RACOM RacomNews

Dear Friends,

after an interval of several years RACOM has once again decided to participate in an international exhibition. From an inexhaustible selection of exhibitions we have gone for **Hannover Messe**, which will take place from 24th to 28th April 2006 in Germany.

Like other companies we too have certain doubts about participation at exhibitions: does it still have any sense to take part in exhibitions these days? Are at least some of the considerable funds invested in participation regained? Is it perhaps not better to invest the money otherwise? Do specialists still visit these exhibitions? You'll probably agree that it's hard to find the correct answer to questions such as these.

However, I truly believe that we have made the right decision. Nowadays with the current overload of indirect communication via the Internet, e-mails, and SMS we want a return to face-to-face meetings with our existing and potential customers. Internet and web presentations are irreplaceable for sure, but face-to-face is face-to-face. We will be wiser at the beginning of May, however, we already believe that we have made the right decision.

We have even given a large section of this year's first RacomNews to our participation at Hannover Messe. Besides general information about RACOM´s new products and activities we shall present in detail some of our prepared and implemented projects in Germany. All these projects as well as Hannover presentation are materialized in co-operation with Degetel, RACOM's German partner.

You are all cordially invited to our stand in Hannover and we look forward to seeing at least some of you there!

Martin Lacha
Sales and Marketing Director

MORSE in Germany

Since Degetel has implemented RACOM´s products into their portfolio, there have been coming up several projects and applications in Germany, in which it proves the MORSE system to be the ideal one. Following examples show very clearly, how the unique features are used.

Testinstallation for electronic Displays at Bus Stops

In the city of Cologne are several bus stations, where new electronic passenger information displays provided by three different suppliers are in a pilote operation. Degetel has supplied the MORSE system for this pilote installation free of charge to the customer. The municipal transfer (KVB) wants to gain experience about technical and practical issues about the features of such systems for buses in the next few months. The MORSE system meets the requirements of the customer in the best way. A decision about the system is expected within the next months.

- **700 busstops in the area of city Cologne**
- **Pilote: 1 base station** with 3 displays
- 434 MHz, 1 simplex channel / 2 Bus lines
- Connection of base station to the **IP Backbone** (customer´s LAN)
- **30 seconds** upgrade time for display of **arrival time**
- Special messages and additional text as running letters
- MORSE network is remotely controlled via GPRS radio modem connection

Remote Monitoring of Objects

For remote access to surveillance systems a radio link was needed, where the access to a computer is done from a vehicle equipped with a laptop by PC remote control software (VNC). The transfer rate should offer at least ISDN speed. There were tests performed with alternative technologies to RACOM´s products like wireless LAN and GPRS. The decision was made to deliver RACOM´s MR900 for testing, which provides a data rate of 98 KBps due to channel-bundling in the licencefree band of 869 MHz. The protocol TCP/IP is tunneled through MORSE system. After a compreheshive Test phase customer made the final decision for the MORSE system due to the unique features of the RACOM radio modems. MR900 was the only product which was able to meet the requirements of the application.

- **Remote access** to a PC via **VNC** from a laptop inside a car
- **Distance** of more than 1 km
- **869 MHz**, 10 simplex channels bundled to **98 KBps**
- Complete page transfered in significantly less than **10 seconds**
- **Mobile Usage** in vehicle with laptop

Interconnection of Windmillparks to Powerplant network

For an operator of Windmills there were delivered several point-to-point transmissions of 4 digital signals. These 4 contacts indicate to the operator of the windmills, how much percentage of power he is allowed to feed into the power plant network due to the actual network load. The transmission of the digital information should be performed online as soon as a change in the state is occurring and the successful transmission should be reported back. Because of the large distances between the points, the transmission via GPRS was requested. Due to the unique features of RACOM´s producs made decision to use RACOM MG100 in conjunction with the telemetrical unit SEP.

- GPRS telemetry data transmission with **secured protocol**
- **Batterie backup** with intelligent powersuppy MS2000
- **Fixed IP Adresses** via RANEC Service Center

Bernd Klimek, Degetel

MORSE & City Transport Management in Brno

The Control and Information System (CIS) at the Brno Municipal Transport Company (BMTC) is a typical example of an application for which it is suitable to use RACOM´s MORSE system for the transmission of data. Thanks to the **unique** properties of the **MORSE** radio modems the CIS used by BMTC achieves **worldwide parameters**.

At the present time the application used by BMTC is one of the largest and most sophisticated applications for controlling city transportation, and not only in the Czech Republic but also around the world.

CIS in the eyes of the user

All companies running city transportation systems attempt to manage them in the most effective manner. Effective management reduces costs for the operator and also brings about greater customer satisfaction. There is a tendency for more satisfied customers to prefer city transportation as opposed to individual transport – city transportation operators have greater revenues and more importantly reduce city traffic jams.

On-line timetable monitoring. Each vehicle transmits information about its location to the centre from its GPS receiver every 30 seconds. The centre evaluates the current position of the vehicle with respect to the desired position according to the timetable, or its position in relation to other vehicles on the same route. The driver then receives information and instructions on the onboard computer display.

Support for traffic dispatchers. All data received by the control centre is stored on a data server. An unrestricted amount of clients are able to access the server. Graphics clients display selected data according to the requirements of individual traffic dispatchers. A large-scale wall projection is also connected to the system.

Information Panels in Vehicle. The system enables text to be transferred from the centre in real time and to be displayed on information panels inside or outside of the vehicles.

Loudspeaker System in Vehicles. Similar to text for visual panels it is also possible to transmit messages on-line to the loudspeaker system inside or outside the vehicles.

City Transport Vehicle Preference at Crossroads. City transport vehicles which are in delay according to the timetable may request a crossroads control system for a free passage through (green light) a crossroads upon approach. If the situation allows this then the traffic through the crossroads is optimised to the city transport vehicle's advantage.

Interconnecting of Voice and Data Networks. The dispatcher can dynamically create a group of voice network users and speak to them all at once. This option for creating a group of voice network users is made use of in the case of traffic incidents, traffic jams in certain locations, etc.

SCADA system. The MORSE network also transmits data for a completely independent telemetric system for managing traction distribution of the transport company's electrical energy.

Statistics. Data stored on the central server can be used for statistical purposes and subsequently, e.g. for optimisation of timetables.

Expansion. Thanks to using the MORSE system the BMTC has the option of implementing additional applications, e.g. connecting on-line terminals for accepting payment cards or special prepaid cards in vehicles, connecting to ticket machines, etc.

MORSE & CIS

MORSE is an optimum communication system for CIS. Thanks to the **unique** properties of the **radio modems** used it is possible to achieve minimum transmission times even when the network is under maximum load.

Infrastructure. The desired territory (approx. 250 km^2) is covered by 25 base stations. There are 3 types of base stations in the MORSE system:

a) connected via IP (Ethernet). The main base stations are connected via a private WAN. For communication with the centre the **unique** properties of the MORSE system are used, meaning it is possible to **transmit MORSE packets** over any transmission medium, and in this case over the **IP network**.

b) connected over the radio channel. In places with less traffic the base stations are connected to the centre via radio modems on a separat radio channel.

c) connected to a “mobile” frequency. In border regions of the network with less traffic base stations may be connected to the centre via neighbouring base stations on the same frequency which are also used for communication with mobile vehicles. This method of connection is possible thanks to the other **unique** properties of the MORSE system, where **several virtual networks** can be operated on a **single frequency**.

Mobile Vehicles. Approximately 700 mobile vehicles (buses, trams, trolleybuses and service cars) are constantly in operation in the network. Each vehicle communicates with the centre at least every 30 seconds. Even though the MORSE system belongs amongst the fastest radio systems in the world the fleet had to be split into two groups. Each group uses a single 25 kHz simplex channel in the 400 MHz band.

Method of Communication. Mobile operation in the MORSE system uses a **unique** internal **algorithm**. This algorithm makes maximum use of the advanced parameters of RACOM radio modems minimum switching time (< 1,5 ms) and maximum signalling rate (21,68 kbps). The mobile station sends each packet at a given moment to the strongest base station, thus achieving the maximum possible propability of packet delivery.

The onboard computer in each vehicle communicates with the radio modem over RS485 using the Modbus protocol and the data server in the centre is connected to the MORSE network using the UDP/IP protocol.

Hardware. Each vehicle is fitted with 2 radio modems: MR25 (predecessor to the MR400) in the 400 MHz band with a rate of 21,68 kbps and MR900 in the 868 MHz band with a rate of 96 kbps.

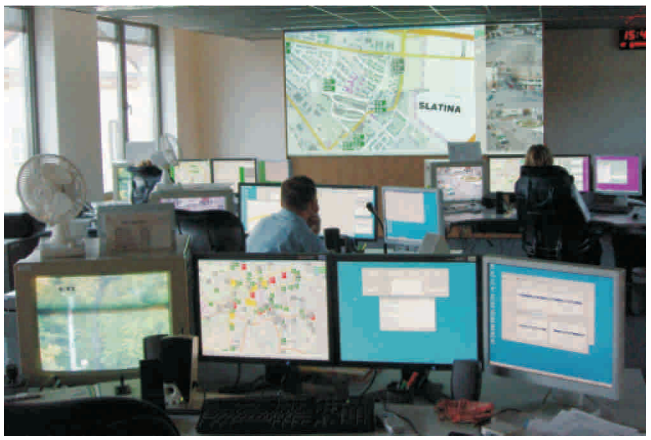
MR25 is used for data transmission to/from the onboard computer (standard mobile operation), MR900 is used in depots for nightly upgrading of onboard computer and loudspeaker system software in vehicles and when travelling for communication with crossroads. When upgrading equipment SW in vehicles another **unique** property of the MORSE system is used – **broadcast way of transmitting**, allowing all vehicles to be upgraded at once.

Frequency. The radio network uses a total of five private 25 kHz simplex channels in the 400 MHz band: two for communication with mobile vehicles, and three for communication with b) type base stations. In the 900 MHz band one 250 kHz channel (general licence) is used.

Network Management. Other **unique** RACOM products are used for managing and monitoring the MORSE radio network: RANEC (MORSE Network Centre) and MRemote (MORSE Remote control).

RANEC is a comprehensive modular HW and SW package, which enables conventional **Network management** (monitoring traffic, displaying alarms, on-line service actions, etc.).

MRemote is a **remote access** module, via which the RACOM service and monitoring centre is permanently connected in case of the need for remote support or servicing.



Conclusion

The MORSE network has been used by BMTC since 2004. Experience gained by the operator shows that the network has fulfilled all its expectations as regards capacity, speed and reliability. Somewhat higher purchasing costs are now balanced by minimum operating costs and independence from public data networks.

It is hard to imagine that different technology, when considering the same operating and acquisition costs, could fulfil the requirements that are placed on the MORSE network in this application: approximately **50 MB of data per day** are transfered over the network (at peak times up to **5 MB/hour**) in **packets** of an average size of **43 bytes**. A typical **traffic delay** (time for delivering a packet) is **900 ms** (the shortest time is 40 ms, and the longest is up to 5 seconds).

Control and Information Systems are a hot topic in the field of city transportation these days. The wide range of visitors who have come to the Municipal Transport Company in Brno to draw experience is proof of this. Only in the last year have approx. 40 companies from 20 countries on 5 continents visited BMTC in order to see a demonstration of the described CIS.

Innovations of the MR400 and MR160

GPS module

March 2006 saw the release of MR400 and MR160 radio modems with an integrated GPS module, which is fitted as standard in to the second slot, e.g. MR400M2C-N-GPS-232-N-N. The first can be used too.

Technical Parameters

Receiver: 16 channels
L1 frequency, C/A code
Accuracy: position: 2,5 m CEP
SBAS: 2,0 m CEP
time: RMS 50 ns, 99 % < 100 ns, granularity 43 ns
Antenna: external, SMA connector
Supports multiple SBAS systems for correction (WAAS, EGNOS)

Outputs: (the following are available on the module for external devices):
RS232 with NMEA-0183 protocol
Time pulses: period 1 s, length 100 ms
(period from 1 ms to 60 s available upon request)

Inputs: One digital input (transmission of its status to the centre)

The GPS module in the MORSE network communicates via the existing GPS protocol which is used for communication with the externally connected GPS receivers.

SLEEP Mode

In locations where emphasis is placed on minimum radio modem consumption it is possible to operate MR400 and MR160 in the so-called SLEEP mode. In this mode radio modem consumption drops to only **2,5 mA**.

The transition to SLEEP mode can be accomplished by sending a special packet over the network (from the customer's application or from RANEC software).

There are three ways to return to the active mode:

1. automatically at the end of the set period (10–86 400 seconds)
2. by sending any data packet to SCC2 or SCC3
3. by disconnecting the power supply for more than 15 secpnds

MR160 – 25 W

RACOM has finished development of the MR160 radio modem with an output power of 25 W. Besides the standard model with an output of 5 W the new version with an output power of 25 W will be available on the market as soon as the current homologation process will be complete.

MD160

RACOM has developed a MD160 radio modem, which is a fully **duplex version of MR160**. MD160 has an output power of 25 W and works on a duplex pair of frequencies, typically with 4,6 MHz spacing. We are now finishing modifications to the protocol on the radio channel so that both duplex channels are exploited as much as possible and thus increasing the throughput and capacity of the MORSE network.

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RACOM introduces a new partner

At the beginning of December 2005 RACOM began cooperation with the **Dutch** company **Schipper Mobiele Telecom**.

Schipper Mobiele Telecom has been working on the telecommunications market for 11 years and is one of the main providers of telecommunications systems for **Rotterdam Harbour**.

The first project materialised in cooperation with RACOM has focused on a solution for a communication system for container lorries within the mentioned harbour. The system transfers a GPS position and some other operative information from 14 vehicles

through 1 base station to a centre. Initial tests were successfully run and RACOM's products have again proved their qualities.

Shipper Mobiele Telecom has opened other negotiations with its customers and partners so both companies are expecting future projects to be materialized using the MORSE system.

MORSE in Japan

Due to their unique technical capabilities RACOM's products are even used in advanced countries such as Japan. The land of the rising sun is the **45th country** on our list of countries to where MORSE systems have been exported.

RACOM delivered a MORSE communication system used for data transfer between an oil rig and surrounding ships in cooperation with the Japanese company SKK Fuchinobe. Pilot installation is now underway and both companies hope that this is just the beginning of long-term profitable cooperation.

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