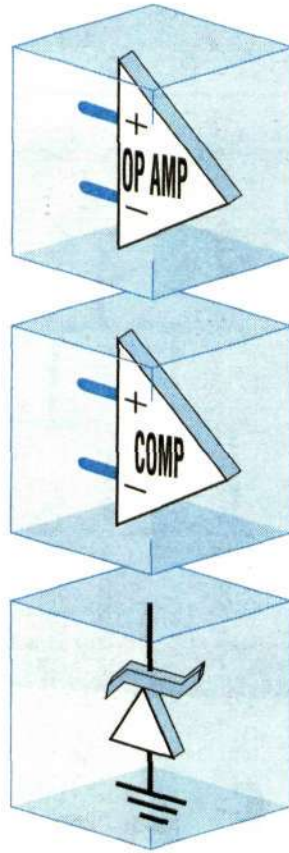
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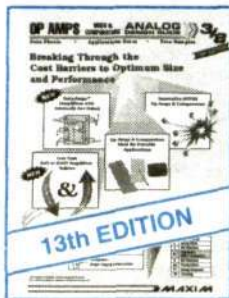
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NEW MAX9000/9001	1.25	—	185	✓	2.5 to 5.5	410	1.80/1.89	8-pin μ MAX/SO
NEW MAX9002	1.25	—	185		2.5 to 5.5	340	1.20	8-pin μ MAX/SO
NEW MAX9003/9004	—	8.0	185	✓	2.5 to 5.5	410	1.80/1.89	8-pin μ MAX/SO
NEW MAX9005	—	8.0	185		2.5 to 5.5	340	1.20	8-pin μ MAX/SO
MAX951	0.02	—	4000	✓	2.7 to 7.0	7	1.40	8-pin μ MAX/SO
MAX952	—	0.125	4000	✓	2.7 to 7.0	7	1.40	8-pin μ MAX/SO
MAX953	0.02	—	4000		2.4 to 7.0	5	1.19	8-pin μ MAX/SO
MAX954	—	0.125	4000		2.4 to 7.0	5	1.19	8-pin μ MAX/SO

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This is MINI-LINK

It is almost 25 years since the first MINI-LINK was delivered. After a slow start, sales have snowballed. Ericsson's links are now to be found in more than 105 countries and the rate of growth remains high. In 1999, link number 150,000 will leave Ericsson Microwave's plant in Borås, Sweden.

But just what is MINI-LINK?

Contact Technology have charted the product's history, its areas of application and its function.

The first MINI-LINK was delivered in 1975. The first links were used to send and receive signals for the inauguration of the Göta Älv bridge in Gothenburg, Sweden.

The MINI-LINK's history began a few years earlier, when engineers at what is now Ericsson Microwave, discovered new areas of application for the technology developed for the company's radar system.

The use of radio links for information transfers was nothing new. The new aspect of MINI-LINK was the way in which the information was transferred. With Ericsson's links, parts of the electronic equipment were located outdoors, adjacent to the antenna. In this way, a common coaxial cable could be used for communication between the modem and the antenna.

The alternative – a waveguide – requires considerably more complicated installations.

Limited radio link market

When the MINI-LINK was launched in the mid-1970s, the market for radio links was fairly limited. It would take until the end of the 1980s, and the major breakthrough for mobile telephony, before the sales of links took off properly.

MINI-LINK proved excellent for communication between base stations and switches. For a new operator, anxious to start up a network quickly, it is a crucial advantage to be able to avoid laying cables.

More than 80 percent of the links sold today are used in mobile systems around the world. The remaining 20 percent is used for fixed telephony and data communication.

Sales snowball

Since the boom at the end of the 1980s, MINI-LINK sales have snowballed. In 1988, 658 radio links left the Ericsson Microwave plant in Borås. Ten years later, in 1998, 53,800 links were produced. That same year, link number 100,000 was delivered.

For 1999, the forecast is between 60,000 and 65,000 links.

With slightly more than a third of the sales volume, MINI-LINK is the world leader in the market for radio links and the rate of growth remains high. Ericsson Microwave's links are taking market shares in a growing market, particularly as a result of the plant in Borås, which is one of the world's most modern electronics production plants.

Strong growth predicted

As MINI-LINK approaches its 25th anniversary, the next boom in sales is being predicted. Waiting just around the corner is strong growth in datacom, both fixed and mobile.

Those operators who want to be a part of this development and compete in the growing market will have to quickly build their



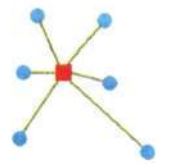
The revolutionary feature of MINI-LINK was that parts of it were located outdoors, adjacent to the antenna. In this way, a coaxial cable was able to communicate between the modem and the antenna.

own broadband networks. The use of radio links is an excellent solution. New MINI-LINK products, point-to-multipoint systems and high-speed links will be Ericsson's weapon in the battle to win new customers.

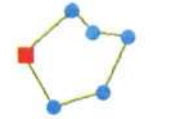
Since the vast majority of MINI-LINK terminals sold today are used in mobile systems, the future description of the links' use and function will be based on mobile applications.

Niclas Henningson
contact@lme.ericsson.se

Instead of cables



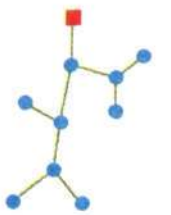
Star topology. Phone traffic is forwarded from each base station to the switch in a single link.



Ring topology. The telephone traffic is forwarded from the base stations in links via other base stations in a ring.



Chain or cascade topology. The telephone traffic from the base stations furthest from the switch is forwarded over links via other base stations in the chain.



Tree topology. The telephone traffic from the base stations far down in the tree structure and far away from the switch is forwarded in links via the base stations closer to the switch.

Key to symbols: square = switch
circle = base station

MINI-LINK has the same area of application as an optic or electric cable.

Using two links directed toward each other – a link stage – information is sent, for example, between two base stations in a mobile telephone network.

The capacity – the amount of information transferred per unit of time – in one link is high. With a maximum speed of 34 Mbits/s, the MINI-LINK is a viable alternative to optic cables.

A mobile telephone network consists of base stations. Each base station conveys all calls to and from mobile phones located in the area, or cell, covered by the base station's antenna. The base station then transfers the calls to the mobile network's switch. It is this link for which MINI-LINK is most used.

Various connections

There are various methods of connecting base stations and switches – that is, various topologies. Using the simplest method, star topology, each base station communicates with a switch. A topology link like this is only required to handle the transfer of calls from a single base station. The capacity need not be especially high.

Using the most common topology, tree topology, the telephone traffic is forwarded to the switch in several links via other base stations.

Different capacity

At the very bottom of the tree structure, far removed from the switch, low capacity is required. Further up in the structure, where traffic from several base stations accumulates, higher capacity is needed. At that point the link must be able to send the collective mass of calls to and from several base stations.

In reality, various topologies are often combined when a mobile network is constructed.

HOW MINI-LINK WORKS

MINI-LINK communicates on microwave frequencies, from 7 to 38 GHz. The high frequencies are necessary so that the capacity – that is, the amount of information transferred – is sufficiently high.

The choice of frequency is controlled by three factors: the length of the link (low frequencies produce a longer link – up to 50 km), the amount of information transferred (at a high frequency, more information can be transferred) and the frequencies have been allocated to the user by regulatory bodies.

MINI-LINK consists of an indoor and an outdoor part. The outdoor part includes the antenna and the electronics, which transform

the indoor unit's signals to microwaves.

One of MINI-LINK's competitive advantages is flexibility. The link's capacity can vary depending on where it is located in the topology.

In addition, the customer can, via various combinations of the indoor unit's components, select various supplementary services, such as extra data channels.

The flexibility is contained in the indoor unit's modem.

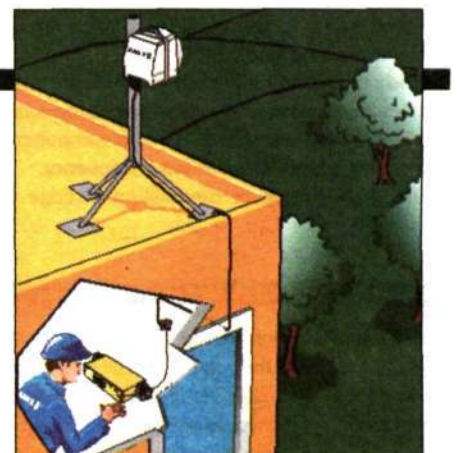
There are four variations of the modem, which transforms the base station's signals to signals that can be sent through the air. In the simplest version, there are two channels of 2 Mbits/s each. These are used for links with

low capacity, such as those far down in the tree topology. For links close to the switch, where capacity needs are considerably greater, there is a modem with a capacity of 34 Mbits/s.

The MINI-LINK user can choose between seven different frequencies of microwaves that transfer information in one link: 7 GHz, 8 GHz, 15 GHz, 23 GHz, 26 GHz and 38 GHz.

The link's capacity may be varied by using various combinations of the indoor unit's components.

The modem is available in four variations: 2 x 2 Mbits/s, 4 x 2 Mbits/s, 2 x 8 Mbits/s and 34 + 2 Mbits/s.



MINI-LINK consists of an indoor and an outdoor unit. The units communicate via a coaxial cable. Illustrations: Hans Dahlberg

The development of advanced broadband systems for next-generation cellular networks is taking two main tracks. One is an improved TDMA system called Edge, while the other is based on CDMA technology.

Driving the development of Edge are the manufacturers and operators of the existing TDMA systems, GSM and D-AMPS.

CDMA solutions, on the other hand, are following two paths. One solution has been developed on the basis of open-ended research being conducted in Europe (by Ericsson among others) and Japan, while the other is based on the so-called IS-95 standard cdmaOne, which is the narrowband CDMA standard that the U.S.-based Qualcomm developed some years ago.

Some ten standard proposals that were originally submitted to the ITU (International Telecommunications Union) have now been condensed into two principal development paths. Ericsson primarily supports the one that includes WCDMA and Edge.

Two tracks in the mobile system of the future

GSM and TDMA operators can use the existing frequency spectrum more efficiently if they adopt Edge modulation techniques. This enables networks to be upgraded to handle third-generation mobile telecom services.

The process of establishing standards for Edge (Enhanced Data rates for Global Evolution) has been in progress since 1997, when Ericsson presented this solution to ETSI, the European Telecommunication Standards Institute. This technology employs the GSM structure, with eight time slots and a bandwidth of 200 kHz, but Edge offers radio access which will also be used by other mobile systems to achieve data transmission rates of up to 384 kbps.

In January 1998, the UWCC – the TDMA operators' association – decided to employ the Edge concept for TDMA as well. This means that Edge will be used to link the GSM and TDMA (D-AMPS) mobile systems, giving operators the opportunity to offer worldwide roaming.

Ericsson's GSM Systems and TDMA Systems business units have been working together for some time on Edge standards.

"Operators will find it easy to incorporate Edge in their systems," says Jonas Näslund, who is product manager for new GSM radio stations. "The base station equipment can be reused, and the upgrading does not affect cell planning or quality. In addition, Edge can be installed progressively, starting for example with locations with intense traffic, such as airports and business parks."

GSM Systems and TDMA Systems have been conducting joint product development for Edge in the radio access sphere since the autumn – the primary impact of the new modulation technique is in radio access aspects of these systems.

"Today, we have a number of joint projects involving our two parallel line organizations," Jonas Näslund says. "We share the same platform for channel coding, control systems and basic software, and we also employ the same power amplifiers and processors for the radio sub-system."

Common platform

Using Edge technology, the core components of the various base stations – RBS884 for TDMA and RBS2000 for GSM – will be identical. In addition, to this core, there will be GSM and TDMA-specific software for speech-coders, for example.

One of the main differences between the existing TDMA and GSM systems is that TDMA uses 30 kHz channels, inherited from the analog AMPS system. But new technology is essential if higher data transmission rates are to be achieved. As a result, with Edge, TDMA will employ the GSM system's 200 kHz bandwidth channels for data communication and 30 kHz for speech.

In order to enable all TDMA operators to upgrade their networks with Edge, Ericsson is developing two Edge versions for TDMA, depending on which frequency spectrum the operators employ.

"This is because the American operators have different amounts of vacant frequency space. The 850 MHz band is particularly full, and operators want to start using Edge on a narrow frequency band," says Ulf Forssen, who is in charge of the systems and technology unit at TDMA Systems.

Note for packet data

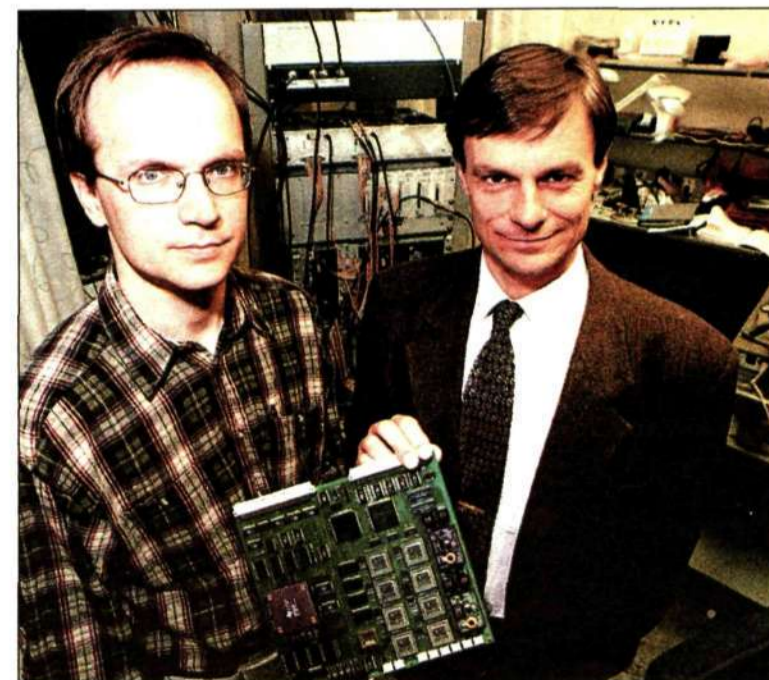
ETSI is expected to approve the first Edge standard by the end of 1999. However, as far as operators are concerned, the GPRS (General Packet Radio Services) solution will be the first stage in upgrading current mobile systems to provide third generation mobile services.

Like current mobile systems, this technology uses GMSK modulation for radio transmission, and permits data speeds of up to 115 kbps. Handling wireless packet data will require new access nodes will be required in the network, and also a node linking to an external IP network. These nodes can then be reused in an Edge implementation.

Commercial GPRS systems supplied by Ericsson are expected to be in operation by the year 2000, although Edge systems are not expected to be in commercial operation until the year 2001.

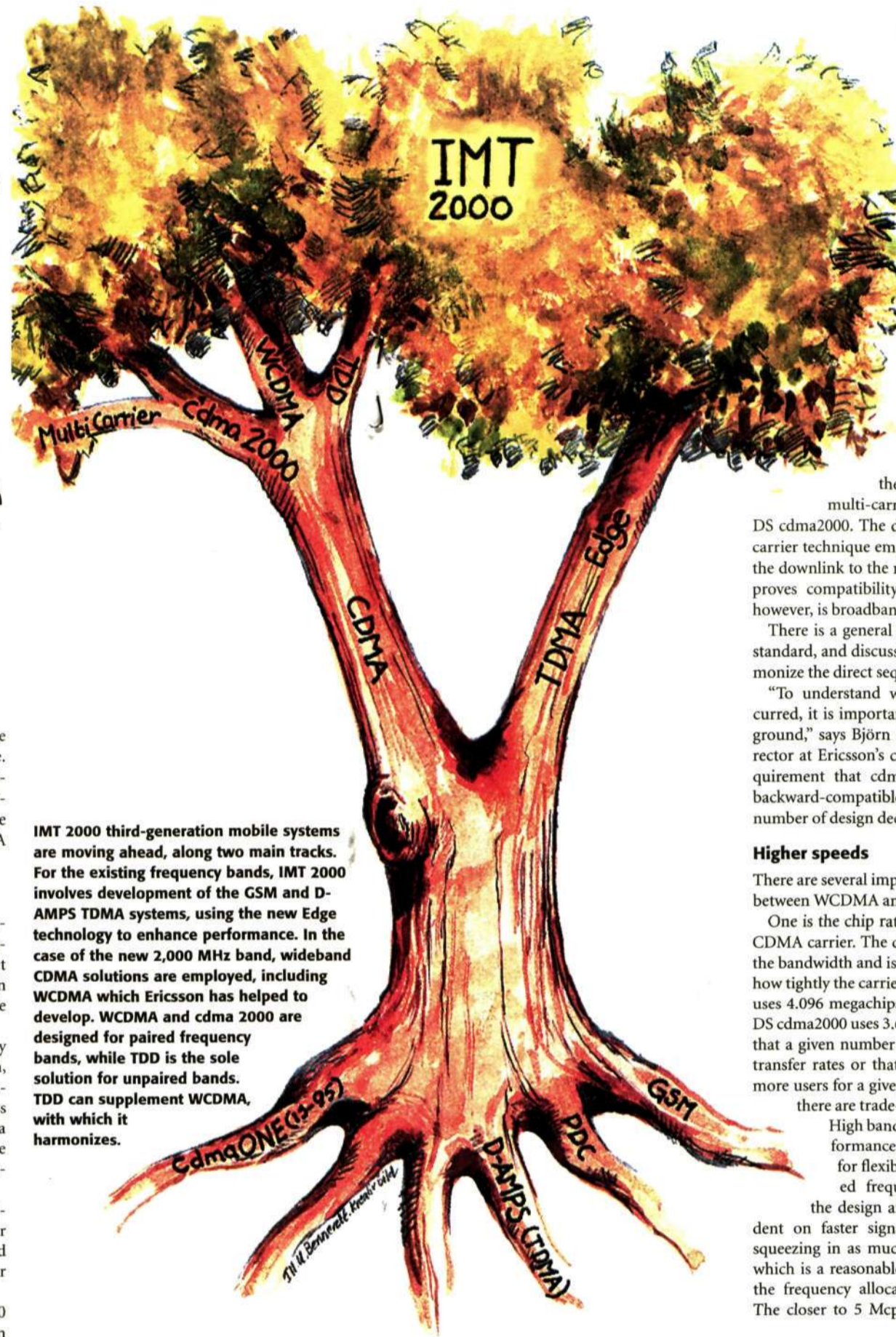
"In the case of GSM operators, we expect 90 percent of them to opt for GPRS, and we also aim to sell them Edge," Jonas Näslund says.

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The GSM and TDMA systems are merging, with Edge technology. Jonas Näslund of the GSM Systems business unit and Ulf Forssen of TDMA Systems demonstrate an equalizer circuit board, which is part of the new digital Edge transceiver used in radio base stations for both systems.

Photo: Nils Sundström



IMT 2000 third-generation mobile systems are moving ahead, along two main tracks. For the existing frequency bands, IMT 2000 involves development of the GSM and D-AMPS TDMA systems, using the new Edge technology to enhance performance. In the case of the new 2,000 MHz band, wideband CDMA solutions are employed, including WCDMA which Ericsson has helped to develop. WCDMA and cdma 2000 are designed for paired frequency bands, while TDD is the sole solution for unpaired bands. TDD can supplement WCDMA, with which it harmonizes.

More variants of CDMA

In the battle to set a global standard for mobile communications, there are several competing solutions based on CDMA technology. The differences between them often have historical origins and are intended to enable the new systems to interwork with existing systems on today's frequency bands.

The principal contenders are a DS (direct sequence) CDMA solution that is supported by Ericsson, Nokia and several other European supplier's WCDMA systems, DS cdma2000 and multi-carrier cdma2000, which both derive from the IS-95 world. In principle, multi-carrier cdma2000 is identical to DS cdma2000. The difference is that the multi-carrier technique employs several frequencies in the downlink to the mobile terminal, which improves compatibility with IS-95. The uplink, however, is broadband, just as in cdma2000.

There is a general desire to create a common standard, and discussions are in progress to harmonize the direct sequence solutions.

"To understand why this situation has occurred, it is important to be aware of the background," says Björn Gudmundson, research director at Ericsson's core research unit. "The requirement that cdma2000 systems should be backward-compatible with IS-95 dictated a number of design decisions."

Higher speeds

There are several important technical differences between WCDMA and DS cdma2000.

One is the chip rate for the coded broadband CDMA carrier. The chip rate is closely linked to the bandwidth and is determined in principle by how tightly the carrier is packed. Here, WCDMA uses 4.096 megachips (Mcps) per second, while DS cdma2000 uses 3.6864. A higher speed means that a given number of users can obtain higher transfer rates or that the operator can support more users for a given level of performance, but there are trade-offs.

High bandwidth provides higher performance, but reduces opportunities for flexible utilization of the allocated frequency, while complicating the design and making it more dependent on faster signal processing. And, when squeezing in as much as possible into 5 MHz, which is a reasonable channel bandwidth given the frequency allocation, new problems arise. The closer to 5 Mcps the system operates, the

greater will be the leakage into the neighboring channel, making sharper filters necessary to eliminate interference.

"We have chosen to maximize performance without making the system too difficult to manufacture," explains Björn Gudmundson, adding that there is talk of yet another chip rate, 3.84 Mcps, in the harmonization discussions.

Three-carrier solution

The determining factor for the cdma2000 chip rate is the multi-carrier solution, which uses three 1.25 MHz carriers for the downlink, allowing a mixture of IS-95 traffic using the narrowband carriers and cdma2000 traffic using the full multi-carrier. To be completely compatible with IS-95, DS cdma2000 will employ a chip rate of 3 x 1.2288, or 3.6864 Mcps.

Incidentally, the multi-carrier technique is a good solution for the migration of IS-95. All traffic can be mixed, since the signals from the base station to the mobile units can be synchronized, and so-called orthogonal dispersion codes can be used to reduce interference within each cell. Because synchronization is not possible on the uplink, other calls cannot be eliminated completely. Using a multi-carrier in that direction is therefore pointless. Instead, both IS-95 and cdma2000 traffic are transmitted on the same 5 MHz broadband channel.

Another difference relates to whether or not to synchronize radio base stations.

Advantage where GPS coverage is poor

WCDMA does not require GPS synchronization, but this function can be added if the operator wants it. Eliminating the requirement for GPS synchronization is an advantage in cases where the base station site has poor GPS coverage.

The IS-95 system, on the other hand, has strict requirements for synchronization, which will also be necessary for cdma2000. Each base station in IS-95 and cdma2000 systems is therefore equipped with a GPS receiver. In an IS-95 system, all base stations continuously transmit the same pre-defined sequence, a so-called scrambling code, that enables the mobile units to locate cells, identify new base stations and establish connections. In order to enable mobile units to identify base stations and distinguish between cells, signals are shifted in time by a constant val-

ue. This requires strict synchronization, which is why a GPS receiver is needed.

The WCDMA standard employs a different technique. Different sequences are transmitted, each one unique for a given base station, thus supporting a system without synchronization.

A third difference relates to pilot information from the base station to the mobile units. This information is used to measure the radio link, refraction, multi-path dispersion, etc.

The WCDMA system is based on a dedicated pilot, which uses a different sequence for each mobile unit, while cdma2000, like IS-95, is based on a common pilot.

"One reason for our choice is that we wanted the WCDMA system to be future-proof and to support smart antennas, which require a unique code for every mobile unit," says Björn Gudmundson.

Although this is a fundamental difference, there is also a method of supporting smart antennas in cdma2000 systems. This solution was added at a later stage, however. In a similar manner, WCDMA has added a common pilot to its solution, which consumes somewhat less power than in a traditional mobile system.

The format for the pilot information also differs. WCDMA uses a time-multiplexed pilot signal, in which the pilot is transmitted first, followed by the data, while cdma2000 transmits two different codes simultaneously. Both techniques offer roughly equal performance.

"Our ambition for WCDMA was to develop a future-proof standard to which various smart solutions can be added," says Björn Gudmundson.

Smart antennas and hierarchical cells

Network capacity can be increased primarily by the use of smart antennas and hierarchical cells. Creating hierarchical cells in a CDMA system is problematic, because it is difficult to switch between cells at different levels when each level uses a different frequency and signals are being transmitted continuously. Ericsson has developed a patented solution for inter-frequency handover in which 10 ms frames are compressed into 5 ms, allowing inter-frequency measurements to be taken in the resulting free time interval.

The same technique can be used to perform measurements against a GSM network, which makes it possible to migrate to WCDMA in GSM systems. This would enable a GSM user with a dual-mode telephone would to access a WCDMA system.

Lars Cederquist

EDGE MODULATION TECHNIQUES

Modulation is the term employed to denote the method used to transmit information in an electromagnetic field.

Each modulated information sequence may be described as a signal with an amplitude component, a phase component and a component which describes the carrier-wave frequency.

The high degree of modulation in Edge is

based on 8-PSK (8-phase shift keying) modulation. In this modulation scheme, the information transmitted is described in both phase and amplitude. Current GSM technology employs GMSK modulation (Gaussian minimum-shift keying), and puts all the information in the phase component. Three times as much information can be conveyed using 8-PSK modulation.

THIRD GENERATION

The ITU's recommendations for IMT 2000 systems specify that they must handle transmission at 384 kbps over large areas, and at 2 Mbps in local, indoor environments. In Europe, two 60 MHz frequency blocks have been allocated for uplinks and downlinks (paired band) in the 2 GHz band. In addition, there are 20 MHz and 15 MHz blocks which can be used

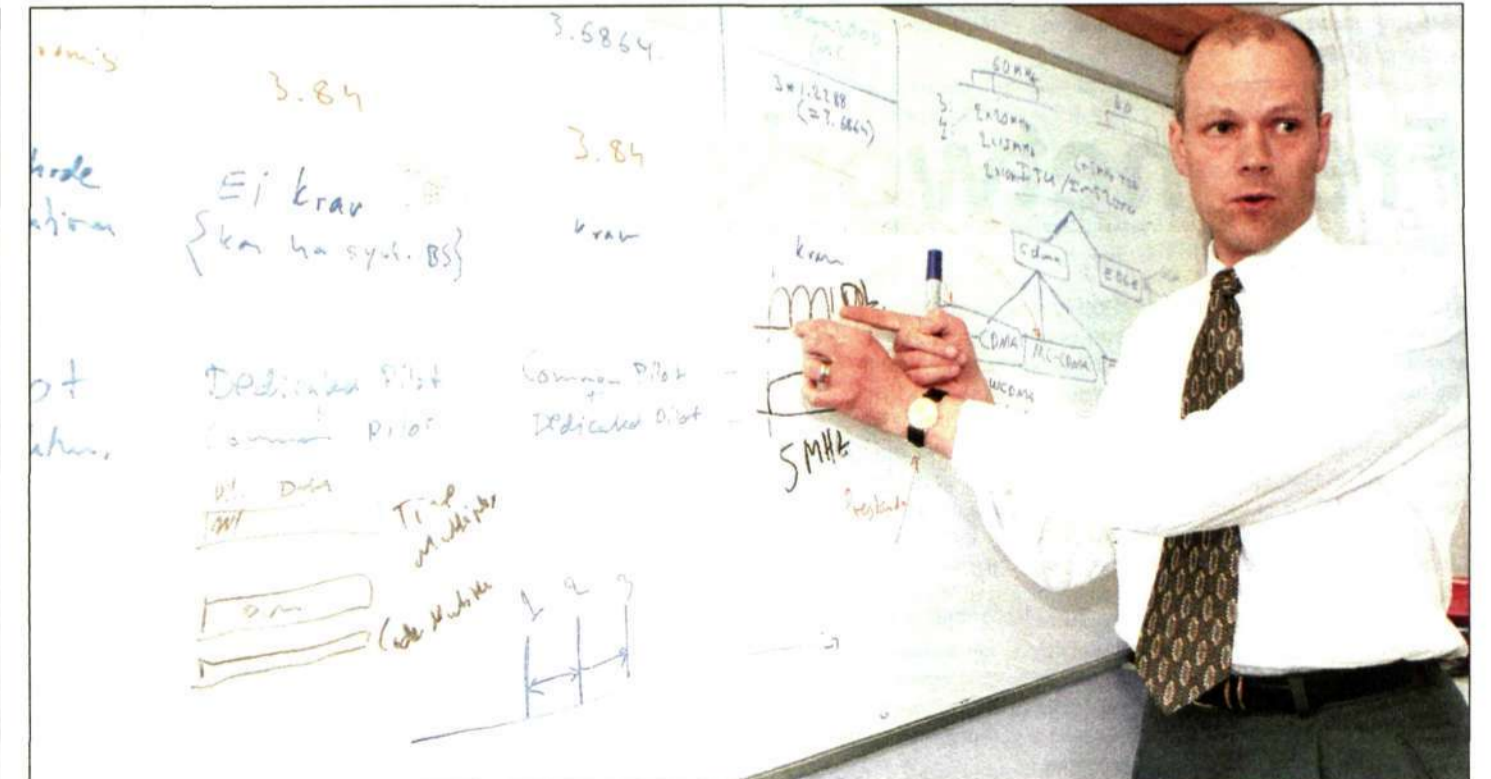
separately for TDD (Time Division Duplex) – with uplinks and downlinks on the same frequency and separated by time duplex (unpaired band). This is useful for Internet applications, which require more capacity in one direction than the other. Assuming four operators to a market, each operator would have 2 x 15 MHz of paired bandwidth 5 MHz of TDD bandwidth.

HOW CDMA WORKS

The two main access technologies for radio communications in a mobile system are TDMA and CDMA. In a TDMA system, the total frequency band is split into several rather narrow frequency channels, which in turn accommodate several calls that are separated in that they are given recurring time slots. In a CDMA system, on the other hand, the calls are stacked on top of one another in the wide joint frequency channel and are separated by being allocated different codes.

In simple terms, every digital call consisting of ones and zeros, is multiplied by an individual code, which varies approximately 100 times faster than the original signal. The code, which is repeated during the entire call, is added to each piece of the message and the result is a wideband signal.

At the recipient's end, the signal is again multiplied by the same code so that the rapid code is neutralized and the call adopts its original form. The other calls that have codes are not neutralized, however, and continue to vary rapidly. The recipient's filter cuts out its own narrow frequency section and can then listen to its compressed call strengthened about 100 times compared with the other calls which are perceived as a weak muted noise.



"Our ambition for WCDMA was to develop a future-proof system," says Björn Gudmundson, research director at Ericsson. Photo: Kurt Johansson

Future focus on services

By the time third-generation mobile telephony is replaced by a fourth, there will be a jumble of different standards. Many of the systems and technologies will be competing against each other for radio spectrum space, according to Jens Zander, Professor in radio systems technology at the Royal Institute of Technology in Stockholm.

Jens Zander is part of a research project known as Personal Computing and Communication (PCC), funded by the Foundation for Strategic Research. Its purpose is to investigate the prerequisites for a future system that offers "personal multimedia to everyone at today's fixed telephony prices."

In Zander's section of the project, participants are attempting to describe the infrastructure needed for a fourth-generation mobile communications system.

"The third-generation mobile communications system incorporates a new standard, a new technique for sending information. With broadband CDMA, transmission rates will be sufficiently high-speed to allow mobile Internet usage. The fourth-generation system will not begin with a new radio technique. Rather, it will be about new ways of using mobile communications."

Access for all

Each new generation of mobile phone system has evolved in order to solve problems that previous generations were unable to handle. GSM was developed to improve voice quality in NMT. The third-generation WCDMA system is being developed in order to offer data traffic speeds that GSM can't provide.

The question, then, is what will the fourth generation add that the third generation is unable to offer? According to Jens Zander, the answer is access for everyone.

"The big problem with third-generation mobile phone systems is coverage. If network speeds are to live up to what has been promised, high density networks are required, with many base stations covering small areas. That's expensive, however. It's not a problem in built-up areas, since there are many subscribers willing to pay. But who will provide coverage for rural areas?" wonders Jens Zander.

Several standards

Jens Zander does not believe that the future of wireless communications lies with a single, worldwide standard. Instead, he sees a devel-



Jens Zander, Professor at the Stockholm Institute of Technology, believes that a whole host of technologies will replace third-generation mobile telephony.

Photo: Niclas Henningsson

opment where many different technologies compete for the radio spectrum. He speaks of a veritable explosion in the number of interfaces where various types of systems overlap each other in a virtually chaotic patchwork quilt. These numerous parallel systems do not pose a problem for users, however.

In fourth-generation mobile phone systems, radio technology is no longer the main focus. Users don't need to worry about which standard they communicate in, be it GPRS, UMTS

or any else. The focus will instead have shifted to content, or services.

Jens Zander talks about one stop shopping. Customers will be able to buy a service and receive a terminal customized for a particular application. Those who prefer verbal communication can sign up for a voice subscription and get a telephone thrown in. For other services, different terminals will be available.

"One could, for example, envision Stockholm's public transportation system, SL, mar-

keting a service that provides continuously updated timetables. All that would be needed for the service would be a small terminal, the size of a credit card, which would maintain wireless communication with SL's computer system. The terminal would display the exact arrival time of a bus, even if the bus was late. It would also know where a user was and could give instructions on how to find the nearest bus stop."

Niclas Henningsson

Free networks or state control?

The PCC research project has developed several scenarios regarding the future of wireless communication. They include an organically expanding network where everyone who wants to can connect their own equipment and a network that grows without any overall control, just like the Internet.

Mobile communications infrastructure is developing slowly. The large investments required for networks that will be in use for several years require farsightedness. The task of Professor Jens Zander, and his colleagues at the Personal Computing and Communication (PCC) research program, is to see into the future. The premise of their work is to identify important areas of research, technical problems and bottlenecks in fourth-generation mobile systems. In order to be successful, they need to form an understanding of the situation in which the systems will operate.

The research group, which includes participants from Chalmers University of Technology

in Gothenburg and the Royal Institute of Technology in Stockholm, presented its first report last autumn. The future of wireless communications was described in three conceivable scenarios. Two aspects were considered – political and technical developments.

"The starting point for our three scenarios was based on which entity would be driving developments: those who provide services, those who manufacture equipment or the authorities," explains Jens Zander.

Scenario 1: Anything is possible

Developments are driven by equipment manu-

facturers. A global network for wireless communications develops organically, without overall control. Technical advances have made equipment so inexpensive that anybody can buy their own base station, providing coverage to their home or business. The global network consists, in reality, of a vast number of local networks linked together.

There are many different standards and technologies. In order to access services, multimedia terminals capable of dealing with several interfaces are required.

Scenario 2: Palm top computers

Developments are driven by service providers. Users subscribe to services and receive terminals customized for particular applications.

Users don't need to worry about which standard their terminal is communicating in. That

is taken care of by the service provider who buys access to an operator's infrastructure.

Few operators care about areas outside cities, since it's too expensive to provide adequate coverage.

Scenario 3: Big brother

Extensive computer crime – economic crimes and crimes against personal integrity – have led to a loss of confidence in the Internet. National authorities are forced to exercise control in order to guarantee security. A few large operators, service providers and manufacturers are approved to operate in the market.

Smaller companies do not survive, competition disappears and the pace of technical development declines.

Niclas Henningsson

Voice and flexibility key for third generation

The third generation's wideband mobile telephony offers major opportunities. High data rates will give rise to a rich flora of new services.

A broad range of mobile phones will be increasingly important for satisfying different customer requirements.

The development of telephones for the third generation's mobile systems is well underway. At Ericsson Mobile Communications, ECS, in Lund, Sweden, the technical foundations for the phones of the future are being laid. At the same time, efforts are being made to determine the look of the new phones.

"The design of the new phones is dictated by what they will do," says Kjell Gustafsson, research and basic technology manager for WCDMA terminals. "Generally, we are facing greater differentiation. The range of models will increase when different subscribers demand different functions.

Future phone concept

Kjell Gustafsson talks about different concepts for the phones of the future. At the far end of the scale is the phone that can handle everything – including data communication, image transfer and voice – within a single unit. At the other end of



Kjell Gustafsson is research and basic technology manager for WCDMA terminals at ECS in Lund, Sweden.

Photo: Niclas Henningsson

the scale there is a concept based on separate devices.

"The separate device concept means that the phone, which is relatively small with a simple display, is supplemented with other devices for various services. If you want to surf, the phone is used to

connect to the Internet. The information is then fed to a portable PC or a palm-top, using a Bluetooth connection."

Ericsson's first devices for the next generation of mobile systems are expected to be launched during the second half of 2001, which is when the first systems are taken into operation.

Basic ideas behind models

The appearance of the new products is a well-kept secret, but Kjell Gustafsson reveals the basic ideas behind the new models:

"Voice will probably continue to be the most important service. Therefore, we will not fill the phones with services at the expense of voice services. But, nevertheless, we must show the possibilities offered by the new technology."

Kjell Gustafsson believes that the first wideband telephone will be a feature phone. The focus is on voice, but with WAP and a good display, the phone will also be capable of handling simple image management and data communication.

"The objective is to create a phone with an excellent voice quality, long standby and talk times and with a size and price comparable with the GSM phones available in the market in 2001."

Niclas Henningsson

3G phones face tough demands

High data rates will be the hallmark of third-generation mobile systems. Enormous amounts of information will be received and processed in the phones. Capacity requirements are high, to say the least, when hundreds of millions of operations must be performed every second. The challenge is to achieve this high performance level without the phones' power consumption becoming too high.

Third-generation systems will send vast amounts of data between base stations and telephones. Data speeds are high for two reasons. On the one hand, the standard itself, wideband CDMA, requires extremely fast processing. On the other hand, the basic objective of the generation shift is to increase the speed of communications. Video conferencing, with simultaneous voice and image communication, and mobile Internet demand high speeds. All the data sent and received is processed in the phones. When several hundred million operations must be carried out every second, the processor and memory capacity must be adequate.

Achieving such performance is not difficult. Several commercially available processors meet the requirements. The problem is power consumption. In a computer, it does not really matter if the processor consumes large amounts of power. In a



The demands for a broad range are increasing, so Ericsson needs to be able to satisfy all types of customers.

mobile phone, where talk time is one of the most important competitive elements, low power consumption is crucial.

The solution lies in finding the right balance between hardware and software. The most flexible solution would be a powerful processor loaded with software for the various functions. Such a processor would require too much power, however. Certain functions must, therefore, be placed in hardware specially designed for this application.

"Finding the right balance between hardware and software to provide the phones with the required performance, without the power consumption becoming too high, is the major challenge in the development of third-generation phones," says Kjell Gustafsson, who is research and basic technology manager for WCDMA terminals at Ericsson Mobile

Communications in Lund, Sweden. "We have come so far as to be certain that it is possible. Now it is just a case of doing it well.

Another challenge is the analog technology. The radio signals that carry the information between the phone and the base station must be clean and this requires electronics with good linear properties. The power consumption once again sets the limits.

"Designing a linear transmitter is really no great problem," says Kjell Gustafsson. "The difficulty lies in maintaining power efficiency. If the efficiency is too low, the operating time becomes too short and the heat generation in the phone too high. So that our products are small and attractive, we have set extremely aggressive efficiency targets."

Niclas Henningsson

The Edge revolution

Edge technology means that GSM and TDMA operators will be able to offer wideband services within the existing frequency spectrum. During the second half of 2001, Ericsson will release its first mobile phone that supports Edge.

The Edge phones are a complement to WCDMA phones and have primarily been developed to handle high transfer rates for packet data. The first Edge terminals will be small and have a large display for down-link applications such as reading e-mail and surfing on the Internet.

Faster terminals

"Edge transfer rates will far exceed those of today's cellular systems," according to Robert Vass at Ericsson Mobile Communications' strategic product management in Lund, Sweden.

"In the long term, the terminals will be able to handle 384 kilobits per second, but it is important not to focus exclusively on data speeds and to concentrate instead on the types of services the customer wants to have, when greater bandwidth is available in the system.

Coordinated work

Ericsson's development units for GSM and TDMA phones, located in Lund, Sweden, and Research Triangle Park, North Carolina, U.S., respectively, are coordinating tasks such as the work on the algorithms used for the Edge technology's 8 PSK modulation. The platforms for Ericsson's Edge telephones were developed separately, however, for the two systems.

ASICs (Application-Specific Integrated Circuits) for the phone will be different, of course, since all GSM phones are using 200-kilohertz channels, whereas the comparable TDMA phones are using 30-kilohertz channels for voice and 200 kilohertz for Edge data traffic.

Handles all frequencies

It is technically possible to make dual-mode Edge phones, which can handle all frequency bands for GSM and TDMA. The question is whether potential market needs motivate such development.

"Trends indicate more of a need for dual mode phones that can handle WCDMA/Edge," says Robert Vass.

"The important factor for the customer is to have a phone that can handle wideband services – technology used for the air interface is not of interest to them."

Nils Sundström
nils.sundstrom@lme.ericsson.se

DEVELOPMENT OF WCDMA TERMINALS

The development of Ericsson's terminals for the WCDMA standard is being managed from Lund in Sweden and the newly formed strategic products unit Universal Mobile Telephone Systems (UMTS) within the Consumer Products business

segment. In addition to Lund, the product unit has operations in Tokyo and at Research Triangle Park in Raleigh, in the U.S.

The unit is driving UMTS standardization work and is responsible for the specification and development

of WCDMA-based phones. A third task is the study of market requirements for UMTS.

The unit coordinates its operations with WCDMA systems, as well as with the GSM business unit in the case of terminals.

The coordination of sales regions for UMTS and business contacts with operators regarding needs for WCDMA terminals is carried out via the Japan and Satellite Standards business unit within the Consumer Products business segment.

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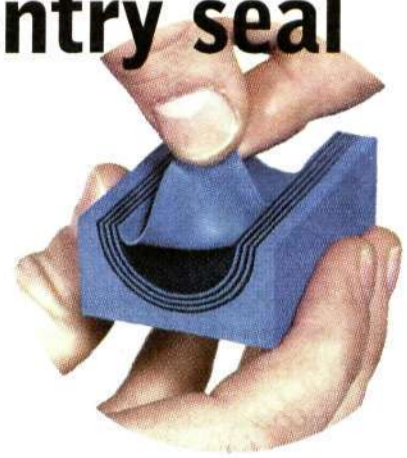
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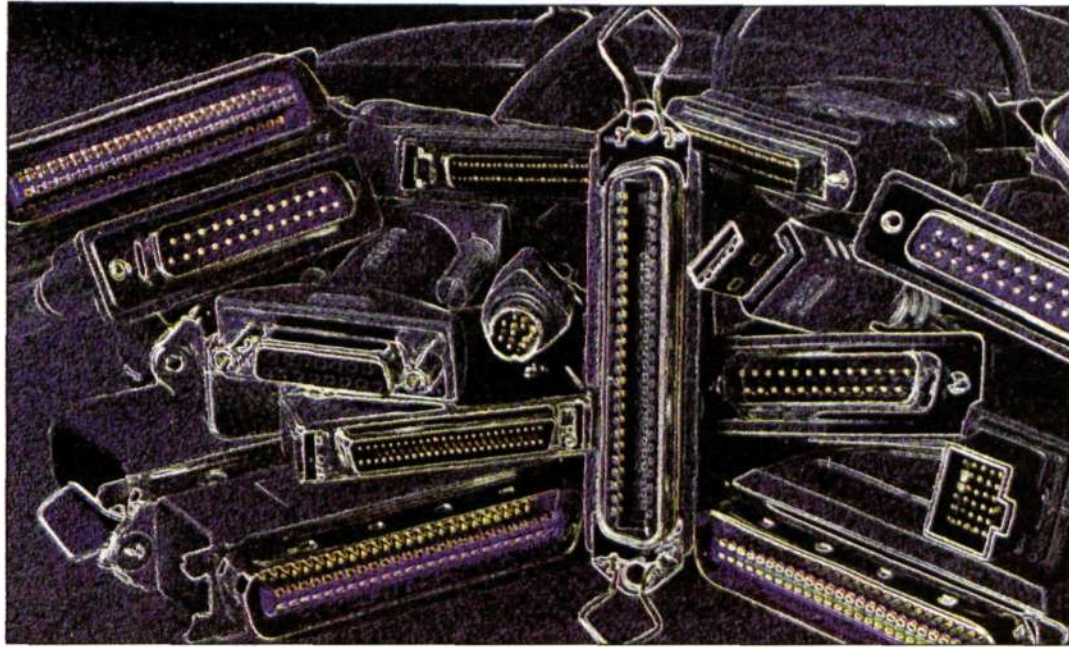
One year after its official launch, Bluetooth is the focus of intensive activity. Over 600 companies have joined the cooperative venture and the first Bluetooth applications have already been unveiled.

The first commercially available products are expected by the end of this year.

The Bluetooth concept was born at Ericsson Mobile Communications in Lund. It was there, back in 1994, that work began on developing a technology that would allow simple, inexpensive radio communication between mobile phones and their accessories. With radio technology, it would be possible to eliminate the growing thicket of cables connecting telephones, modems, hands-free sets and other equipment.

Four companies invited

Although the project was successful, in order to take full advantage of the technology's capabilities, four other telecom and data companies, Nokia, Intel, Toshiba and IBM, were invited in 1997 to participate in further development work. With the combined strength of several equipment manufactur-



Bluetooth makes it possible to eliminate the growing thicket of cables connecting telephones, modems, hands-free sets and other equipment.

Photo: Lars Åström

ers, the technology would have a significant impact.

A year ago, in May 1998, the Bluetooth venture was publicly launched. The project—named after the Viking King Harald Bluetooth who achieved peace in Denmark—alludes to how this new technology has put data and telecom on equal footings and brought competitors such as

IBM and Toshiba and Ericsson and Nokia together in cooperation.

600 new players

Today, intensive activity surrounds Bluetooth. In addition to the five initial partners, another 600 businesses have joined the cooperative venture.

These new companies are al-

lowed to freely manufacture products based on Bluetooth technology in exchange for sharing competing patents in a patent pool.

Several operational Bluetooth applications have been presented and the first commercial products are expected by the end of the year.

Niclas Henningsson

Frequency hops prevent collisions

Bluetooth replaces cables. All sorts of cables. It's capable of supporting 80 different Bluetooth units within the same environment. The use of rapid frequency hops according to a unique, predetermined schedule, eliminates the risk of interference between different links.

The idea behind Bluetooth technology is that it should be small and inexpensive. Currently, the system consists of three microchips which take up about as much space as a medium-sized coin. The goal is to create a significantly smaller single-microchip solution that only costs five dollars and can be easily and inexpensively built into mobile telephones, computers and other electronic equipment.

Bluetooth communicates on the 2.4 GHz bandwidth. That portion of the radio spectrum is unregulated and was chosen so that the technology could be used anywhere in the world, without the need for a license from regulatory bodies. All Bluetooth equipment is standardized and should be capable of operating anywhere.

Bluetooth also offers high-speed communications. With speeds of almost 1 megabit per second, Bluetooth is over 25 times faster than an ordinary computer modem. It has two different communication ranges, 10 or 100 meters.

In the simplest of applications, two Bluetooth-equipped units are able to communicate with each other, a mobile phone and a headset for example. It is also possible, however, for several units to communicate with each other within cells.

In such applications, one Bluetooth unit operates as a master node, with up to seven subordinate or slave nodes. It's possible for the same Bluetooth unit to be both a master and a slave. The role is determined by the current application.

Within a given range, there can be up to ten different cells, each with one master and seven slaves.

Interference among the 80 different units is avoided through the use of frequency hopping where communication between master and slave hops between frequencies according to a predetermined schedule, unique to each master. The frequency changes 1,600 times per second among a total of 79 different frequencies.



Johan Åkesson with the three Bluetooth microchips. In the future, the technology will fit on a single chip.

With the use of frequency hopping, the risk of signal collisions is reduced to a minimum. Coping with the risk of collisions allows

several Bluetooth applications to operate simultaneously.

Niclas Henningsson



The first generation of Bluetooth products consists primarily of plug-in units connected to telephones or computers.

Cordless options abound

The first generation of Bluetooth products is expected out by the end of the year. Ericsson is launching plug-in units for mobile phones along with a wireless modem and a headset. The next generation of phones, computers and a whole host of other electronic products will have the technology built-in.

The first generation of Bluetooth products consist mainly of so-called plug-in units connected to telephones or computers. One example is the wireless headset that Ericsson showed off at the CeBIT trade show. With a Bluetooth connection between the headset and a unit connected to a mobile phone, a cord is no longer needed.

Ericsson is launching the telephone plug-in and a wireless headset along with a Bluetooth modem at the end of 1999.

Will replace everything

Applications in other areas can be expected in the future.

"In the second generation, we'll see Bluetooth technology built into numerous different electronic devices," says Johan Åkesson, Technology Marketing Manager at Ericsson Mobile in Lund. "It will be found in computers, palm tops, telephones and other devices."

"It's important to not just limit one's view of Bluetooth to merely mobile phone technology," continues Johan Åkesson. "Bluetooth will replace cables—in many different contexts. The mobile phone industry has, of course, gone the farthest in terms of this new technology, but we can expect many other applications. Imagination is the only limit."

"One example is the automotive industry which is extremely interested in this technology. Modern cars have lots of cables in them which could be replaced with Bluetooth communications."

For both home and industry

Johan Åkesson cites several examples of future Bluetooth applications. The technology could be used in homes to remotely control electronics, as well as in industry, where various kinds of sensors communicate with a central node.

"With Bluetooth on a smart card, it would no longer be necessary to run an ID card through an electronic door lock or to take out one's keys when getting into your car. A Bluetooth unit on the card would send out a tiny, unique signal—the door lock and a sensor in the car would know that you are you."

Niclas Henningsson

Mikael Edholm has the world as his work place. He often visits many parts of the world in the space of a few weeks. With 25 days of travel a month, he goes around the world collecting information and analyzing future business opportunities for Ericsson. He is worried that Ericsson is working at too slow a pace.

Contact Technology met Mikael one Thursday morning in Stockholm, where he works intensively for three days about every sixth week. He is tired after arriving from New York the same day. He never has the time to adapt to different time zones, so he is constantly jetlagged. On this particular day, he woke-up at 2.30 a.m., so we start the day with a cup of coffee.

Mikael lives in San Francisco, but is never home for more than five days each month. In Ericsson's new organization, he works within Torbjörn Nilsson's area, Marketing and Strategic Business Planning.

"If you work in the communications business, California is where it all happens. Every year, approximately 1,800 companies are started. It's an exceptional part of the world. Not all the companies survive, but the ideas remain."

Part of Mikael's work is to study why certain companies survive and why others do not, and also to define the success factors.

Mikael is a popular speaker both at Ericsson's own functions and at other conferences.

Debate about free software

When Contact meets Mikael, he has just been at a debate in New York on "Open Source," in other words, free software. It's in the process of changing conditions for the whole industry. Prior to that, he had been at an Ericsson meeting with personnel in Toronto, Canada, and before that, at a retailers' meeting in Australia and a customer conference in Brazil.

If you want to book a meeting with Mikael you have to do it well in advance. He tries to keep up with writing analyses and articles for Ericsson, but most of his time is spent on business commitments – speaking at conferences, attending a management course or Business Intelligence network seminars, for example.

He gave up the idea of regular working hours and a stationary office a long time ago.

"I work when I am awake. Most of my reading is done on my trips. I have also learned not to keep all that much paper, everything I need should fit into my bag."

He receives approximately 50 e-mails per day. He has set his e-mail software so that it blocks all the cc-copies. "They are all unnecessary," says Mikael.

A connection is the only thing he needs

He doesn't stay longer than two days in any one place. As long as there is the possibility of connecting up his computer, he can work anywhere.

Mikael Edholm has qualifications in economics from both the U.K. and Sweden, but has not always worked for technology companies. He has been at Ericsson since 1995. Previously, he worked for such companies as ABB, Hewlett-Packard, 3Com and Rockwell.

A few years ago, Mikael was involved in an analysis the company carried out for Ericsson 2005.

"Scenario planning is an important part of the analysis work. Ericsson 2005 has attracted a lot of attention. Many companies would like to know how Ericsson has come up with such visions. Now part of my work is to follow up the 2005 project.



On the hunt for success



Photo: Peter Nordahl

It has progressed a lot quicker than we expected, but I think we are on the right track."

Studying other industries is a good way of creating a picture of how the future is going to be. Michael mentions the data sector which went through a major transformation a few years before the telecom sector. Now that the sectors are at their height of their convergence process, there is a lot to learn from others' mistakes.

Telecom industry a lot like airline industry

Another interesting sector is the airline industry. There are more similarities with telecom than we had first thought. For a long time the airline companies had monopolies in their own countries and they were often state-owned. Now the whole industry is being deregulated and conditions are changing. It is highly reminiscent of what telecom operators are experiencing right now.

Today's business climate is a lot faster than it was just a few years ago. And there is nothing to indicate that it's not going to become even faster.

"A new product or service has a life-cycle of 18 months. It is important to be there from the start. The manufacturer that is first on the track has a big advantage. If you emerge a couple of months later, it's difficult to win market shares irrespective of how good your product is. This is where I think Ericsson has a lot to learn. The company has to become a lot quicker. There can be no wait and see, otherwise the opportunity disappears."

Patrik Lindén

patrik.linden@lme.ericsson.se

“Ericsson has to be a lot quicker. There can be no wait and see, otherwise the opportunity disappears.”