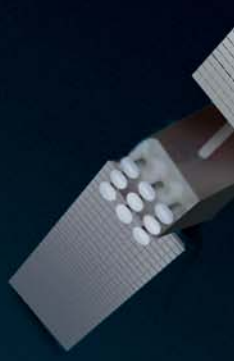
REMOTE DATA TRANSFER WITH GPRS TECHNOLOGY

The use of GPRS transmission technology in existing call-up systems



The liberalisation of the energy markets has also increased the requirements imposed upon devices in the field of remote data transmission. Data from volume correctors and data loggers has to be read out in shorter cycles. These requirements can only be fullfilled with the help of powerful call-up systems which are fitted with GPRS technology. The technical details and advantages that lie behind the abbreviation GPRS (Global Packet Radio Service) were explained in the Profiles issue 3/2004.

Resulting from this, a number of questions have arisen:

- How can this transmission technology be used for the remote data readout of meters?
- Can the existing EK260, EK230 volume correctors and DL240 data loggers still be used?
- What changes or modifications are necessary so that GPRS communication can be integrated into an existing infrastructure?
- Can this technology be used in connection with the WinCOMS data call-up software?

In this article we would like to answer these questions, and some more on top of that.

GPRS data transmission is a service available in GSM networks just like voice and circuit switched data transmission (CSD). Therefore, in principle, GPRS uses the same transmission components as modems and antennas. It is a connection-free and packet-oriented service which uses the TCP/IP protocol and, consequently, this must be supported by all components involved in the remote data transfer system.

One possibility to be able to use GPRS in data transmission from volume correctors and data loggers is to implement the necessary TCP/IP communication elements into the actual device firmware. On top of that, it is also necessary to develop corresponding modules for use in the counterpart systems, i.e. the call-up software, which also support the TCP/IP protocol. This, however, involves time-consuming and cost-intensive modifications to an already existing system. Besides, a firmware update in approved volume correctors which are already in operation can only be carried out under the supervision of the calibration authorities, which once again incurs considerable costs.

A major economical alternative is the use of components which already provide the required modifications to the extent that they can be used in the available infrastructure without further ado.

To do this for DL240 data loggers and EK260 volume correctors, it must be ensured that it is possible to communicate via the TCP/IP protocol.

For the call-up system, which is normally designed to use physical modems and static telephone numbers, the following measures are necessary:

- Implementing the TCP/IP protocol for the purpose of data transmission
- Mapping the dynamic IP addresses used in the GPRS network to static telephone numbers
- Mapping communication channels (TCP sessions) to “virtual” serial COM ports and “virtual” modems to get access to the GPRS network.

In order to implement this method, Elster-Instromet is able to provide a system which minimises the effort involved in adapting the devices in an existing infrastructure, whether it is a question of refitting the data logger or the volume corrector or integrating the modifications into the data transfer system.

As long as the DL240 data logger (from firmware 2.0 / January 2003), the EK260 volume corrector (from firmware 2.1 / June 2003) and the EK230 (from firmware 1.22 / January 2004) are basically suitable for transmitting data in the GPRS network, the required support for the TCP/IP protocol is not implemented into the device itself but rather into the modem. Depending on the version of its hardware and firmware an already existing GSM modem can be updated or must be replaced. The already available antennas can still be used.

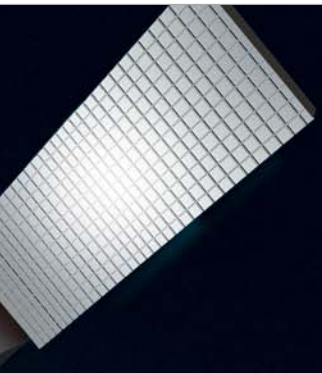
TSC-Server maps dynamic IP-addresses to static telephone numbers

1) logging into GPRS network

2) logging into TSC system

GPRS Station with TSC-GPRS-Modem

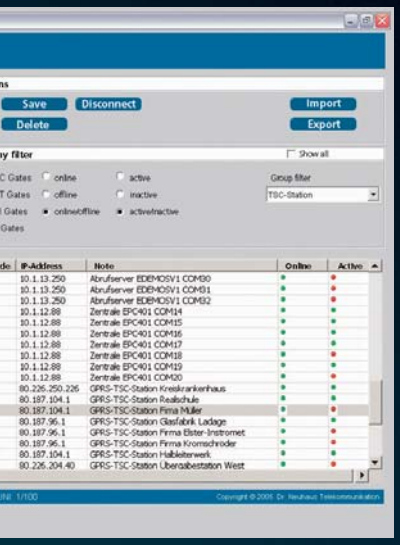
3) actual data transmission



When it comes to data call-up systems, the software package TAINY SwitchingCenter (TSC) from Dr. Neuhaus Telekommunikation GmbH is available for use. This system consists of three components:

- TSC Server
- TSC Manager
- TSC ComPortClient

The heart and soul of the system is the TSC Server. It has the job of creating a link between the GPRS network and the call-up software. In doing this, the dynamic IP addresses allocated in the GPRS network for the purpose of identifying the stations are mapped to static telephone numbers (see diagram). These numbers can be used just like conventional telephone numbers by the call-up centre down the line in order to call up the data from the various devices.



Since it is connected to the internet, the TSC Server is protected against any form of attack by firewalls and is, therefore, stored in a particularly safe area in the main server, the so-called demilitarised zone (DMZ). As a result of this, it is necessary to have a remote console to set parameters, a job which is done by the TSC-Manager.

The third component of the software system is the TSC ComPortClient. This component sets up on the one hand a network connection to the TSC Server and, on the other hand, provides communication channels in the form of virtual serial interfaces and modems.

The connection between the modems in the data logger or the volume corrector and the TSC Server is set up with the help of a clever log-on procedure (see diagram). For this purpose, the fixed IP address of the TSC Server is entered in the settings of the modem when it is first started up. After the modem has logged into the network of the mobile network provider, it is then allocated a dynamic address (1). This dynamic address registers the modem together with the information concerning the metering point (including right of access) with the TSC Server (2). When this has been completed, the metering point is then online and the actual data communication can begin (3). Additional monitoring functions such as a Watchdog, which monitors the accessibility of the individual modems, round off the system. For this purpose, and also in order to control the whole data communication process, the TSC protocol is implemented into both the GPRS modem and the TSC system. This protocol will in the near future be released as a standard protocol.

By using the virtual interfaces and the static telephone numbers that have been made available by the TSC system, any existing call-up software, e.g. Elster-Instromet's WinCOMS, can then carry out the call-up of the data from the data loggers or the volume correctors in the normal fashion.

The use of a GPRS modem with an integrated TSC protocol and in connection with the software system TAINY SwitchingCenter provides a simple and elegant way of integrating the GPRS transmission technology into an existing Elster-Instromet hardware and software infrastructure.

This in turn offers a number of advantages, e.g.

- The hourly readout of archive data is possible at a reasonable cost
- It is possible to have many parallel connections to metering points with only one network connection
- It is possible to save hardware (modems) and telephone connections in the main centre

Would you like to make use of these advantages? – We'll give you all the support and any advice you need to meet your individual requirements.

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Log-on procedure for GPRS network and TSC Server

Modem logs into GPRS network →

Modem is registered and receives a dynamic IP address ←

Procedure of TCP/IP session →

Modem logs into TSC Server with log-in name and password and provides its IP address at the same time →

TSC Server informs Modem of Watchdog time interval ←

Data transmission phase (on request) ↔

GPRS switching computer in DMZ with Dr. Neuhaus TSC-Server