What is SCADA?

SCADA stands for Supervisory Control and Data Acquisition. As the name indicates, it is not a full control system, but rather focuses on the supervisory level. As such, it is a purely software package that is positioned on top of hardware to which it is interfaced, in general via Programmable Logic Controllers (PLCs), or other commercial hardware modules.

Contemporary SCADA systems exhibit predominantly open-loop control characteristics and utilize predominantly long distance communications, although some elements of closed-loop control and/or short distance communications may also be present.

Systems similar to SCADA systems are routinely seen in factories, treatment plants etc. These are often referred to as Distributed Control Systems (DCS). They have similar functions to SCADA systems, but the field data gathering or control units are usually located within a more confined area. Communications may be via a local area network (LAN), and will normally be reliable and high speed. A DCS system usually employs significant amounts of closed loop control.

SCADA systems are used not only in industrial processes: e.g. Manufacturing ,steel making, power generation (conventional and nuclear) and distribution, chemistry, but also in some experimental facilities such as laboratories research, testing and evaluation centers, nuclear fusion. The size of such plants can range from as few as 10 to several 10 thousands input/output (I/O) channels. However, SCADA systems evolve rapidly and are now penetrating the market of plants with a number of I/O channels of several 100K.

What is data acquisition?

Data acquisition refers to the method used to access and control information or data from the equipment being controlled and monitored. The data accessed are then forwarded onto a telemetry system ready for transfer to the different sites. They can be analog and digital information gathered by sensors, such as flow meter, ammeter, etc. It can also be data to control equipment such as actuators, relays, valves, motors, etc.

So why or where would you use SCADA?

SCADA can be used to monitor and control plant or equipment. The control may be automatic, or initiated by operator commands. The data acquisition is accomplished firstly by the RTU's (remote Terminal Units) scanning the field inputs connected to the RTU (RTU's may also be called a PLC - programmable logic controller). This is usually at a fast rate. The central host will scan the RTU's (usually at a slower rate.) The data is processed to detect alarm conditions, and if an alarm is present, it will be displayed on special alarm lists. Data can be of three main types. Analogue data (i.e. real numbers) will be trended (i.e. placed in graphs). Digital data (on/off) may have alarms attached to one state or the other. Pulse data (e.g. counting revolutions of a meter) is normally accumulated or counted.

The primary interface to the operator is a graphical display (mimic) usually via a PC Screen which shows a representation of the plant or equipment in graphical form. Live data is shown as graphical shapes (foreground) over a static background. As the data changes in the field, the foreground is updated. E.g. a valve may be shown as open or closed. Analog data can be shown either as a number, or graphically. The system may have many such displays, and the operator can select from the relevant ones at any time.