SCADA Upgrade-O-Rama

Order of Presentation

• Programmable Logic Controllers (PLCs)
• Human-Machine Interfaces (HMIs)
• Computer Hardware
• Computer Software
• Remote Access Capabilities
- Provide overview of existing and new technologies
- Equip operators, administrators and supervisory staff with a knowledge of options so they can provide input and ask the right questions when facing a SCADA upgrade project.
Manufacturers

It’s all about

- Reliability
- Service and Serviceability
- Support
- Longevity
- Installation base

Allen-Bradley is most common in this area.

There are others, but they may not meet all these considerations.
Design Considerations

- Although they have a long service life, models are updated and replaced from time to time.
  - **Small Logic Controller - SLC**
    - Older platform that is on the “Legacy” path.
  - **MicroLogix**
    - Ethernet Communications
    - 1100 remains applicable for small applications
    - 1400 was introduced a few years ago, often replacing other MicroLogix models
Design Considerations

- **CompactLogix Family**
  - Utilizes a different programming logic than the MicroLogix PLCs, and used to be best for larger applications.
  - A new, smaller CompactLogix is now available, the most recent with on-board Input and Output (I/O) capability, making it an affordable way to have all plant PLCs of same platform.

- **ControlLogix Family**
  - For large-scale applications
Design Considerations

- Communication to Field Devices and Motor Control (Traditional)
  - Wired directly to I/O cards in PLC
    - Good application for communication within a building
    - Requires more field labor for new installations
    - Possibility of installation error, damage or degradation over time.
Design Considerations

- Ethernet, Wired (Copper, CAT 6 cabling)
  - Ideal for communications between panels, MCCs, and instruments.
- Ethernet, Fiber Optic cabling
  - Ideal for communications between buildings
  - Not subject to lightning damage
Design Considerations

- OEM-type Equipment – “Brand X”
  - Evaluate for long-term suitability
  - Designed for specific purpose, inexpensive deployment
  - Consider if savings on equipment is worth less flexibility, longevity, and upgradability
  - Future upgrades may require replacement rather than re-programming.
PART II - OPERATOR INTERFACE
Human-Machine Interface

- Not just a touchscreen. Models now have
  - Built-In PLC Functionality
    - Data Logger
    - Alarm Logger
  - Built-In PC Functionality
    - Web Server for remote access
    - Print Server for daily report printing
    - Data Logger
      - Can download data to a memory stick
    - Video, Graphics
Human-Machine Interface

- High Brightness Screens are visible in sunlight
Human-Machine Interface

- Manufacturers include:
  - Allen-Bradley
  - Pro-Face
  - Maple Systems
- Each has different features available, and different price points.
- Selection depends on application
Human-Machine Interface

- Design Considerations
  - Reliability
    - PLC-type vs. PC-type
    - PLCs are designed for industrial use and reliability
    - PCs have flexibility, but may be more subject to damage, viruses, hardware failure.
  - Where and how many?
    - HMI could replace with portable tablet.
      - Lowers installation cost
      - Provides operator versatility
    - Remote access available directly to screen over Internet.
PART III - Computer Hardware

THERE’S ALWAYS SOMETHING NEW
Computer Hardware

- Desktops
- Laptops
- Tablets
- Phones
COMPUTER HARDWARE

- Desktops and Servers are still the workhorse of the industry
  - Data and software reside on local equipment.
- Laptops
  - Computing capability resides on computer, or can host session on server.
  - Still have a role, but are becoming replaced by other equipment (tablets, phones).
  - Subject to loss or damage
  - Expensive to replace.

Desktops and laptops have limited service life and will require replacement within 5 - 8 years.
COMPUTER HARDWARE

- Tablets
  - Can provide window to your SCADA and even take the place of a traditional HMI
    - Software and Data reside on Server, usually at plant, but offered more and more “in the Cloud.”
    - Easily upgraded or replaced
    - Subject to loss or damage
    - Inexpensive
- Phones – Handheld Computers
Computer Software

THE BRAINS OF YOUR SCADA
SOFTWARE

- “Owner-hosted,” which is typical
  - Software and data reside on local server
  - Locally maintained and backed up
  - Software maintenance
    - Annual support subscription
    - Upgrade as required
  - Can have off-site back-up of files
SOFTWARE

- “Cloud-hosted”
  - Software and/or data can reside on remote server
  - Not really in the clouds, just on another computer off-site that is maintained and backed up by a service company
  - Typically requires subscription service that includes updates
Software Types

- Visualization
- Plant Management
  - Process Reporting and Performance Analysis
  - Historical Data Management
- Commercial
  - Hach WIMS / OPS
  - AllMax Operator10
- “Home-Grown” Excel or Access-based
  - Often Simpler, but not necessarily upgradable
Software Types

- Maintenance Management
  - Limited equipment tracking
  - Generates work orders
    - Hach JobCal
    - AllMax Antero
Software Types

- Asset Management
  - Linked to GIS mapping
  - Can be used by multiple municipal departments
    - Lucity
    - City Works
    - eRPortal
  - Can be utilized to create information database to protect knowledge and management priorities of long-time personnel
Remote Access

GETTING TO YOUR SCADA WHEN YOU’RE NOT THERE
Remote Access

- Cell Connection
  - Suitable for remote areas where broadband isn’t available
  - Small data usage packages are not expensive
  - Good application for lift station
- Broadband
  - DSL, Cable
- Network Design - Security
  - Hardware firewall essential to protect system, and isolate from business network
Remote Access

- CHANGE YOUR PASSWORD
  - “Admin”
  - “SCADA”
  - “Operator,“
  - “1234”
  - “User”
  - “Default”
  - “Your Name Here”

- It’s easy to steal a default password.
- Target hack was through an HVAC contractor’s “stolen credentials.”
SUMMARY

- Technology changes continually
  - Hardware
  - Software
  - Access and Security
- You don’t have to know it all, but it’s helpful to be familiar with options, terminology when you have a SCADA upgrade project on the horizon.
Questions?
SCADA Upgrade - O - Rama

A REVIEW OF KEY COMPONENTS AND OPTIONS

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