Quality in the Power System

The fault and power quality recording system at CFE

The company

The Comisión Federal de Electricidad (CFE) is a state-owned utility in Mexico. It is responsible for generating, transmitting, and distributing electrical energy for over 21 million customers. CFE also allocates energy to regional power distribution companies such as Luz y Fuerza in the Mexican Federal District.

Because of undefined power system disturbances and limit violations, CFE operates an extensive power quality system. This system stretches from the northern Baja California Peninsula region to the southern Yucatan Peninsula region.

The starting situation

Currently, CFE has an equipment pool of 173 digital fault and power quality recorders (SIMEAS R), 40 fault recorder systems (OSCILLOSTORE P531), and 4 data concentrators (DAKON). To date CFE has operated the installed fault recorders in off-line mode.

Operating the fault recorders in isolation requires each CFE agent to have a laptop with its own OSCOP P license, resulting in many single-user licenses and thus higher costs. Data transfer takes place manually and remote data transmission is not available.

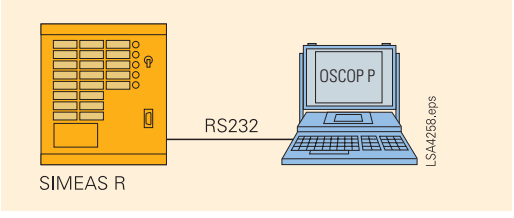

Fig. 3 Fault recorder in off-line mode operation

Fig. 1 CFE at a glance

Fig. 2 Overview of the CFE regions with an installed SIMEAS R digital fault and power quality recorder

The concept

CFE and Siemens Mexico collaborated to develop a concept that met the following requirements by the customer:

- Quickest possible fault analysis
- Central data management
- Central parameterization
- Integration into the existing communications infrastructure

The challenge was to install 16 analog channels (8U/8I) in one central unit – a special requirement influenced by the American competition.

Automatic data collection and processing

The fault records of the analog and binary channels are recorded in the individual systems by the fault recorders (SIMEAS R) and automatically collected and processed in a data concentrator (DAKON).

Flexible access

The DAKON is an industrial PC to which several SIMEAS R and numerical protection relays can be connected. The fault recorders can connect to DAKON using either fiber-optic cable or a LAN. The DAKON also provides the option of remote access from regional evaluation stations. Normally this access relies on the communications structure the customer provides, which in most cases consists of an analog telephone network (see Fig. 4).

Real-time synchronization via GPS

In the DAKON, parameters (OSCOP P software) define which information from the fault recorders should be automatically transmitted. Real-time synchronization is necessary so that the data recorded at the various points can be allocated clearly to each fault event. CFE decided to install synchronization using GPS (global positioning system) receivers. High-precision real-time synchronization allows users to compare the logs of the connected fault recorders with those of the protection relays from different locations.

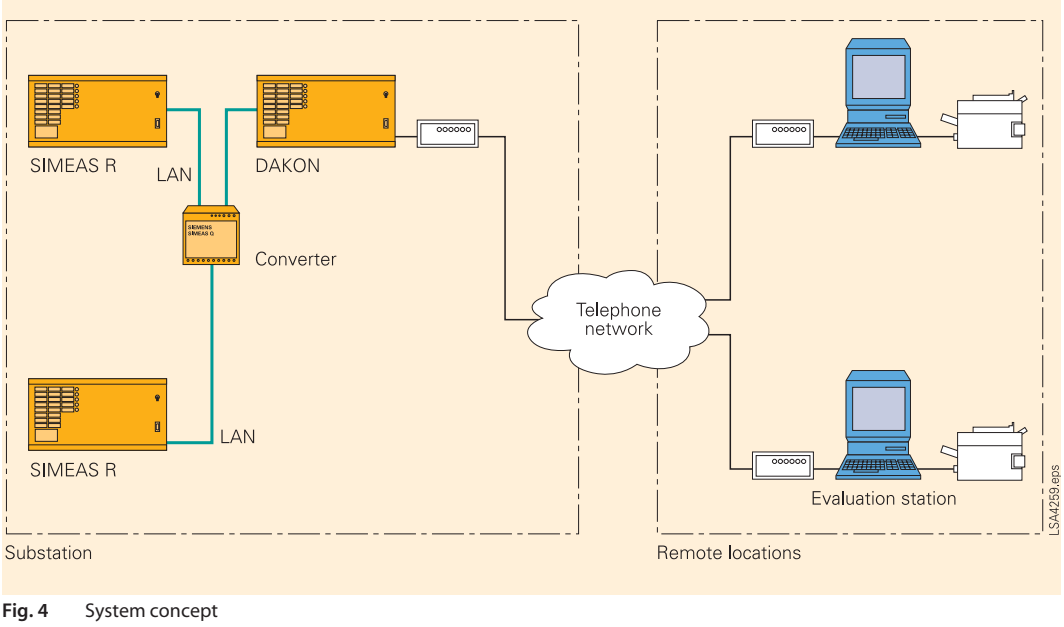

Fig. 4 System concept

The special advantages

Always flexible

The SIMEAS R is a multifunctional recorder with the following basic functionalities:

- Fault recorder
- Power/frequency recorder
- Round-the-clock (digital or mean value) recorder
- Message printer
- Voltage dip recorder

Of these five functionalities, CFE primarily uses the fault recorder.

Optional add-on package

In addition, CFE acquired the optional add-on package for OSCOP P. This software module (DIAGNOSE) enables automatic calculation and reporting of the fault location on a line.

Conclusion

The comprehensiveness of the SIMEAS R and OSCOP P fault recording system provides CFE with a uniform system with no limits to further extensions. The profound know-how and expertise of the local Siemens project managers was decisive in achieving the high degree of customer satisfaction.

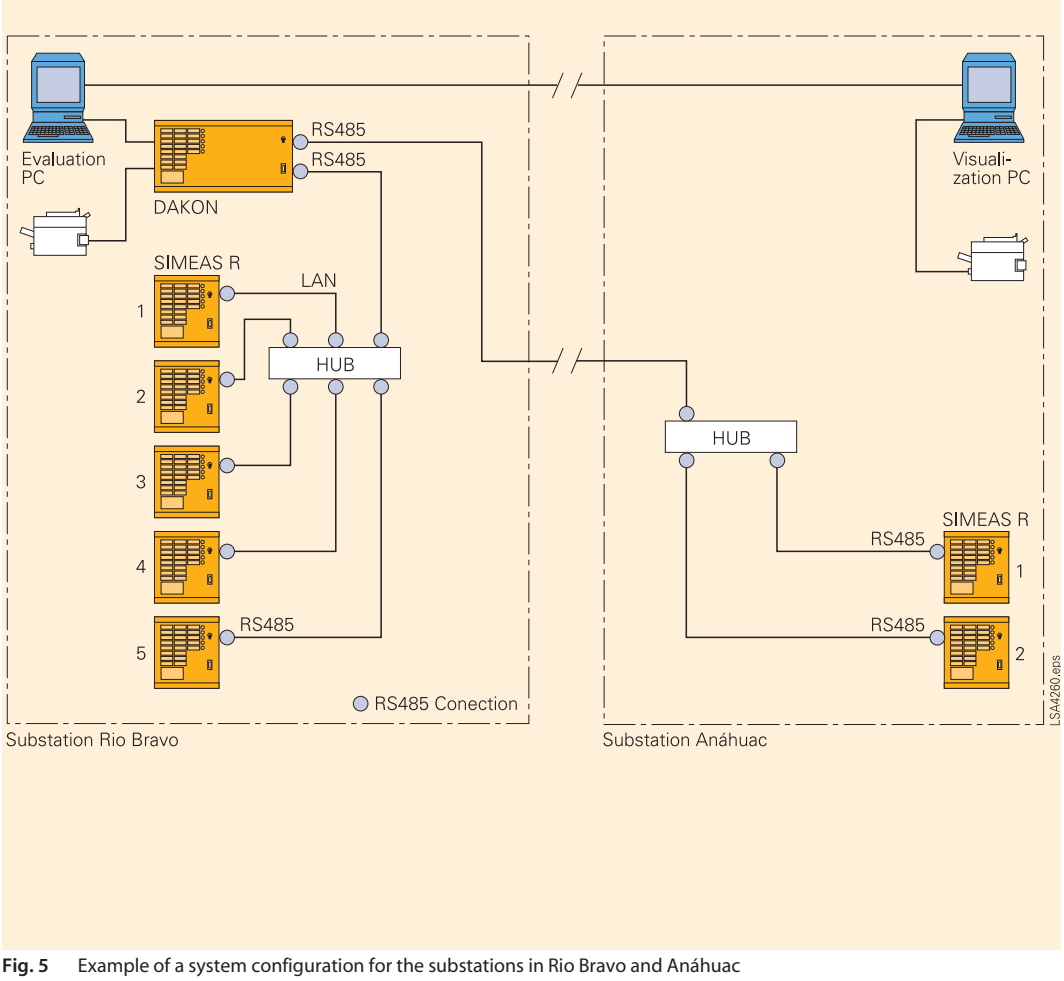

Fig. 5 Example of a system configuration for the substations in Rio Bravo and Anáhuac