SUPervisory Control and Critical Infrastructure Systems

SESSION no. 5
Programmable Logic Controller (PLC)

Industrial Process Control

- Simple programmable scheme
- Structured text

STANDARDS

Power Supply
- D I
- A I
- A O
- CPU

Controller

Justification

University of Idaho
vendor capabilities beyond minimum for standards
- Originally RTU was simply an interface
  - Convert between formats for communicating data or commands

1960s/1970s:

- 1980s
  - Starting to look like PLC
    - Modular I/O boards
    - Logic engine
  - Evolving to real-time OS
RTU - Remote Terminal Unit (older: Remote Telemetry Unit)

"Geographically" - distributed control

- Originally Pakistan
- General Electric

Master

- RTU
- RTU
- RTU

Comm.

Xref. Digital
Modern RTU - Super PLC

- Power Industry Product

Real Time Automation Controller (RTAC)

- Capable of interfacing to "traditional" I/O
  - Digital & Analog I/O to sensors/actuators

- Communicate with other automation controllers
Distributed control system where remote units have more autonomy.
MASTER (Control center)

I/O from Field

Front End Processor

Display (Mimic panel)

Real-time database

Data Historian

RTUs/PLCs etc

Power Inducts 2-10 sec (was 30 sec or more)

Policy command

Correlation location

Time alarm

Management system
Front End Processor Examples

1. Energy Management System
   - at utility level operating center
   - piece of a large interconnected system that spans much of a continent
   - interacting control areas
   - ICCP - control/comm between control centers
Power System

- Complex
- Non-linear
- Real-time balance between generation and load
  - Limited energy storage

- Take measurements
- Determine "state" of system
  - Screen to determine operating margin