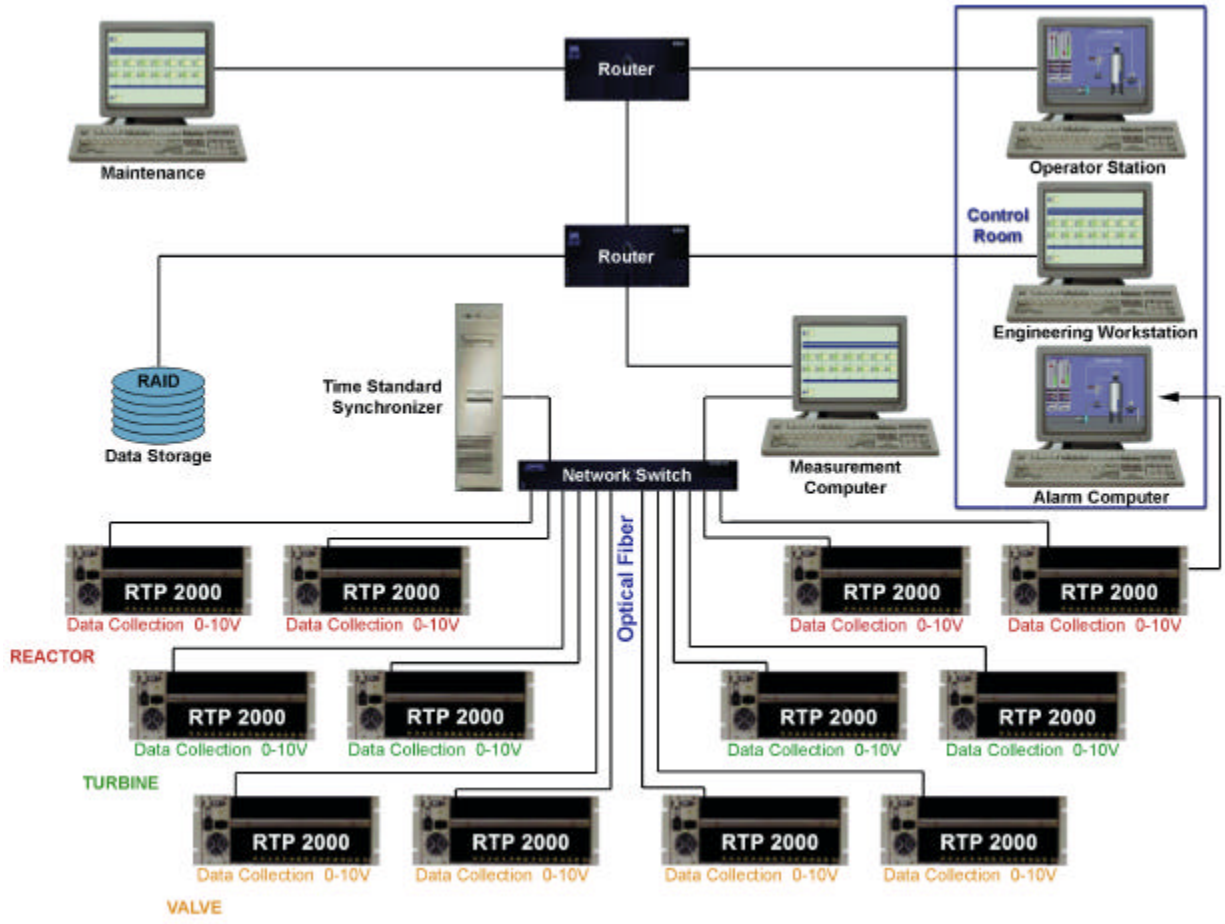
RTP 2000 Data Collection System for Nuclear Power Plant Monitoring

New measurement systems have been installed at the Forsmark Sweden nuclear power plant. These systems collect operational data from two of the plant's three reactors. Each system consists of approximately one thousand 0-10V analog points, which are collected by data collection nodes located throughout the facility. The system architecture is shown in the illustration below.



Forsmark Data Collection System

The heart of the measurement system consists of twelve interconnected RTP 2000 Hybrid Control System nodes. These nodes interface with the measurement computer system via industry standard network protocols over a fiber optics medium.

Fiber optics technology is more immune to the high EMI/RFI levels typically encountered in power generation plants than traditional copper-based networks, and it also helps to electrically isolate the different systems from each other, which is a preferred safety action. The original cabling was retained and used to connect the RTP 2000 data collection nodes with the measurement points. This reduced the changeover work, saving time, and avoided additional associated costs that may have been incurred.

The measurement system's data collection rate operates at 100 Hz. With data being collected from each RTP 2000 node every 10 milliseconds, coordinating that many measurements with the high sampling frequency requires that all of the nodes are closely synchronized. Time synchronization is performed by an independent system, which uses an external time-standard. It monitors RTP 2000 nodes and updates each node's clock as required, which keeps all clocks in the system in sync with each other within one millisecond. This helps to ensure that collected data are accurately maintained when required for historical analysis purposes.

An independent disk subsystem is used to record the measurement data collected from the RTP 2000 data collection nodes. Using RAID (Redundant Array of Inexpensive Disks) technology to record measurement data over several disks means that even if one of the disk drives fail, previously recorded data can be recreated, and the integrity of the measurement system will be maintained.

All the computers in the measurement system are commercial grade PCs manufactured by Compaq, and the operating system is Windows NT.

The task of these measurement systems is to collect operational data for analysis. These systems do not perform any functions used to control the plant, therefore they operate completely independent of the process control system. The only connection is a separate alarm signal advising the plant operators that something needs attention.

The process control system and the measurement systems are also isolated from each other for security reasons. In addition, only the measurement systems are connected to the outside world through the plant network. Isolating the process control system from the Internet greatly reduces the risk that hackers could compromise the integrity of the plant.

These high-performance measurement systems were provided to Forsmark by Intertechna AB, Nolgårdsvägen 11 B, S-663 41 HAMMARÖ; Sweden. For more information, please contact Mr. Lars Djuvfeldt at the above address or by phone at (+46) 54-52 10 00.