When an outage occurs, power companies use a procedure called sectioning to localize the break. By using disconnectors to selectively switch out sections of the network, the portion of the network where a line is down can be isolated. This allows a repair team to be dispatched to the correct location almost immediately and power to be restored as quickly as possible. The power utilities Vattenfall and Graninge, along with more than 100 other power companies in Sweden and Finland, work with the Finnish company Netcontrol, which develops, markets and supplies monitoring and control systems for energy production and distribution.

In Vattenfall’s case, Netcontrol has supplied equipment for controlling line disconnectors, small remote control stations and its entire communications network. For Graninge, Netcontrol has provided equipment for all network monitoring. In both cases, Netcontrol provided the Mobitex equipment, as well as the gateway between the Mobitex system and the control and monitoring system.

**Operation interruption**

Both Vattenfall and Graninge, which is now part of Sydkraft and its parent company E.ON, have been working with Mobitex for many years. In Graninge’s case, Per Sundqvist, who was formally operations manager for Graninge’s network in central Norrland, began working with Mobitex in the mid-1990s, when it was introduced in the company’s forest operations for the collection of data for felling plans. Based on this experience, Graninge quickly introduced Mobitex in its power operations for the purposes of controlling disconnectors, circuit breakers and monitoring various alarms. In some cases, Mobitex is also used for collecting analog measurements from the network.

“Mobitex is extremely reliable and provides superb coverage,” says Per Sundqvist. “In the beginning, we ran tests and performed various control measurements, but we stopped doing that long ago. There has not been a single interruption of operations in ten years. Occasionally there may be temporary disturbances, but they are not noticed, since the traffic always gets through.”

Tage Nilsson, who is an engineer with Vattenfall, has had similar experience. His company has been using Mobitex to control the power networks in northern Sweden since 1998 and is adding new areas all the time. This area offers some of Sweden’s harshest weather conditions. Nilsson says: “Many times it is our own equipment that does not work. Conditions can be extreme, and battery back up for circuit breakers that require considerable power to operate can be a problem. Mobitex, on the other hand, is a solid performer.”

**Severe conditions**

The equipment most commonly used for sectioning in northern Sweden is Netcontrol’s M 2001 pole-mounted disconnector, which is a complete package that includes a motorized actuator, a modem, communications equipment, a remote control unit, heaters and a power supply with a battery backup. Once mounted, the unit will rarely need servicing. In Netcontrol’s own tests conducted at the Tampere Institute of Technology, the unit continued to function even when the disconnector was covered with a 10 mm coating of ice and operating at a temperature of -50°C.

“Several customers including Graninge evaluated GSM and other alternatives for operation under these conditions but in the end chose Mobitex,” reveals Netcontrol’s Lars-Gunnar Liff. “In addition to issues of network coverage and reliability, it was difficult to find GSM equipment (radio network solution) with a dependable battery back-up. In a situation where a line goes down and the power is out, the battery back up simply has to work.

In a region like northern Sweden, where weather conditions are harsh and temperatures can remain below -25°C for days on end, power outages are relatively common but can be life-threatening. The power companies serving therefore need to identify where a line is down as quickly as possible.
Otherwise the whole system is useless.”

Netcontrol is currently in the process of expanding Vattenfall’s equipment and adding Mobitex installations in more locations. In this project, the use of Mobitex in Netcontrol’s monitoring and control systems will be expanded to include transformer stations and small power stations. More data will also be accommodated. Netcontrol considers communications to be central to its remote control and monitoring solutions and prides itself on its extensive expertise in communication protocols and systems.

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Restoring power
On 8 January 2005, southern Sweden was hit by one of the worst storms in decades. Before it was over, 415,000 households were left without electricity. This massive power outage naturally also affected telephones and other communications networks. Fortunately, Mobitex weathered the storm and was always available to repair crews as they began the major task of restoring power.

Communication needs were twofold during the repair work. First and foremost was the need to manage resources to ensure that power was restored as quickly and efficiently as possible. Of equal concern was security, since many tasks could not be performed without adequate coordination. “The Mobitex network provided excellent coverage and proved to be extremely robust during the storm and its aftermath,” says Johnny Olsen, product manager at Mobitex operator Multicom Security. “These are factors that all companies and public authorities should take into consideration in procuring equipment for mobile communication.”

Automated distribution
In Sweden, Vattenfall and Graninge have been using Mobitex for many years to monitor and control critical aspects of their power networks. However, in China, where Mobitex is regarded as a new technology, Electric Power Technology is implementing two pilot projects to evaluate a new concept. Initially, each pilot installation will consist of about 100 measurement points served by three or four Mobitex base stations. The Electric Power Technology system measures power and collects data at different points in the local network from distribution substations out to smaller transformer stations and beyond. These readings make it possible to determine where power losses occur and analyse their causes. At each measurement point, readings are taken several times per hour, and the total amount of data to be transmitted may be as much as 100 kilobytes per day for locations at which data from several measurement points is concentrated before being sent over the Mobitex network. In many cases, measurement equipment will be mounted on poles. Because power consumption is being monitored in near real time throughout the distribution network, it is possible to automate power distribution and dynamically reconfigure the network as consumption patterns change, thus increasing efficiency. The system naturally also meters consumption and provides the raw data for billing.

New advances
Mobitex has an open standard that is compatible with a wide range of hardware and software components. Competition among hardware manufacturers in combination with new advances in chip design are driving down prices for modems to the point where wireless connectivity is a viable option in an increasing number of applications. Mobitex is used within many organizations and has increased profitability while improving service. For municipal authorities and local governments that must satisfy public demand for services, and in many cases are obligated by law to do so, delivering better service using fewer resources often seems an impossible task. Wireless data communication brings simplicity to the complex equation of delivering better service by making innovative use of technology.

Important services, such as energy and water distribution, may remain the same, but wireless data allows them to be organized in a different way that reduces administration and makes service delivery more efficient, thus reducing costs.