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MOBILE DATA MAGAZINE

2

NO.2 2003.

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PASSENGER AND TRAFFIC INFORMATION TRAVEL IS FASTER WITH MOBITEX

p.10

INCREASED EFFICIENCY FOR TAXI OWNERS P.7

REAL TRAFFIC FINDS THE FASTEST ROUTE P.14

TRACKING SCHOOL BUSES P.16

TOMORROW'S TRANSPORT SOLUTIONS TODAY P.18

LESS EXPENSIVE MODEMS AHEAD P.22

NEW MOBITEX BASE STATION P.23

BLUETOOTH EXTENDS RANGE AND CHOICE P.24

5

**INTERVIEW:
CONNEXION, NL**

Facility manager John van der Zwan at the Connexion Taxi Service in the Netherlands explains in this interview why Mobitex has become an indispensable communications link in his company's operations.

6

BUSINESS NEWS

- Looking at the Dutch taxi market
- Sears extends wireless reach
- Secure transport for Swedish Prison Service
- Benelux market integrated
- Advances in UK parking



22

MARKET NEWS

- CML unveils new super-chip
- New Mobitex base station
- Airpack ready for take-off
- Bluetooth Adapter extends range
- BlueTex: Versatility in wireless
- New middleware from Ericsson

**WIRELESS
DATA IN PUBLIC
TRANSPORT****10 TRAVEL IS FASTER
WITH MOBITEX**

Three new applications on three continents show that Mobitex is opening new markets and helping to make travel faster and more convenient. As the theme articles in this section show, there are several viable business models for successful transport applications ranging from a completely outsourced service operating over a public network to a small, privately owned network.

**12 SKÅNETRAFIKEN:
IS MY BUS ON TIME?**

In Sweden's southernmost county, Skanetrafiiken is implementing a Mobitex-based system for vehicle location and passenger information that will help to keep buses running on time and provide real-time information to passengers on departure times and possible delays.

**14 KOREA:
REAL TRAFFIC FINDS
THE FASTEST ROUTE**

An innovative system for traffic information being deployed by Mobitex operator Real Telecom will contribute substantially to reducing traffic jams in the congested capital city of Seoul. The system gathers real-time traffic information from probe vehicles over the Mobitex network and then uses the operator's paging network to broadcast data about traffic flows to a vehicle navigation system that can compute the fastest route given current traffic conditions.

**16 DISCRETE WIRELESS:
KEEPING TRACK OF
SCHOOLCHILDREN**

Operating a fleet of school buses poses many challenges, not least of which is to keep track of schoolchildren who may miss the bus or get off at the wrong stop. In the US, many county school authorities are finding that a service offered by Discrete Wireless not only helps them keep track of students, but saves significant sums of money while improving fleet efficiency.

18

TECHNOLOGY: TOMORROW'S TRANSPORT SOLUTIONS TODAY

Research shows that many journeys are not made by public transport due to a lack of information. Passengers hate delays, and an automatic vehicle location and real-time passenger information (AVL/RTPI) can give them the information they need to plan their journeys. Far from simply being a convenience for passengers, however, these systems result in measurable benefits that no public transit authority can afford to ignore.



26

OUTLOOK: DESIGNED TO BE ROBUST

Few people have failed to notice that Bluetooth is now achieving its commercial breakthrough. To find out what is happening, Mobile Data Magazine visited Ericsson Technology Licensing, the company that licenses the technology that Ericsson invented and talked to marketing director Johan Åkesson, who reveals that a new Bluetooth product is being qualified almost every day and that Bluetooth-compatible devices are selling in millions of units.

28

WANDA WAVE

While planning a romantic sejour, Wanda finds that you can't get there from here.

**LINKS****Ericsson AB**

Lindholmspiren 11, S-417 56 Gothenburg, Sweden
phone: +46-31-747 0000, fax: +46-31-7476033

Mobitex information:

www.ericsson.com/mobitex, www.mobitex.org

Mobitex e-mail addresses at Ericsson:

Marketing and sales mobitex.info@ericsson.com

Customer support mobitex.tac@ericsson.com

Mobitex training center mobitex.training@ericsson.com

Ericsson links:

Ericsson www.ericsson.com

Ericsson Mobitex www.ericsson.com/mobitex

Mobitex operators featured in this issue:

ADT Wireless, Australia: www.adtwireless.com.au

Cingular Wireless, US: www.cingular.com

Movic, Sweden: www.movic.se

Multicom Security, Sweden: www.multicomsecurity.se

Real Telecom, Korea: www.realtelecom.co.kr

RAM Mobile Data, Netherlands: www.ram.nl

Transcomm, UK: www.transcomm.uk.com

Companies and organizations featured in this issue:

CML Microcircuits, UK: www.cmlmicro.com

Connexion, Netherlands: www.connexion.nl

Discrete Wireless, US: www.discretewireless.com

Ericsson Technology Licensing, Sweden:

www.ericsson.com/bluetooth

INEO, France: www.ineo.com

Mobitex Operators Association: www.mobitex.org

Int. Association of Public Transport (UITP), Belgium:

www.uitp.com

Schlumberger, US: www.slb.com

Taxitronic, Spain: www.taxitronic.com

Volvo Mobility Systems, Sweden: www.volvo.com/group

Hogia, Sweden: www.hogia.se

Thoreb, Sweden: www.thoreb.se

WSI, Sweden: www.wsi.nu

CNI: www.cni.co.kr

Itronix, US: www.ltronix.com

Wireless Matrix, US: www.intersatcorp.com

Bluetooth SIG: www.bluetooth.com

SMOOTHING THE RIDE WITH MOBITEX



Public transport is vital to society and for preserving the environment. Providing communications solutions for public transport that contribute to sustainable development and improve the quality of life are part of Ericsson's corporate culture. We are therefore pleased to present in this issue Mobitex solutions that are setting the standard for increasing efficiency and improving service in public transport.

Our three feature articles describe new wireless transport solutions from three continents. In the US, Discrete Wireless is using Mobitex to help school authorities to minimize costs for transportation services while increasing safety and providing greater peace of mind for children and their parents.

In Sweden, Mowic won a fiercely contested tender and is now deploying a Mobitex application for the municipal transit authority's public buses. In Sweden's southernmost county, Skånetrafiken is beginning deployment of a real-time passenger information (RTPI) system that will increase efficiency for transport operators and improve service for the county transit authority's customers. RTPI systems are also the focus for our Technology section in this issue.

Korean Mobitex operator Real Telecom has developed an innovative system to provide traffic information for motorists. In addition to using Mobitex to gather traffic information, Real Telecom is using its existing paging network as a data broadcast medium for motorists who subscribe to the service. By using existing technology in new ways, Real Telecom is creating synergies that will result in profitable growth.

One of the most important developments is described in our Market News section. As announced here for the first time, CML Microcircuits and Ericsson is working on a joint venture development project resulting in a new super chip and a reference design for Mobitex modems.

The new modem platform developed jointly by CML and Ericsson will send waves throughout the Mobitex community. This is enabling technology that will be available to all and which will significantly raise the standard for price and performance for Mobitex modems. CML's new super-chip and Ericsson's reference design will greatly simplify the modem developer's task and dramatically shorten time to market for new terminal products.

Another important product announcement in this issue is our own BRU1 base station. Designed as a campus base station, the new BRU1 enables spot coverage to be provided in areas where expanding coverage and capacity of the Mobitex network has not been economically viable previously.

Ericsson is once again hosting the annual Mobitex Conference in Gothenburg, Sweden on September 22 to 24. As usual, this promises to be an exciting conference with an agenda packed with product announcements and presentations of new solutions. Activity in Mobitex markets all over the world continues to increase, and Ericsson always welcomes an opportunity to meet friends and colleagues from the Mobitex community.

If you are not able to make it to the Mobitex Conference in Gothenburg, take heart! Distribution of this issue of Mobile Data Magazine is being timed to coincide with the conference so that we can provide a preview for our readers. You can also look forward to a full report from the conference in our next issue.

Anders Baaz

Anders Baaz

MDM NO.2 2003/POSTAL ADDRESS: Mobitex, Ericsson AB Lindholmospiren 11, SE-417 56 Gothenburg, Sweden, e-mail mobitex.info@ericsson.com, Internet www.ericsson.com/mobitex. **PUBLISHER:** Anders Baaz. **EDITOR:** Ingrid Wallgren, tel: +46 31 747 64 40, e-mail ingrid.wallgren@ericsson.com. **CONTRIBUTOR AND EDITORIAL CONSULTANTS:** Alan Sheats, Bugli Company AB Stockholm, Sweden, e-mail alan.sheats@bugli.se. **LAYOUT:** Peter Menke, Citat Media Production. **PRINTED BY:** Ofta Grafiska AB, Gothenburg, Sweden. **PRE PRESS & REPRINTS:** Citat Media Production AB, Gothenburg, Sweden, e-mail kicki.nordenstrom@citat.se. **MOBILE DATA MAGAZINE:** is published under Swedish press law by Mobitex, Ericsson AB in cooperation with The Bugli Company. The opinions expressed in Mobile Data Magazine are not necessarily those of Mobitex, Ericsson AB. Mobile Data Magazine is distributed to the international telecommunications community in more than 50 countries.

AN INDISPENSABLE LINK

connexion



Following an extensive evaluation of new networks, the Taxi Service division of transport company Connexxion decided to extend its Mobitex contract with RAM Mobile Data in June 2003. Proven reliability of the Mobitex network and satisfaction with RAM Mobile Data's service provisioning were decisive for Connexxion Taxi Services in signing a new three-year contract. The contract encompasses data communication between the Connexxion's central system and some 1,200 taxis.

In addition to operating various types of transport services for small numbers of passengers, such as collective demand-based taxi services and subsidized taxis for the elderly and disabled, Connexxion Taxi Service provides private, business and specialist taxi transport. Quality is of paramount importance in the services that Connexxion provides, and the RAM Mobile Data Mobitex network is a key factor in delivering quality.

"Mobitex has become the standard for our taxi division and we have had excellent experience with it for years," says John van der Zwan, facility manager at Connexxion. Data communication via the Mobitex network helps Connexxion Taxi Services to plan and execute the journeys efficiently. Demand-based collective taxi services and subsidized taxi services for the elderly and disabled are carried out on contract. The clients for these contracts, which are often publicly tendered, want detailed management information.

"Our central system sends all journey information and the planning for the drivers via the RAM Mobile Data Mobitex network to the vehicles and there is a continuous stream of business information from the taxis to our systems. Mobitex is an indispensable link in this," says John van der Zwan.

Although technology is advancing rapidly at the moment, Connexxion Taxi Services is cautious in making a transition to new systems.

"The data communication market is currently in flux. Just look at GPRS, UMTS and WiFi. No one knows what the market standard will be," observes Van der Zwan.

"Naturally we experiment with new technologies on a small scale, but if we had to invest in a new taxi system, we would have to convert a large number of taxis simultaneously, which would cost a substantial amount of money. Considering the lack of clarity with respect to standards and the high degree of satisfaction with our existing solution, we have decided to extend our Mobitex contract by three years. From experience we can say that Mobitex will be the most reliable network for our data communication in the coming years," says Van der Zwan.

VISION FOR THE FUTURE

Connexxion is not alone in this decision. As account managers Huib Leenknecht and Marinus Willemsen at RAM Mobile Data note, every taxi client whose contract has expired has chosen the Mobitex network again for the coming 3 to 5 years because of its reliability and avail-

ability. In addition to Connexxion, these include Taxi Blaakman/Taxicom, Hoek Vervoer, VZA, Taxi Zeevang, Personenvervoer Van Dijk, Omnitax/PZN and RVU. Prior to extending their contracts, some of these taxi companies evaluated new technology, particularly GPRS. RAM Mobile Data also offers GPRS via a number of network operators in the Netherlands. Nonetheless, none of these taxi companies were sufficiently confident about GPRS and were of the opinion that the Mobitex network is outstanding in satisfying the requirements that the taxi world imposes on mobile data communication.

The Connexxion contract also confirms that the use of GPS and route navigation has become generally accepted at taxi companies. In addition, taxi operators are increasingly offering the ability to pay in the vehicle using an electronic customer card. Mobile data communication via the Mobitex network is used in all these applications. In recent years RAM has built up a network of software partners, including suppliers such as BS Automatisering, Tamis, Censys, Ortec/Taxion, Hoffice and Cabman2 to support these solutions. In addition RAM Mobile Data works closely together with suppliers of in-vehicle hardware, including Taxitronic, Quipnet and Next.

"For years RAM Mobile Data has focused fully on the business market and for this reason it has the edge in advising clients about reliable migration to new technology", says Van der Zwan, adding that this is why Connexxion actively involves RAM Mobile Data in the introduction of communication systems for all its divisions, not just at Connexxion Taxi Services.

"My ideal is actually to integrate as many systems as possible on one mobile platform that works in small, large, thick and thin vehicles. RAM Mobile Data keeps close track of all mobile developments and collaborates with various operators to be able to offer its clients the latest technology on time. We therefore see RAM as an important partner for the future," concludes John van der Zwan. ■

MOBILE BUSINESS NEWS

Working with its business partner Schlumberger e-City, a business segment of Schlumberger Limited, UK Mobitex operator Transcomm has significantly strengthened its position in the UK parking market. Together they have in recent months received orders from Plymouth City Council, the City of Salford, the London Borough of Bromley and Milton Keynes Council in England and the City of Edinburgh in Scotland.

In Milton Keynes, parking operator, Vinci Park, has also provided terminals to Xscape, the town's privately operated leisure complex. By opting for the same

ADVANCES IN UK PARKING

type of machines as used by Milton Keynes Council (MKC) in the town center, Vinci Park has been able to supply the Xscape's owners with an efficient and cost-effective parking control system with which local drivers are very familiar.

At the same time Vinci Park is centralizing control of its 272 Schlumberger DG Series and Stelio Pay & Display (P&D) terminals installed for MKC in phases over the last 12 years. The centralization system will link the Council's P&D terminals via the Transcomm network to a PC in the Parking Shop that Vinci operates in the center of Milton Keynes.

"With another 100 terminals being added this year, we felt that it was no longer an option for maintenance to be managed on an ad hoc basis. The system generates considerable revenues and the Council has laid down



In the UK, more and more conventional parking machines are being replaced with units that use Mobitex for centralized monitoring and control.

very strict conditions on the level of machine downtimes that it will tolerate, so effective maintenance is very important to us," says Philip Young, senior contracts manager at Vinci Park.

Vinci Park also operates parking services in the London Borough of Bromley (LBoB), where operational and financial data from the new parking terminals will be monitored in the Council's own offices. The Council opted for terminals from Schlumberger operating on the Mobitex network because they can be upgraded easily to handle payments via mobile phones, smart cards and credit cards.

"We knew that we had an antiquated system that just had to be replaced," says Gerald Broomfield, head of parking at LBoB. "We have never had a statistics package before, and the only means of monitoring parking revenues was manually by counting up tickets and cash. The new system will give us far greater information, with each machine's usage and revenue readily identifiable. This will greatly enhance planning, enabling us to review tariffs on a street-by-street basis, for example. It will be an invaluable tool in our plans to improve the efficiency of management of the parking space in Bromley." ■

MOBILE BASE STATION EXTENDS SEARS' WIRELESS REACH

The Product Repair division of Sears, Roebuck & Co., one of the pioneers in the US Mobitex market, recently enhanced the wireless application used on its 10,000 repair trucks with the Wireless Base Station developed by Wireless Matrix Corporation in Calgary, Canada. The Mobile Base Station contains a wireless LAN, Mobitex terrestrial packet data and satellite system in a package that is just 11 in. wide by 6.7 in. high. With the Wireless Base Station, Sears repair technicians can connect to Mobitex, satellite and wireless LAN

networks, thus guaranteeing 100 percent nationwide coverage that allows them to exchange data with backend systems from any customer location.

Sears has been using a combination of Mobitex and satellite systems in its repair trucks for many years and was one of Cingular Wireless' first major customers for this type of wireless field service application. With the vehicle-mounted Wireless Base Station from Wireless Matrix, repair technicians can take their laptops with them from the van to the customer's



premises while maintaining a connection with the Wireless Base Station, which provides wide-area connectivity via Mobitex or satellite. The laptop itself is a ruggedized touch-screen model from Itronix.

Each laptop comes packed with a library of product repair information that includes more than 90,000 illustrations and schematics of every product that Sears sells and services, from washers to lawn tractors. The product library also contains a list of 4.5 million parts that might be needed to make repairs, as well as

an inventory of the 2,500 parts carried on every truck. The laptops also have built-in 802.11b WLAN modems, that communicate with the Mobile Base Station which then selects a Mobitex or satellite connections as appropriate for wide-area communications. Service technicians no longer need to leave a customer site to order a part not found in the database. They can place the order with a supplier, with the WLAN serving as the link to the Mobile Base Station, Sankey says.

Beta testers who have used the system for more than 18 months report that they save invaluable time locating parts because they can communicate directly from the job site, rather than having to walk back to the truck. Being able to order online from the customer site also eliminates the common mistake of ordering the right part but in the wrong color. ■

LOOKING AT THE DUTCH TAXI MARKET



As the completely dominant player in the Dutch taxi market, RAM Mobile Data is not standing still. In June, the Dutch operator extended a framework agreement with Connexion Holding NV to continue providing service over its Mobitex network for some 1,200 taxis over the next three years. With nearly 150 taxi operators among its customers, RAM Mobile Data's GPS and Mobitex solution sets the standard for the industry, and the operator continued to enhance its services to increase efficiency for taxi owners and service for passengers.

"In 2002, just as in 2001, we were able to add more than 1,000 new subscriptions. That included both new customers, such as Taxi Korthout in Amsterdam, as well as new connections for existing customers. Our experience is that increasing investment in mobile data brings even greater returns," says Huib Leenknecht and Marinus Willemssen, account managers at RAM Mobile Data.

One of the reasons for the steady growth on the number of subscribers is the subsidization of taxi travel for persons with disability in which central organiza-

tions impose strict requirements on exact figures for taxi travel with respect to distance traveled and the duration of each ride. In these respects, the Mobitex solution is invaluable, particularly for small taxi operators with five to 15 vehicles. These small operators can compete with larger companies not only in providing the data required for compensation, but also because they can be easily connected to centralized dispatching systems.

Fraud is another important consideration in the selection of a Mobitex solution. Rides off the meter for which the driver pockets the money paid by the passenger cost taxi companies substantial sums. With an onboard computer that records the exact route, the number of kilometers driven and the times during which the meter is running, this type of fraud can be completely eliminated.

The taxi solutions offered by RAM were created together with business partners Taxitronic, Quipment and Next, which supply equipment for the vehicle. Thus far, most RAM customers choose equipment from Taxitronic. In addition, the Dutch Mobitex

operator works with software partners to provide two solutions for one-way communication (polling of vehicle locations) and two-way communication for dispatching of vehicles. Dispatching is the more common solution, although some operators choose a polling solution for school buses.

Return on investment from wireless data communications is high in the taxi industry. "The efficiency gained in route planning alone is often worth the investment," notes Huib Leenknecht. "In the traditional scenario with voice

The Dutch Mobitex network currently serves more than 5,500 taxis throughout the country and some 150 taxi operators. The GPS and Mobitex-based solution that RAM Mobile Data offers allows even small operators to make more efficient use of their fleets while improving service for passengers. By leveling the playing field in this manner, RAM Mobile Data has gained a formidable advantage that has allowed it to become the completely dominant market player. ■



communications, the dispatcher's job is very hectic. With the introduction of mobile data communications, dispatchers have a better overview and their work becomes much less stressful. The improvement in planning results in a higher degree of utilization of the taxi fleet. Communication with the taxis is also reduced, since each dispatch order is displayed on a screen that is more comprehensible and less prone to errors than voice communications."

Mobitex makes even small taxi operators competitive in the Dutch market.

SECURE TRANSPORT FOR SWEDISH PRISON SERVICE



The Swedish Prison and Probation Service recently selected a Mobitex solution for its transportation service. The new solution will be supplied by Multicom Security AB, which recently acquired the first-generation Swedish Mobitex network providing coverage of more than 90 percent of the country's land area and also operates a nationwide alarm network.

The Swedish Prison and Probation Service's transport service is an important part of the prison authority's total operations. Each

year, some 40,000 persons are transported within the country, while nearly 2,500 transports are effected to countries outside Sweden. The service operates as an independent entity with 24 offices from Malmö in the south to Luleå in the north of Sweden and some 50 vehicles.

The transport service is not only responsible for transports to, from and between correction facilities, but also a large number of transports on behalf of other public agencies. Although police

authorities are responsible for carrying out deportation orders, for example, the Prison and Probation Service normally handles transports. A similar division of responsibilities exists in transports carried out in accordance with laws governing treatment of substance abusers, compulsory psychiatric care and other instances in which secure transport is essential.

The solution being deployed by Multicom provides both positioning and alarm functions for the transport service's vehicles. Initially some 50 of the transport service's own vehicles will be equipped.

"For the Swedish Prison and Probation Service, it is extremely important that alarms from vehicles are forward to the proper instance at the right time and contain accurate information. With the solution being supplied by Multicom Security AB, we will have both a reliable alarm system and the ability to use position data to plan transports in a

cost-effective manner," says Göran Stenbeck at the transport service.

"The contract with the Swedish Prison and Probation Service is one of the first in which we are combining Mobitex with GSM/GPRS to deliver a total communication solution for the customer. With this combination, Multicom's solution provides geographic coverage of more than 90 percent of the country and achieves a very high level of operational reliability, in part because the entire Mobitex network is equipped with reserve power for every base station," says Måns Forsberg, president of Multicom Security AB, adding that he regards the delivery of this solution to the Swedish Prison and Probation Service as confirmation of the company's focus on the requirements of professional users for secure and reliable communications. ■



The International Public Transport Association, known internationally by its French abbreviation UITP (Union Internationale des Transports Publics), will be holding a conference in Gothenburg, Sweden on September 17 to 19, 2003 entitled Making technology work for travelers' information. The UITP could not

have chosen a more appropriate location than Gothenburg, which is the home of Mobitex and whose residents are served by a Mobitex-driven real-time passenger information (RTPI) system that is truly state-of-the-art.

Founded in 1885, UITP is the world-wide association of urban and regional passenger

transport operators, their authorities and suppliers. Headquarters are located in Brussels, and there are over 2,000 members from nearly 80 countries. The UITP seeks to promote a better understanding of the potential of public transport by providing information, research and analysis on all aspects of public transport, including infrastructure, rolling stock, organisation and management.

The conference in Gothenburg is the third on this subject that the UITP has organized and the first in which Ericsson will participate as a member. Speakers will include Krister Nordland from Skånetrafiken, whose company is implementing the RTPI system featured in this issue of Mobile Data Magazine. As noted in the conference pro-

gram, research has shown that travelers expect more information and start considering alternative ways to complete their journey when unexpected waiting times are longer than three minutes. New technology makes it easier to answer the increasing demand for information. In the last decade, there have been major developments in information and in the media that can be used for providing information to the travelers. Information can now be provided in real-time, at every moment of the journey.

Ericsson will also participate in an exhibition being held in parallel with the conference where Mobitex solutions for public transport will be presented. ■



BENELUX MARKET INTEGRATED

In May, RAM Mobile Data (Netherlands) BV acquired the Mobitex network of the Belgian company BASE NV, a subsidiary of RAM's former owner KPN Mobile NV. Thereby RAM Mobile Data Netherlands becomes the sole owner and operator of the Mobitex networks in Belgium, the Netherlands and Luxembourg (Benelux). A new company, RAM Mobile Data (Belgium) NV, was established to manage operations in Belgium and Luxembourg. The new company will operate from RAM Belgium's current office in Zaventem with Francis Minnebo as Country Manager.

Customers will notice few differences apart from improved service and a stronger operator with greater resources. The Mobitex networks in Belgium,

Luxemburg and the Netherlands have always been integrated, even when BASE was the owner. During this period, RAM Mobile Data Netherlands and the former Belgian owner closed a service contract for the maintenance of the Mobitex network in Belgium and Luxembourg. RAM Mobile Data will thus continue to offer customers the same excellent service that they have come to expect.

"Mobitex is a growing and profitable business in the Netherlands," say Dirk Fabels and Joachim Kaarsgaren, both managing directors of RAM Mobile Data. "Today we have approximately 900 customers in the Netherlands with more than 20.000 users. The Belgian market for business-critical mobile

data communication solutions has the potential to be just as successful as the Dutch. The management of RAM Mobile Data Netherlands therefore also sees excellent opportunities in the Belgian market. There is a growing demand for a safe and reliable network which can be used in vertical markets for business-critical applications such as field service, transport, security and telemetry."

The take-over is a logical development for both parties, since BASE and the KPN organization are focused on mass markets and horizontal solutions. RAM Mobile Data, on the other

"Although the Belgian market for mobile data communication has developed more slowly than other West European markets, the prospects are very good," continues Joachim Kaarsgaren. "The demand for mobile data solutions is growing in Belgium. We expect a growing number of users on the Mobitex networks in both Belgium and the Netherlands."

In the Netherlands, RAM Mobile Data has built a successful business despite considerable competition from GSM, GPRS and soon 3G operators. Part of this strategy has been based on providing professional services and application hosting, while reselling GPRS for those customers who require it.

"In Belgium, we will focus on Mobitex with a limited number of business partners," says Dirk Fabels. "Over time, professional services, hosting and GPRS will be added to the product range. The Belgian market can clearly benefit from our experience in the Netherlands.

"We expect to achieve significant synergies by using the knowledge and organizational infrastructure in both countries. With a subsidiary in the Belgian market, we will be able to provide full support to our existing customers in Belgium in the way that people have come to expect" concludes Joachim Kaarsgaren. ■



hand, intends to continue pursuing business opportunities in vertical markets with applications for professional users. As in the Netherlands, the focus will be on traditional Mobitex markets, such as transportation, taxi, field service, telemetry and public service.

**UPCOMING
MOBITEX CONFERENCE
IN GÖTEBORG 22-24 SEPT.**



TRAVEL IS FASTER WITH MOBITEX

Mobitex may not be able to transport people, but it can certainly help them to get where they are going faster and with greater convenience and safety. From relatively simple dispatching, vehicle location systems, and wireless ticketing to sophisticated real-time passenger information (RTPI), the applications for wireless data in public transport are numerous.

In addition to providing recent examples of how Mobitex is being used in public transport on three continents, the case studies that illustrate our theme, as well as the technology article on page 18, provide convincing proof of one crucial point. Wireless data plays a key role in applications in this sector by providing real-time communications with vehicles operating on the route network. This key functionality, however, requires a wireless data network that is absolutely reliable and available at all times, also at rush hours.

Many successful Mobitex applications in this sector are used in public transport services operated by municipal transit authorities or in taxi services operated by private companies. Examples of public transit services using Mobitex applications are described in this and previous issues of Mobile Data Magazine.

The basic functionality in most of these applications consists of automatic vehicle location (AVL) and computer-assisted dispatching (CAD), both of which use the Mobitex network to exchange data in real time between the central dispatching center and vehicles operating on the route network. Essential requirements for these functions are two-way data exchange so that vehicles can both send positioning information to the central dispatcher and receive dispatch orders. Mobitex can guarantee availability so that the network is always available for data exchanges and does not become overloaded at busy terminals, for example, where many vehicles may need to transmit data simultaneously.

In addition to these basic functions, wireless data can be used in a variety of other ways that enhance public transport services. In Korea, for example, Mobitex is used for a wireless ticketing system that allows passengers to purchase tickets and pay with a credit card at numerous locations throughout the capital city of Seoul. Pre-paid tickets are naturally an important factor in speeding up boarding times, thus increasing the efficiency of public transport services, while allowing drivers to focus their attention on traffic.

Wireless data provides the greatest benefits when it is used to drive real-time passenger information (RTPI) systems, which are described in a separate article. These systems not only provide real-time information to passengers on buses and trains but also on signs and monitors at major connection points and terminals. In these cases, a fixed wireless data installation is often a less expensive and more flexible alternative than a wireline data link.

Although the focus in this issue is on public transport, Mobitex can also enhance private transport in a number of ways. In Singapore, for example, public officials have realized that building more highways on the already congested island is not an optimal solution for traffic problems. Instead, a sophisticated wireless information system gathers data on traffic flows and displays information about best routes on roadside signs.

Mobitex is also widely used in parking facilities, particularly in combination with a

There are examples of Mobitex networks in the public transport sector that were built for a single application and a single transport company. Whether the network is publicly or privately owned, additional applications can be added over time to increase revenues or expand the services provided.

At a time when demands on public transport are increasing and resources are diminishing, introducing mobile data can create exceptional value. Highly reliable and always available, Mobitex solutions for public transport



wireless payment solution. In this application, which is used extensively in the UK, Sweden and the Benelux countries, the parking ticket machine is equipped with a wireless modem and a payment terminal. Because Mobitex offers two-way data communications, it is not only possible to collect information about the number of cars in the lot and the amount of cash in the machine. Parking rates can be changed centrally to adjust them for peak periods or special events when demand for parking is great. The vending machine can also be used to display tourist information that always includes the latest events.

Network ownership and operation is an important consideration in wireless data applications for public transport. Mobitex is a compelling choice even in this regard because it offers a wide range of alternatives. These can range from ownership and operation of a dedicated private network used by a single transit operator as in Paris or total outsourcing to a WASP (wireless application service provider) as with the Marcus application provided by Discrete Wireless for public school bus services in the US.

can be deployed on a dedicated private network or a public network to increase the efficiency of operations while significantly improving passenger service. These solutions are not only cost-effective with short pay-back times. They can be deployed incrementally over time without breaking the public transport company's budget. ■

“Additional applications can be added over time.”



IS MY BUS ON TIME?

Sweden's southernmost county Skåne, also known in English as Scania, is one of the country's most populous. With the completion in 2000 of the Öresund Link joining Skåne's capital Malmö with Copenhagen on the other side of Öresund, the region also became one of Sweden's most dynamic, with rapid growth and increased foreign investment. This growth and the closer ties with Denmark naturally increased demands on public transport.

As part of its efforts to improve public transport services, the county transit authority Skånetrafiken recently signed a contract with Swedish Mobitex operator Mowic for a new passenger information system. Skånetrafiken chose Mowic's Mobitex solution over several other offers.

Skånetrafiken is responsible for all public transport in Skåne and operates buses and trains serving the entire county and linking the region's four largest cities with each other and with Denmark via train services over the Öresund Link. Some 150,000 passengers travel with Skånetrafiken each day, and in 2001 a total of 86 million trips were made on the operator's buses and trains, which include city, regional and express buses and commuter and regional rail-lines.

As noted in the county transit authority's traffic service plan for the period from 2002 to 2003, traffic information is an important area for improvements and a prerequisite for ensuring that public transport is easily accessible and that passengers are satisfied. This applies to information both prior and during travel regarding schedules, delays and alternative routes. The information must be easily accessible, relevant and correct.

"Today, our passengers are not particularly satisfied with information regarding delays when problems occur in our bus and train services. By introducing automatic vehicle location and real-time information on buses over the next few years, Skånetrafiken intends to improve traffic information for its customers," says Krister Nordland, technical manager at Skånetrafiken.

MOWIC SUPPLIES A SOLUTION

The service that Mowic will supply to Skånetrafiken includes wireless data communication for sending and receiving messages and for positioning with GPS (Global Positioning System). The position of each bus is reported in real-time, thus allowing arrival times at stops further down the line to be estimated. This information is presented to passengers on displays at bus stops and on electronic signs on the buses, as well as directly to affected drivers. Drivers will also be able to receive messages from the traffic control center and be able to send messages themselves in cases of emergency, for example.

In the first phase, the Mobitex system will include city bus lines in Malmö and a regional bus route linking South Sandby and Staffanstorps with Lund, the region's second largest city and

home to its two largest universities, Lund University and Lund Institute of Technology. A total of 57 buses will be connected to the Mobitex system, which is expected to handle some 6.5 million messages per year.

WIRELESS DATA VITAL FOR REAL-TIME INFORMATION

As Skånetrafiken's system is expanded, the county transit authority also intends to present real-time traffic information on its website using an application called Is my bus on time? This application will be similar to an existing application called Is my train on time?

Real-time information for trains is already available through the National Rail Administration, which owns the tracks and is responsible for traffic control. The application on Skånetrafiken's website displays a route map for all train services with color-coded symbols showing the current position of each train and indicating whether it is on time, no more than 10 minutes late or more than 10 minutes late. More detailed information regarding delays and estimated arrival and departure times is available by clicking on train symbols and station names.

"A wireless data service meeting high demands on quality is a vital component in a real-time passenger information system," says Krister Nordland. "Special expertise is required for such a service. Skånetrafiken lacked such expertise and had not desire to

"When Skånetrafiken formulated the requirements for the tender, availability and reliability were key technical requirements."

GUARANTEES WANTED

When Skånetrafiken formulated the requirements specification in its request for tender, availability and reliability were key technical requirements. Simply put, the county transit authority wanted guarantees that the wireless network would always be available and that positioning data would be transmitted under all traffic conditions.

Although one of Sweden's GSM/GPRS operators eventually submitted a tender, customer requirements eliminated GPRS from the start. The GPRS operator, which is addressing a mass market with its services, simply could not guarantee that the network would always be available, even when many buses were transmitting from a single location, or that data would not be lost due to a dropped connection. "Because we target professional users, we always ask



acquire it or to master the challenges that mobile data communication would entail. In evaluating the tenders, Skånetrafiken concluded that the Mowic solution was the most economically advantageous alternative."

customers what level of service they require. Mowic's Mobitex solution provided the guarantees that the customer wanted and was also the most cost-effective solution," says Björn Sabel, marketing manager at Mowic AB. ■

REAL TRAFFIC FINDS THE FASTEST ROUTE



With a population of just over 10 million, the capital city Seoul is home to nearly one quarter of the South Korean population. In a city of this size, traffic is naturally a problem. Dozens of railway and motorway bridges cross the Han River linking the two halves of the city. Traffic on these bridges and the city's motorways never seems to stop, and at rush hours, a journey of just a few kilometers can easily take an hour or more.

Seoul motorists are naturally interested in reducing travel time and are eager to obtain real-time traffic information. In addition to the traffic reports provided by local radio and TV stations, there are fee-based services that provide more detailed information on the Internet. To date, however, this information has either been of poor accuracy or relatively expensive.

Mobitex operator Real Telecom (formerly Intec Telecom) is now entering this market with an innovative application and a well-conceived business model. The RealTraffic application uses the Mobitex network to gather traffic information and leverages the operator's existing paging network to broadcast this information to vehicles equipped with a special car navigation system (CNS) or a PDA.

CONTENT STILL KING

"Content is the key factor in a telematics application of this type," says Won Baek, president of Real Telecom. "While it is obviously a great strength that we can provide both the terminal, the network and the platform for the RealTraffic system, its value derives primarily from content."

For this reason, RealTelecom devoted considerable effort in planning data collection for the RealTraffic system to ensure that the company would own the content on which traffic information would be based. Data collection relies on probe vehicles equipped with a GPS (Global Positioning System) receiver and a Mobitex modem that continuously report their position over the Mobitex network.

This raw data, which is forwarded to RealTelecom's servers, is processed by sophisticated algorithms that use the position information and the corresponding time stamp to compute traffic flows on the city's road network. This information is then broadcast to motorists over the paging network and can also be sold to other content providers.

The RealTraffic system relies on police cars and taxis as probe vehicles. Both types of vehicles are spread out widely throughout the city, with the greatest concentration of vehicles tend-

ing to be in areas where traffic congestion is also greatest. The first tests used 100 vehicles equipped with Mobitex and GPS and were conducted in 2002 in cooperation with the Seoul Metropolitan Police Agency (SMPA). Following this test, in which several other wireless technologies were also evaluated, the SMPA decided to adopt Mobitex as its main network for GPS-based traffic data collection and to sign a contract with RealTelecom. Some 1,800 vehicles have been equipped to date, with the number expected to increase to 20,000 next year.

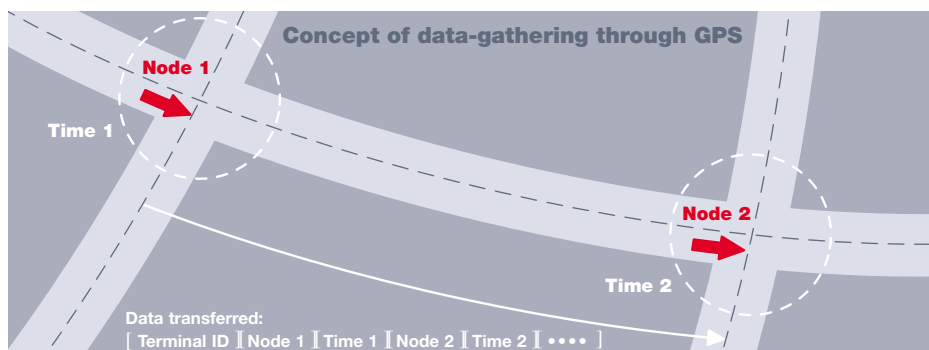
In March of this year, RealTelecom also signed a contract with Korea's largest taxi operator, which is currently installing the Mobitex and GPS equipment in some 3,500 taxis serving Seoul area and plans to expand this coverage to about 10,000 vehicles next year.

"This is a win-win situation for both parties, since the taxi company is able to use the Mobitex network for its own dispatching and payment applications, while we are able to use the taxis as probe vehicles," notes Won Baek.

FASTEST ROUTE CALCULATED IN REAL TIME

Gathering data is one aspect of the RealTraffic system. The other is delivery of real-time traffic information over the operator's existing paging network. Broadcasting over a paging network is an ideal method for distributing continuously varying data, and this solution also keeps revenue-generating traffic on RealTelecom's paging network, which has naturally lost subscribers to other wireless networks.

The data gathered via the Mobitex network is linked to nodes representing major intersections on the computerized map of the city's road network. The algorithms that process this data generate numbers representing the average speed of vehicles entering and leaving each node.



Servers at the data center collect the uploaded data and transform it into the content required for the traffic information by applying many sophisticated algorithms to filter and sort the data points.

"Special algorithms can be applied locally in the vehicle to determine the fastest route between two points."

A specially designed car navigation system (CNS) or a PDA in the vehicle is equipped with a paging receiver and proprietary software that interprets the data broadcasts. This information is then displayed on a map in the vehicle. One of the greatest strengths of this solution is that special algorithms can be applied locally in the vehicle to determine the fastest route between two points.

TELEMATICS NEW GROWTH MARKET

"The potential market is naturally enormous," observes Won Baek. "Initial interest in the RealTraffic service has exceeded our expectations."

Telematics is highly prioritized among both car designers and car buyers, and the technically advanced South Korean market is no exception. Increasing numbers of new cars are being delivered with CNS and other telematics devices, and several independent studies indicate that as many as 50 percent of all new vehicles will be delivered with some form of telematic navigation device within five years.

To address this growing market, Real Telecom is negotiating with Korean car manufacturers to offer its CNS terminal as an option for new vehicles. Now that the RealTraffic system has been tested and is fully operational, Real Telecom is ready to execute this next phase of its business plan and to leverage the next wave of growth in wireless telematics. ■

CHILDREN DON'T THINK LIKE MOTHERS

How will a child's parents react when the school bus passes their home and their daughter is not on it? Does the bus driver notice that she got off at the wrong stop? These and many related concerns are being addressed by a Mobitex application hosted by Discrete Wireless and offered as a service to county schools.

Discrete Wireless, based in Atlanta, Georgia in the US, is a wireless application service provider (WASP) that runs its flagship product, the Marcus Fleet Management Solution, over the nationwide Mobitex network operated by Cingular Wireless. The Marcus Fleet Management Solution won the Cingular Best Solution award in 2002 for the most innovative use of the Mobitex network by a commercially available solution.

With Marcus tracking school buses, parents don't have to worry. Not only does the system monitor the location of all buses at all times, while transmitting position and operational data back to the dispatcher. A relatively simple enhancement using RFID (Radio Frequency Identification) tags enables the Marcus system to keep track of who is on the bus and where he or she got off. If the child forgets to phone home, her mother can phone the transportation service to determine that she is with a friend. If the county chooses to make it available, she could even get this information on the Internet.

Managing a school bus fleet presents many challenges, of which safety is a prime concern for both parents and school authorities. Fleet management, however, raises additional issues that typically do not concern parents until the threat of higher taxes arises. Public authorities, whether they are operating transportation services or providing other public services, such as medical care and rescue services, are faced with a familiar dilemma: providing better service with diminishing resources.

The Marcus Fleet Management Solution uses a combination of hardware and software to address the requirements of fleet management. Discrete Wireless targets two business cases, one in which the county owns and operates the school bus fleet and another in which the county contracts transportation services and pays by the student headcount per mile.

"Both scenarios share the same basic business needs and ask similar questions," notes R Wayne Johnson, Vice President at Discrete Wireless. "Fleet managers want to know how they can maximize usage of the current fleet, meaning is it possible to consolidate routes and remove buses from service. They also want to maximize existing fleet assets in order to delay purchasing new buses.

The savings in both cases are very significant. Removing a bus from service saves an estimated USD 50,000 per year. Delaying new bus purchases increases the savings, which may be as much as USD 150,000. These are significant savings that result in a rapid

return on investment for a wireless fleet management solution. Given that a typical installation costs less than USD 1,000, being able to remove one bus from service in a fleet of 50 results in an immediate pay-back.

The Marcus Fleet Management Solution addresses all of the fleet manager's issues in an easily installed and low-cost application. The solution is designed to offer a phased approach during deployment, and a migration path is provided to allow rollout that does not break budgets.

The first phase consists of the baseline product and provides basic data, such as duration of route time, distance traveled, load and unload times, route adherence and a number of operational parameters for the vehicle. This basic functionality not only provides vehicle tracking, but also enables on-the-fly dispatching in cases of breakdown.



The second and third phases add RFID tags for each student. The phase-two build-out simply uses these tags for counting students as they enter and leave the bus, thus providing the basic data required when transportation services are purchased by headcount per mile.

During the third phase, use of the previously installed RFID tag is expanded. This involves some back end system interface development and a method for adding more data to the RFID tag. Data collection at this stage consists not only of a headcount, but also who is riding the bus, as well as when each student boarded and left the bus. Read/write capability is added, and the information on the RFID tag is expanded to include student ID number and name, as well as emergency contact information.

Discrete Wireless currently has about 1,000 corporate customers in various sectors for its tracking services based on the Marcus Fleet Management Solutions. The school bus application has been deployed by school transportation services in Atlanta, New Orleans and a number of other locations in the US.

"We recently rolled out an additional 50 units for Clayton County Schools here in Georgia and just recently exhibited at the Georgia Pupil Transportation Association. We have several other opportunities on the horizon that will be slated for the end of the summer; before school year starts," reveals R Wayne Johnson.

"The Marcus suite of products and services has been a tremendous success for us and allowed us to quickly build a strong business as a wireless application service provider," observes Jeff Thacher, president of Discrete Wireless. "By combining wireless data, GPS

and XML technology with the Internet, Marcus provides cutting-edge solutions to our customers nationwide."

"Fleet managers want to know how they can maximize usage of the fleet."

TOMORROW'S TRANSPORT SOLUTIONS TODAY

An automatic vehicle location and real-time passenger information (AVL/RTPI) system is the ultimate tool for optimizing public transit services. Fully deployed, such a system not only enables the transit company to achieve maximum utilization of its vehicle fleet. It provides a new level of service for passengers by allowing them to make intelligent decisions and to plan their journeys.

“The benefits of an AVL/RTPI system are substantial and measurable.”

FROM DATA TO REAL-TIME INFORMATION

Research has shown that a large number of journeys are not made by public transport solely because of a lack of information. An effective information and communication strategy for public transport can make the difference between success and failure, especially in today's context of competition,” states the International Association of Public Transport (UITP) in a press release announcing its upcoming conference entitled Making technology work for travelers' information to be held in Gothenburg, Sweden on September 17-19, 2003.

The information that travelers need naturally varies and consists not only of real-time information during their journeys, but also of maps, timetables and other information that helps them to plan their journeys before leaving home. Real-time information, however, is as the UITP notes, often the decisive factor in deciding whether or not to use public transport.

MEASURABLE BENEFITS

AVL/RTPI systems are complex and typically deployed in stages, starting with one or a few routes or a simple dispatching application. Over time, they are expanded to cover more of the route network and enhanced to provide a decision support system to assist traffic controllers in dealing with delays and service interruptions. By combining position information for vehicles with route maps and schedules stored in a database, real-time information about arrival times and connecting services can be provided to passengers at terminals, train stations and bus stops and on electronic displays on trains and buses.

Mobitex has been a key technology for two of the most extensive and successful deployments of RTPI systems. These are the systems in Paris, France and in Gothenburg, Sweden run by municipal transit authorities. Both of these deployments illustrate the complex nature of such systems, as well as the project-oriented and stepwise approach to implementation and dependency on a number of different suppliers and technologies. Because both systems have been presented previously in Mobile Data Magazine and are described in some detail on the Mobitex website, the emphasis here will be on a generic architecture for RTPI systems and different approaches to deployment.

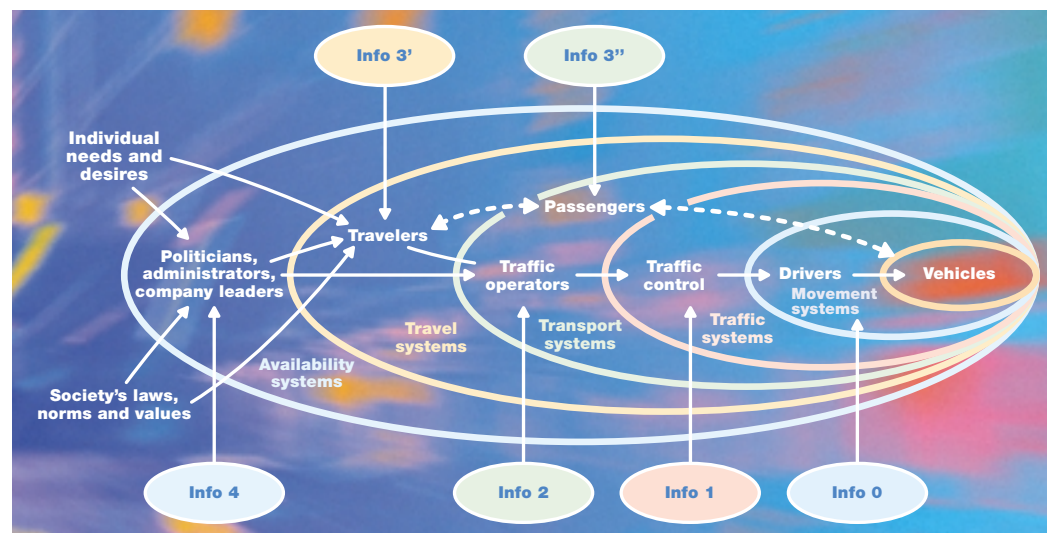
The first stage of the Paris system began ten years ago in 1993, while the first trials for system in Gothenburg date back to the late 1980s. Today, both deployments are state-of-

the-art RTPI systems that provide real-time information to passengers via electronic signs on buses and trams, as well as on signs and monitors at major connection points and terminals, while providing continuous updates to traffic controllers and transport operators on vehicle locations, passenger loads and delays. In addition, these systems can control traffic lights to give precedence to buses and trams and collect a wealth of operational data that facilitates fleet maintenance and increases its efficiency. Finally, there are a number of security functions built into each system that allow drivers to alert traffic controllers in cases of assault, traffic accidents and other emergencies and to automatically forward these alarms so that police, emergency and maintenance vehicles can respond appropriately.

The benefits of an AVL/RTPI system are substantial and measurable. Total investment in the system in Gothenburg amounts to SEK 150 million (approximately USD 18.3 million). Data from traffic operators indicates that service can be provided with about 10 percent fewer vehicles. It is also estimated that the AVL/RTPI system has resulted in an increase in passengers of about 2 percent, corresponding to some SEK 20 million per year in added revenues. A reasonable assessment is thus that the annual savings resulting from the system are on the order of SEK 100 million, meaning that the investment paid for itself in just 18 months.

The communication network used in a public transport application must be able to handle a large amount of real-time data that is generated by hundreds or even thousands of vehicles operating over a large and often densely populated metropolitan area. Typically, the data consists of positioning information generated by GPS (Global Positioning System) devices mounted in the vehicles that is forwarded over the wireless data network to a traffic center where it updates a geographical information system that shows the current traffic situation and the locations of all buses and trains on all lines, thus allowing dispatchers to respond in real time to delays or interruptions of service.

The many thousands of vehicle positions being forwarded wirelessly to the dispatching center each hour are only the raw data for a public transport information system. In typical systems, this data is further refined, and there is also a substantial outflow of data to signs and monitors at bus stops and train stations that provide passengers with information about arrival and departure times and connecting lines. The dispatchers also use the system to send orders to drivers, so that a bus may be told to wait some extra minutes, for example, if a bus on a connecting line is delayed. Another important use of the system is to allow drivers to send an alarm to the dispatcher if an accident or a robbery occurs. ▶



Information flows in an RTPI system and the persons using this information form a complex pattern with different types of information and decision makers on several levels.



As the system overview shows, the real-time data from the route network consists not only of position information and operational data sent over the wireless network from the vehicles, but also of other inputs, typically via fixed lines, from the WLAN network into the depots and from traffic signals (for junction priority) and rail switches (for Tramway lines). Much of this raw data is processed by roadside computers that control traffic lights and rail switches or by local computers. At the traffic control center, however, the raw data is combined with route maps, schedules, traffic statistics and other information stored in central databases and presented in a more user friendly form.

What is a user-friendly format for real-time traffic information naturally depends on the user's role. Traffic controllers, for example, normally sit in front of computers and work with a graphic interface that presents a very large amount of information simultaneously on a map that provides them with a dynamic overview of the entire route network or the sector for which they are responsible. Passengers, on the other hand, are in a hurry and want only the most relevant information presented in the most comprehensible manner. Research in Gothenburg, shows that short messages, such as stop announcements, are most comprehensible when presented both as text on an electronic display and as synthetic speech via a loudspeaker. More complex messages, such as information about a service interruption and alternative routes, are best presented only as text.

Many public transport authorities are now making passenger information available on their websites and via mobile Internet, WAP and SMS services. Passengers are thus not only able to access printed timetables and other static schedule information, but can also obtain real-time information on a wireless handheld or mobile phone and access location-based services that provide route information and departure times from their current location. This is an exciting development that is beyond the scope of this article.

UP TO THE TASK

For public transport operators, a wireless data system can thus significantly increase the efficiency of transport services while greatly improving comfort, convenience and service for passengers. As has been documented in Gothenburg, these benefits are very real and measurable. Fuel costs are reduced, and fleet management becomes more efficient. Fewer vehicles, drivers and dispatchers are needed, thus reducing both

"Passengers are in a hurry and want only the most relevant information presented in the most comprehensible manner."

capital and overhead costs. Commuters get to their destination faster and are thus more productive. Improved service can provide the incentive for many people to leave their cars at home and take public transportation. At a time when public authorities must reduce spending while offering better and more environmentally compatible services, these benefits cannot be ignored.

However, as the Mobitex Operators Association notes in a white paper entitled *Wireless data technology in public transport*, "Realizing these benefits in a public transport information system requires a wireless data technology that is up to the task. If data from vehicles is not received due to the unavailability of data channels, dropped connections during roaming or other network problems that prevent data delivery, the whole system breaks down. Information provided to passengers at bus stops and train stations is incorrect or missing. Dispatchers are not able to deal with disruptions of service dynamically as they arise. Drivers become harassed and are unable to work effectively. Irritation among passengers mounts, while operating costs increase. These are the inevitable consequences of choosing a technology that is not up to the task."

Mobitex was designed from the start for optimal performance in a system where thousands of vehicles are using the network and as many as hundreds of buses may be sending data every 30 seconds from the same terminal. Mobitex has proven itself under these demanding conditions and is serving public transport operators and passengers in numerous cities on several continents. For public transport information systems, Mobitex is therefore an ideal choice for increasing efficiency and improving passenger service. ■

IMPLEMENTING AN RTPI SYSTEM

An AVL/RTPI system for a major city with thousands of buses and trams operating on hundreds of routes over a wide area is a long-term project for which few public authorities would rely on a single supplier. The implementation of the featured systems in Paris (5000 Buses and Trams) and Gothenburg (450 Buses and Trams) followed different approaches as dictated by requirements and the resources available to each city.

After the first successful trials in Paris in the early 1990s, the municipal transit authority commissioned Ineo Systrans (previously named GTMH Systèmes de Transport) as project manager and gave the company responsibility for implementing a complete system that would not only provide real-time information for passengers, but also increase efficiency and provide greater security for drivers. In Gothenburg, on the other hand, the Traffic Office took the responsibility for project management of the RTPI system. The municipality created GoTiC (Gothenburg Traffic Information Center), a municipal research and development center, that later took over responsibility. Göteborg Energi (currently Volvo Mobility Systems) developed the RTPI system and Hogia and AB Thoreb were the principal suppliers.

Despite these different approaches, RTPI systems share many general characteristics. Driving the entire system is the onboard computer in the vehicle, which typically includes a GPS (Global Positioning System) receiver and a Mobitex modem. The onboard computer normally drives the electronic displays in the vehicle and may also collect operational data, such as number of miles traveled and the number of passengers boarding and alighting at each stop. This equipment, which was supplied by Ineo Systrans in Paris and

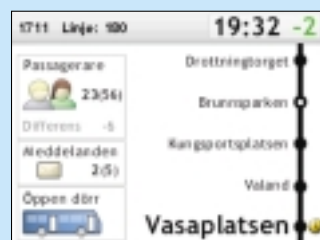
Hogia and AB Thoreb in Gothenburg, is typically available from local suppliers.

At the core of an RTPI system are one or more databases containing schedule information, geographical information about the route network and a transactional database that combines this information with real-time data from the vehicles. This information must not only be presented in an appropriate format for traffic controllers, but also integrated with central systems that collect and standardize data from many traffic operators and traffic systems. Implementing this part of an RTPI system demands a very high level of systems integration expertise.

Today, Ineo Systrans has supplied some 40 urban transport networks throughout France and in other European countries, including the UK. Volvo Mobility Systems is another supplier able to provide complete AVL/RTPI systems in the international market as well as deliver the system factory installed or as a retrofit.

In the Asia Pacific region, the Australian company Technisyst has also acted as systems integrator for several intelligent traffic systems and real-time passenger information systems, most recently in Auckland, New Zealand.

Ericsson is naturally able to provide services and support in implementing a Mobitex-based RTPI system and works with local partners in all Mobitex markets. ■



REAL-TIME PASSENGER INFORMATION

An RTPI system makes a wealth of information available to travelers, passengers, drivers, traffic operators and traffic controllers. This information typically includes the following:

TRAVELER INFORMATION AT STOPS

At major connection points and terminals, real-time information allows travelers to choose alternative routes.

- Departure information
- Information on delays
- Seat availability on following bus
- Information on best routes

PASSENGER INFORMATION ON VEHICLE

Passengers need simple information about their current location.

- Automatic stop announcements via loudspeakers and electronic signs
- Information on delays
- Connection information

DRIVERS

An RTPI system enhances safety by allowing drivers to devote full attention to operating the vehicle, while giving them a two-way communications channel with traffic controllers.

- Time in relation to schedule
- Next stop
- Support for making connections
- Route information
- Text messages from traffic control
- Automatic control of destination signs
- Automatic stop announcements
- Stop indication on electronic signs
- Connection information on electronic signs
- Traffic light priority
- Alert in case of assault
- Alert in case of vehicle fault

TRAFFIC OPERATORS

Traffic operators responsible for fleet management gain invaluable information that allows them to schedule maintenance and plan schedules more efficiently, as well as to respond dynamically to accidents and delays.

- Automatic passenger counting
- Automatic mileage metering
- Ticket statistics
- Vehicle data for maintenance
- Fault reports during operation
- Fault follow-ups

TRAFFIC CONTROLLERS

An RTPI system gives traffic controllers a dynamic overview of the entire route network or the sector for which they are responsible and allows them to respond appropriately to accidents, traffic jams and other service disruptions.

- Vehicle positions
- Text messaging with all vehicles
- Voice communication with individual vehicles
- Coordination with other traffic control centers
- Analysis of delays
- Exact vehicle position for assault alarm
- Information on bridge openings

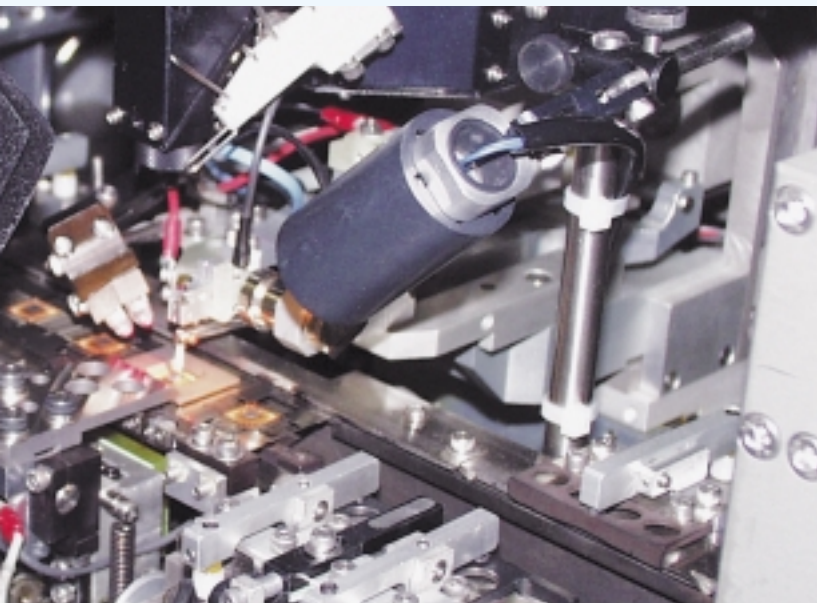
MOBILE MARKET NEWS

contributes a rock-solid reference design for Mobitex modems. This powerful new combination already has modem developers lining up for a first peek.

CML expects the first silicon to be in evaluation by the first quarter of 2004 and production silicon to be at CML in the third quarter. Meanwhile an evaluation board is expected to be available to CML and Ericsson by the first quarter of 2004.

With the new chip, volume

SUPERB ENGINEERING TEAMWORK LIGHTENS THE LOAD FOR MOBITEX DESIGNERS



The CML production plant in Maldon, Essex in the UK has advanced equipment for manufacturing state-of-the-art components for narrowband radio communications.

New Mobitex terminal devices are set to become much less expensive and to reach the market much more quickly thanks to a cooperative effort by CML Microcircuits and Ericsson. In this groundbreaking joint development project, CML Microcircuits is developing a super-chip that integrates virtually all modem components in a single package, while Ericsson

prices for a Mobitex modem may be reduced by as much as 30 to 50 percent, while development times, and thus time to market, will be shortened dramatically. Put simply, CML and Ericsson have produced a product for developers that will constitute a quantum leap in price and time-to-market and create waves in the Mobitex market.

MORE COMPONENTS AND MORE FUNCTIONALITY

For more than 30 years, CML Microcircuits has been providing very low-power solutions for a variety of communications needs in wireless data, wireline tele-coms and two-way radio areas. Narrowband radio communications has long been the company's special area of expertise, and CML's FX and CMX 909/A series of GMSK packet data modem chips are the core components in the greater majority of Mobitex modems in use today.

The previous generation 'X909/A chip has often been described as the data pump in a Mobitex modem. This highly integrated CMOS circuit contains all of the baseband signal processing and Media Access Control (MAC) functions required for a high-performance GMSK wireless packet data modem. It interfaces with the host processor and the radio modulation/demodulation circuits to deliver reliable two-way transfer of application data over the wireless link.

CML's new flagship product for Mobitex takes integration to new heights by putting more components in silicon and by packing more functionality into the chip. The RF stage is simplified, for example, because most of the clocking and divider functions are included on the chip. Naturally, the new product implements additional functions to support the latest Mobitex radio protocol, thus simplifying the modem designer's task even further.

"With the new CML chip and the Ericsson reference design and Mobitex firmware, the hardware designer's task consists largely of optimizing antenna performance and interfacing the modem to terminal equipment. In typical cases, producing a prototype will now take only weeks, rather than months as in the past," says Folke Bergqvist, head of technology at Ericsson.



Anders Baaz, General Manager Mobitex at Ericsson, and Kevin Swann, sales and marketing director at CML Microcircuits, shake hands after signing the agreement for the joint development project.

"This joint development project represents a strategic commitment to Mobitex on the part of CML that we believe will open new market segments and extend the technology's lifetime," says Kevin Swann, sales and marketing director at CML Microcircuits. "As a narrowband packet data technology, Mobitex is ideally suited for a wide range of mobile and fixed wireless applications. In certain applications, however, particularly those involving telemetry and machine-to-machine communication, Mobitex modems have not yet reached a price point that would make broader deployment economically viable. Together with Ericsson, we are now providing the hardware and software components that equipment manufacturers need to produce extremely competitive products that will fuel rapid and sustainable market growth."

ENABLING TECHNOLOGY AVAILABLE TO ALL

"This development effort is the next level of our support for developers and is being offered to modem and terminal manufacturers. Earlier we have focused on expert services for design and validation, but now we can jump-start new designers with the reference design and firmware," says Folke Bergqvist, adding that this is intended as an enabling technology that will stimulate and accelerate growth in the Mobitex market. ▶

Ericsson's partnership with CML is also the fruit of many years of cooperation in the advancement of narrowband packet-data technology in which each has contributed its own unique expertise. With its previous products, CML has been the chip supplier of choice for the majority of Mobitex manufacturers and the new product raises the bar once again with respect to integration, performance and price.

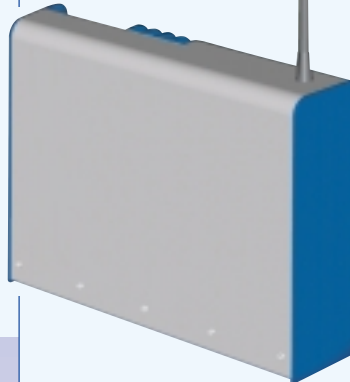
Ericsson as the system supplier, on the other hand, is the self-evident authority on modem design. It has put all of

its considerable expertise into the reference design, while at the same time launching a number of new services for modem design support and modem and terminal verification.

The new developer package from CML and Ericsson will be officially presented at the Mobitex Conference in Gothenburg, Sweden in September 2003, where developers and hardware designers will have an opportunity to talk to the experts about how to leverage this groundbreaking development and to create the next generation of Mobitex devices. ■

NEW MOBITEX BASE STATION

Text contribution by Mats Udikas



The BRU1 can also be used to increase capacity in areas with very high traffic volumes, such as the business district of major cities," says Christian Olesen, director system technology at Mobitex, Ericsson.

The BRU1 Mobitex Base Station is installed and configured in exactly the same manner as larger Mobitex base stations, meaning that installation can be accomplished in less than an hour using a portable PC. Configuration can also be performed remotely from the Network Control Center.

A flexible licensing scheme has been produced for the new base station. Although the BRU1 can handle as many as 500 users, licenses are available in increments of 250 and 500 users, meaning that the base station can be economically deployed for a small number of users. It will have capacity for about 200 simultaneous e-mail users. The traditional BRU3 Mobitex base station typically handles four times that amount.

BRU1 will be wall-mounted and will weigh less than 5kg. The transmitter power will be 1 watt, compared with 6 watts or more for other Mobitex bases.

It will operate in the 900MHz band, which is used for Mobitex in the US. There is currently no ongoing development work for BRU1 using other Mobitex frequencies. BRU1 will be equipped with an Ethernet port, lowering the cost of using an IP-based network such as an intranet as a bearer for traffic between Mobitex base stations and the core network. The packet-data protocol X.25, which Mobitex uses between bases, will then run on top of TCP/IP (Transmission Control Protocol/Internet Protocol). ■

Ericsson has received the first orders for a new Mobitex base station to be delivered in April 2004. A scaled-down version of the highly successful BRU3 Mobitex Base Station, the new BRU1 Mobitex Base Station is designed to provide spot coverage in areas where capacity requirements range from ten users up to a few hundred.

The BRU1 Mobitex Base Station is ideal for campus applications in such environments as offices, hotels and government buildings where it can provide excellent indoor coverage. The new base station can also provide spot coverage in areas not previously served by the Mobitex network.

Because the BRU1 is designed exclusively for indoor use, the protective casing required for outdoor mounting has been eliminated, thus resulting in a significantly smaller unit that is easily placed. Filtering and thus sensitivity have also been reduced somewhat, since the BRU1 will provide coverage for a relatively limited geographical area and its output power has been limited to 1 watt.

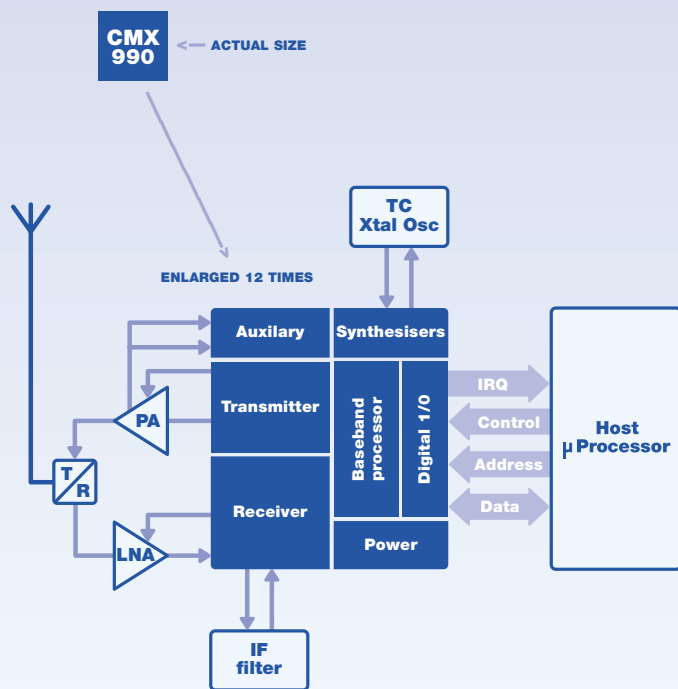
"The BRU1 is designed to help operators to address new market segments. It will now be economically feasible to deploy local coverage for smaller enterprises whose offices are not reached by the national network.

INTRODUCING THE CMX990

With an operating supply requirement of about 60mA in a range of 3.0 to 3.6 volts and offering a flexible range of powersave options, the new CML chip will be known as the CMX990 and will be available in a 64-lead (no-pin) VQFN package (9.2mm x 9.2mm x 1mm - max dimensions) - great for size and weight-conscious modems!

The basic block diagram shows the functions that CML has integrated on the chip. These include:

- RF Transmitter
- RF Receiver
- Synthesisers
- Baseband Processor
- Auxiliary DAC and ADC Stages
- Digital I/O



VERSATILITY IN WIRELESS

Wireless System Integration (WSI), a privately owned company devoted to the development of wireless products and a Bluetooth SIG member, recently announced BlueTex, a Bluetooth gateway solution for Mobitex, that the company has developed in cooperation with Ericsson. With BlueTex, Mobitex achieves device independence.

In simple terms, BlueTex is a small device with a belt clip and built-in antennas that combines two different wireless technologies, Mobitex for the long haul and Bluetooth for the short hop. BlueTex functions as a gateway that converts signals between Bluetooth and Mobitex. With BlueTex and specially designed software, virtually all Bluetooth-enabled devices, such as PDAs, Pocket PCs or other handheld or portable computers, can connect to the Mobitex network for wireless wide-area communications.

"Working with Ericsson on this break-through product was very exciting," says Jan-Åke Lindqvist, managing director of WSI. "BlueTex will open a new era in wireless communications using an innovative combination of technologies in a product created by the WSI team."

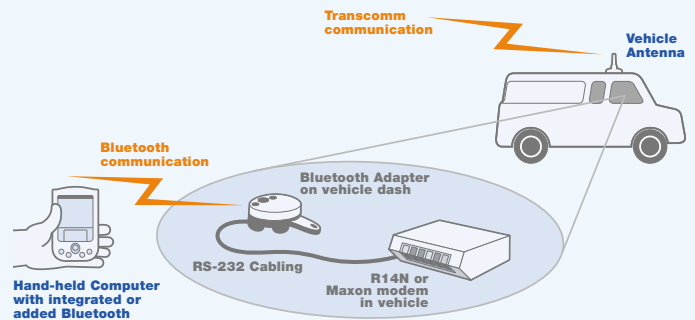
BlueTex is thus an extremely versatile tool that supports virtually any computing device plus a wide range of accessories. The unit is sufficiently rugged to withstand field use, yet designed for use with off-the-shelf consumer products. BlueTex includes a standard connector for battery charging plus a connector for an external antenna when used in a vehicle.

BlueTex is available in versions for 450 and 900 MHz Mobitex networks, thus ensuring that it can be used worldwide. Based on an OEM Mobitex radio modem from CNI and supporting the latest 1.1 specification, BlueTex is fully compatible with all Bluetooth-enabled devices and also fully supports the most recent R14N Mobitex system release. The first-generation BlueTex product is being delivered as a developer's kit. Product development will be completed during the third quarter.

"Mobitex users need a highly reliable solution that is well adapted to their needs. The BlueTex gateway solution will provide more options on a greater number of mobile computer platforms, thus significantly increasing flexibility for our customers worldwide. We see great opportunities in our collaboration with WSI," says Tomas Lundkvist, Sales and Marketing Director, Mobitex at Ericsson. ■



BLUETOOTH ADAPTER EXTENDS RANGE



With the Bluetooth Adapter from Transcomm, service technicians remain connected to the Mobitex network even when they leave their van.

UK Mobitex operator Transcomm plc has announced its Bluetooth Adapter for extending the range over which devices connected to the Mobitex network can be used.

In a typical scenario, a field service engineer travels to a customer site in his van and uses a handheld computer for his work. In the vehicle, the handheld is securely mounted in a cradle that also provides a connection to a vehicle-mounted Mobitex modem. When he arrives at the site and takes the handheld with him to perform the service order, the connection is no longer available.

With the Bluetooth Adapter, the service engineer remains connected and can receive updates on job details, since his handheld can now communicate with the vehicle using Bluetooth over a range of up to 100 meters. The service engineer can thus check service history, order spare parts and submit invoicing information without returning to the vehicle. If his schedule changes, perhaps because an emergency job has arisen, messages sent over the Mobitex network will also reach him.

Shaped like a small mouse, the Transcomm Bluetooth Adapter measures 3.8 x 7.8 cm and weighs just 68 grams. It is designed to sit on the dashboard of a vehicle and be connected to the serial port on the modem in the vehicle and to communicate with a Bluetooth-enabled handheld device.

The Bluetooth Adapter hardware and software are fully compliant with the latest Bluetooth 1.1 specification and supports the Serial Port Profile (SPP). With this profile, the Bluetooth Adapter converts serial data into a Bluetooth wireless transmission, allowing it to emulate an RS-232 serial connection with any similarly configured Bluetooth device.

In addition to the Bluetooth Adapter, Transcomm is offering a Bluetooth CF card for handheld devices that supports the Compact Flash format. The Transcomm Bluetooth Adapter is supplied with Transcomm Airpack software for the handheld device to maintain the Bluetooth connection and ensure its integrity is maintained, even if the device moves out of range of the Bluetooth Adapter, automatically re-establishing the connection when the device is back in range. ■

AIRPACK READY FOR TAKE-OFF

Transcomm plc, the UK Mobitex operator, has released its Airpack Gateway software product that reduces the time and cost required to develop wireless applications, while increasing operating efficiency and reliability. Airpack is communications middleware that enables customer host applications to send and receive wireless data over the Mobitex network to remote user applications with little concern for the underlying details of the radio network.

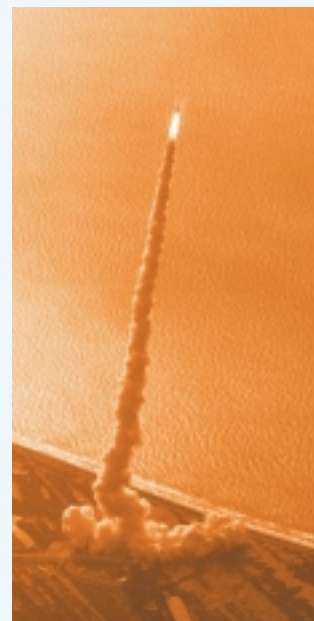
Airpack manages connections between application servers and the Mobitex network, balancing loads across network access paths. Multi-packet messages are handled using the Transcomm Packet Protocol for assembling

and disassembling large messages. Redundancy is included so that alternative paths are automatically used if one should fail. This results in reduced latency when used with Internet host access or multiple X.25 links. Security is also enhanced with leased-line host access.

"We were delighted to work with Airpack because we really needed rapid and reliable integration between the Transcomm network and our back-office parcel management system," says Alec Cormack, IT Director at Initial City Link. "We have found that wireless data communications over the Transcomm network through the Airpack Gateway achieves high performance levels, managing data transmission and

connectivity for more than 1,000 data-enabled remote users."

"Airpack allows us to offer customers and partners an even more efficient means of running their business-critical applications across our network," says Andrew Carver, chief executive officer of Transcomm. "By providing a low-cost middleware tool that sits between the application and our network interface, we are making the network more accessible to more users. Through our close relationship with Initial City Link, we have been able to develop in Airpack a strong addition to our portfolio of reliable wireless data solutions from which they and many other customers and Transcomm Partners will benefit." ■



NEW MIDDLEWARE FROM ERICSSON

Ericsson is now preparing the release of new Mobitex middleware designed to support the Mobitex Transport Protocol (MTP/1). MTP/1 is a higher-level protocol that can be used by applications involving large transfers of data between a host and a terminal where it is essential to ensure that all data is received correctly. The Ericsson MTP/1 driver will be available for the Windows and Pocket PC operating systems and implemented as DLLs (dynamic link libraries), meaning that the driver can be updated without recompiling the application.

The Ericsson MTP/1 driver is a tool for developers and will be available for downloading from the Mobitex Developer Zone. Release is scheduled for the end of October. Packaging and licensing conditions had

not been finalized when this issue of Mobile Data Magazine went to press.

Mobitex middleware is intended to provide a high-level interface to applications that hides the complexities of the radio interface. Middleware is available from a number of Mobitex suppliers, most of whom have implemented a proprietary API (Application Programming Interface) for their products. Ericsson is offering the MTP/1 driver for developers who prefer to use a standardized and well-defined interface with a specification that is supported by Ericsson and MOA and includes a complete test suite for conformance testing.

The Ericsson MTP/1 driver is middleware that operates at the transport layer where it provides services to the next-higher session

level by hiding the details of data transfers involving several MPAKs and maintaining connections. At lower levels, MTP/1 uses MPAKs at the network level and the MASC (Mobitex Asynchronous Communication) protocol on the client or terminal side and MDOT on the host side for the link layer. MDOT (MPAK Datagram Over TCP/IP) is a protocol designed for tunneling Mobitex MPAK datagrams over TCP/IP. Both MASC and MDOT are fully specified in the Mobitex Interface Specification (MIS).

The MTP/1 driver will initially support connectionless services. Connection-based services, which provide greater reliability and security, are scheduled for the next release. MTP/1 is an end-to-end protocol that provides transparent transmission of data blocks with a length

not limited by MPAKs, which typically contain no more than 512 bytes of data. The sequence of data blocks is guaranteed during transmission. MTP/1 also provides error signaling and positive end-to-end provider acknowledgment.

"With the Ericsson MTP/1 driver, we are responding to a long-standing need among developers," says Niclas Cahlin, manager for end-to-end solutions at Mobitex, Ericsson. "We know that there is a great need for a robust and full-featured transport protocol for Mobitex with a complete test suite for conformance testing. Every effort has been made to ensure that the MTP/1 driver is an industrial-strength product and that it is highly optimized for the BlueTex that is released simultaneously." ■



DESIGNED TO BE ROBUST

Have you heard about Bluetooth? Long billed as the next big thing waiting to happen, Bluetooth is becoming a success. Chip sales are going through the roof, and Bluetooth is now being included in hundreds of consumer products being sold in millions of units.

Mobile Data Magazine talked to Johan Åkesson, marketing director at Ericsson Technology Licensing, to find out what has happened. His company is totally devoted to Bluetooth, and Ericsson has also been the driving force behind Bluetooth since its conception in the mid 1990s. The success that Bluetooth is now enjoying has been some time in the making, but make no mistake about it. Bluetooth is here to stay.

Has Bluetooth finally achieved a breakthrough?

Absolutely. There are now close to 1,200 qualified Bluetooth products, with 20 to 30 being added every month, and chip sales are going through the roof. Bluetooth is definitely happening now.

What is a qualified product?

Bluetooth qualification is actually part of the specification. The qualification process is required by the Bluetooth Special Interest Group (SIG) and is designed to ensure interoperability between Bluetooth devices. It is also a necessary pre-condition for the intellectual property licensing of Bluetooth wireless technology and must be completed before a manufacturer can use the Bluetooth trademark on a product. Right now, there is a new Bluetooth product being qualified almost every day.

What role does Ericsson play?

Ericsson licenses Bluetooth technology, meaning that we license intellectual property rights to semiconductor manufacturers and OEMs. Ericsson Technology Licensing is totally dedi-

cated to Bluetooth. Together with the Bluetooth SIG, we have developed Bluetooth as an open specification for short-range wireless communication between electronic devices. The first Bluetooth chips were manufactured by Ericsson Microelectronics already in 1999. Responsibility for the Bluetooth specification, however, is handled by Bluetooth Special Interest Group (SIG), a trade organization comprised of leaders of the telecommunications,

computing, and network industries with over 2,000 members. Ericsson is one of nine promoter companies in the group. The SIG was established in 1998 to promote Bluetooth and to handle the Bluetooth brand and trademarks. Ericsson continues to support Bluetooth at the highest management level and regards technology licensing as part of its core business.

What does this mean to consumers?

It means that it works. If the Bluetooth trademark is included in a product, then it has been certified as complying with the Bluetooth specification and will work with other Bluetooth devices. The success of Bluetooth could be seen in the light of Bluetooth devices are now an item available in mail order catalogues, for example, which was the intention from the beginning.

How is Bluetooth being used?

Bluetooth was always meant as a cable replacement. The initial applications were naturally in data and telecommunications, which is the industry where Bluetooth was born. However, Bluetooth can be used for much more than connecting a phone to a headset or a laptop computer to a printer. Bluetooth is constantly finding new applications in a wide range of industries. As a recent article in *Network World* pointed out, Bluetooth is getting dirty and gritty and being used as a cable replacement in industrial settings, such as steel mills and cement manufacturing, where cables just aren't up to the task of transmitting process control data over short ranges. Bluetooth is also the rage among auto designers, and we hope that it will soon be included in the control system for cars. On a more trivial note, Bluetooth is an enabling technology for interactive games on mobile phones. I won't name names, but I've seen more than one person playing *Battleship* over Bluetooth with a colleague during a boring meeting.

Does Bluetooth fulfill consumer expectations?

It does in so far as the applications included by a manufacturer in a Bluetooth product support it. A Bluetooth headset for a Bluetooth-enabled mobile phone, for example, normally works flawlessly and does what it is expected to do. How manufacturers and application developers match consumer expectations, however, is another matter. What would you expect if you had a phone that supports Bluetooth and

bought a Bluetooth headset? We have seen at least one Bluetooth-enabled phone that does not support a Bluetooth headset!

What is being done to address these issues?

The focus in the Bluetooth SIG is shifting toward applications that meet consumer expectations and supporting the appropriate profiles



for the type of product being offered. The Bluetooth specification includes a large number of profiles to support imaging devices, such as digital cameras, or streaming media, for example. Now that manufacturers have solved the teething problems relating to Bluetooth compliance and interoperability, they need to provide support for applications that meet consumer expectations.

Are there Bluetooth applications that you did not anticipate?

Bluetooth is such a versatile technology that there are countless unimagined applications. One application that I did not anticipate, however, was using Bluetooth to print out contact information or a picture from a phone. If you have a Bluetooth phone and happen to be close to a Bluetooth printer, it's a no-brainer, but it's a very useful capability that you may not have expected.

Are you familiar with Bluetooth-enabled products for Mobitex, such as BlueTex and Transcomm's Bluetooth Adapter?

No, I am not, but as you describe them, this is an excellent application of Bluetooth technology. Using Bluetooth with the Serial Port Profile for wireless communication between a modem

"Bluetooth can be used for much more than connecting a phone to a headset or a laptop computer to a printer."

and a terminal device is an ideal solution for mobile professionals that increases the versatility of their handheld devices.

Is Wi-Fi a threat to Bluetooth?

No, they are complementary technologies. Wi-Fi is designed for wireless LANs and as such has only one application, which is "Wireless Ethernet". In that capacity, it works very well, but Bluetooth is much more versatile. Bluetooth was designed from the start as a build-in technology for mobile phones, handheld computers and other devices and consumes very little power while providing extremely robust wireless communications over short distances. There are application areas where the two technologies overlap, but Bluetooth has capabilities that Wi-Fi simply cannot match.

What is the future for Bluetooth?

The future for Bluetooth is almost without limits. What we are witnessing today now that Bluetooth has been included in hundreds of products that have been sold to millions of consumers is just the beginning. It is only now that we can realize the potential of Bluetooth to create personal-area networks that control and integrate a variety of devices that happen to be at hand. As an example, the day is coming when we can use Bluetooth in our cars both to stream video to the kids in the back seat and to have an e-mail that was just received at the office read as a voice message on a personal Bluetooth headset. ■

 **Bluetooth®**



You can't get there from here

When my plane touched down in Paris, all I could think about was Lago d'Orta, reputed to be the most romantic sub-alpine lake in northern Italy and an area renowned for the quiet beauty of the landscape and fascinating history. Inspired by my mother, whose frequent trips to France seemed to keep her relaxed and feeling younger, I had decided to vacation in Europe. The highlight of my vacation was to be a trip to Lake Orta, where a friend had promised to take me to the mystical island of San Giulio where it is rumored that ancient spirits still linger.

Before traveling on to Italy, however, I was going to spend a day with my mother, who was vacationing in Cannes. Because my flight had landed early, I was able to catch the first morning train, a high-speed and extremely comfortable TGV train that sped me to the Mediterranean coast in just over five hours. France, I realized, is a wonderful country with train service, at least when there are no strikes and the trains are running, that is perhaps the best in the world.

Cannes is the home of the International Film Festival originally started in September 1946 but now held every spring. For wireless professionals, it is also the home of what was recently renamed the 3GSM World Congress. I was here on vacation, however, and as I quickly discovered, so were what seemed to be at least a million other people. No matter, I thought. Soon I would be at Lake Orta.

After a good night's sleep, I should have been well-rested and in a better mood for exploring the Mediterranean holiday resort despite the constant crowds. My idea of a vacation in Europe was to start the day with a leisurely breakfast with café au lait and croissants. Naturally, I should have known that my mother had other plans. Well-meaning as always, she had planned a full day of activities that would allow us to make the most of our time together and enable us to see two museums, visit countless shops and refresh ourselves at several cafés, each of which seemed more crowded than the last. Needless to say, I was exhausted by the end of the day and more determined than ever to get to Lake Orta the next day.

As entered the train station the next morning, I did not feel my usual confidence. Although my high-school French usually enabled me to manage in stores and restaurants, I sensed instinctively that it was not up to the task of explaining where I wanted to go and purchasing a ticket. As I knew from previous trips, English was not an optimal choice in a country where French culture in general and the French language in particular are highly valued.

"I'd like a ticket to Italy, please. To Milano," I said to the ticket agent, trying to speak as slowly and as clearly as possible. The man looked at me as if I was a zombie from Mars, which naturally did little to increase my confidence.

"I can't sell you a ticket," replied the agent, immediately dismissing me and looking beyond me to the next person in line.

"What do you mean, you can't sell me a ticket?" I exclaimed, suddenly panicking and wondering why I was not allowed to buy a ticket for a train that according to the timetable that I had consulted on the Internet was leaving in half an hour.

"There are no trains. Next please!" replied the agent curtly, leaving me little choice but to step aside and let the next person in line come forward. Exasperated, I turned to the tourist information desk where there was a kind French gentleman who was more patient and could speak more English.

"I'm sorry, but the trains to Italy are not running. They're doing some work on the tracks on the Italian side," said the man, looking genuinely apologetic.

"No trains! You mean that I can't get there from here?" I cried, not wanting to believe what I was hearing. Desponded, I made my way back to the hotel, where I was surprised to find my mother sitting at an outdoor café with a French couple.

"Wanda! You're back! I'm so glad you decided to stay in Cannes! Please come and meet these charming people. Jacques and his wife have offered to take us out on their yacht this afternoon, and tomorrow they want to show us some small villages along the coast," greeted my mother, full of enthusiasm as usual.

I started to sigh, but as I looked at the azure sky above and the ultramarine water below us, I paused. Suddenly the special light, the colors and the fragrances all around me were overwhelming. Focused as I was on Lake Orta, I really hadn't been aware of my surroundings, and I realized at that moment that Cannes really was a wonderful place for a vacation.

