Application

The SPIDER platform provides functions for communication between different control centers. The control centers may be individual centers or centers organized in a hierarchy. SPIDER also provides communication to external SCADA/EMS systems, accounting, billing and other information systems.

The basis for the inter-center communication is the IEC 60870-6/TASE.1 ELCOM protocol which is a standard method of inter-center communication.

ELCOM provides reliable and efficient data transfer in a transparent environment. Exchange of real-time data as well as statistical, historical and planning data is supported. To exchange functionality so that one control center e.g. takes over the night shift duties of one or several other control centers.

SPIDER supports a wide range of other standard protocols, such as IEC 60870-6/TASE.2 (ICCP).

When special customized protocols are required they might as well be developed and integrated with the system.

Benefits with inter-center communication
- Provides a fast and secure information exchange between control centers.
- Data that are collected by the field equipment can be used for new applications, also in other systems.
- Possible to process data locally and send the results to the master station computer for storage.
- The computational capacity of the control center can be increased without having to upgrade the hardware by using free capacity in another control center.
- ELCOM supports popular low level communication protocols such as DECnet, X.25 and TCP/IP.

Functions

SPIDER inter-center communication meets the increasing need for automated acquisition of data from different information systems.

The following data types are handled:
- telemetered values, i.e. indications and measured values
- control commands and setpoint values
- time stamped data
- historical data for statistics and reports
- future data for schedules and forecasts
- device status, e.g. RTU status

All transmitted data are marked with a quality flag, indicating the source of the data and its corresponding status.
Functions (continued)

The control center that requires the data is responsible for its definition and the transfer of the data sets. The definitions are done dynamically and stored in the remote system.

Modes of transfer
ELCOM provides four basic ways of transferring data:

- Initiated Data Transfer: Typically used by the operator at the process computer for a "manual" data request from the off-line system. Requests can be made periodically from the Initiator.
- Spontaneous Data Transfer: Data is transferred as soon as an event has occurred. Typical data for this mode of transfer is circuit breaker change of state.
- Cyclic transmission of measured values, indications and general data from the real-time database.
- Mixed data transmission mode (spontaneous-cyclic transfer with delay) of measured values and indications from the real-time database. Many data values from any group can be packed together and transmitted in the same buffer. A delay is implemented to buffer up a number of changed values in the responder side. The transmission occurs, when the timer expires or the internal buffer is full. The delay is set by the responding system as a system parameter.

ELCOM
ELCOM is an IEC standard protocol based on the Open Systems Interconnection (OSI) reference model. A complete implementation consists of the user element, the application programming interface and the protocol layers.

User element: The User Element implements database to database communication between SPIDER systems and other remote systems using the standard communicating services provided by the ELCOM protocol.

The User element comprises:
- An Initiator to initiate requests to remote systems.
- A Responder to respond to request from remote systems.
- A Supervisor to supervise and monitor ELCOM links.

Application programming interface (API): The ELCOM protocol contains a basic set of application services for user software in an API Library. The services are used by the Initiator and Responder to implement inter-center data exchange.

ELCOM Application Layer: Standard ELCOM Services are implemented in the Application and Presentation layers of the Protocol:

- Attach Services
- Association Establishment Facility
- Association Termination Facility
- Data Transfer Facility
- Command Transfer Facility

ELCOM Presentation Layer: acts as an isolation layer between the application layer and various options for transport and network services. The presentation layer has services for connection management and data transfer.

Human Machine Interface (HMI)
The SPIDER HMI provides a number of control pictures that present the status of the ELCOM function. Start and stop of ELCOM is also initiated from these pictures.

Information about the communication with remote systems such as addresses and communication protocols is displayed. The timer specifications for cyclic requests of time tagged data and real-time data are also included in the displays.

An on-line help defines the parameters and error codes in these pictures. Information about connections, groups and objects are presented in a status lists. The user is provided with a menu of all available ELCOM status lists.