## Learning Objectives

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Adrian Ramkelawan
Product Manager

Adrian Ramkelawan is a Product Manager at ASCO Power Technologies. He has 13 years of tenure with ASCO, where he began as an Applications Engineer supporting, and implementing critical power management and communication solutions with customers and sales teams across the world. He then shifted into a Product Management path where he has been involved with product development for new critical power management solutions. His experience concentrates around power system/equipment control and their monitoring systems, including work on several patents.

Adrian received a Bachelors in Electrical Engineering from the New Jersey Institute of Technology.
This webinar will be recorded and made available through our website.

Please use the “Questions” feature to ask technical questions.
To understand why communication to a transfer switch matters you need to ask one question:

Where is a Transfer Switch?
Pivotal to Understanding the Critical Power Chain

The Transfer Switch knows about:

- Utility source
- Generator source
- Load
Pivotal to Understanding the Power Equipment

The Transfer Switch is placed in a position to take in more information from peripheral equipment:

- Circuit Breakers
- Loadbanks
- UPSs

The data about your power is just as critical as the power itself.
What Is That Value of the Data?

**Cost Saving**
Increase efficiency

**Isolate Issues**
Earlier detection of problems

**Immediate Control**
React to changes

**Improve Productivity**
Better deploy your team
How Do We Capture Data Inside a Transfer Switch?

Transer Switch Controller
Brains of the Transfer Switch

Metering
Power and energy information for the sources and load.
The choice of meter can impact the quality of information

Ethernet-IO Module
Bypass information and information from facility equipment
What Data is Captured

Event Logs
- Used for historical analysis.

Status
- From Switch position, engine start signals, contact closures and the activation of other functions.

Realtime Data
- The analog parameters for Power, Energy Voltage and Frequency.

Settings
- See the configuration of the switch.
What happens when a source fails, and the other source hasn’t come online?

Do you really know what happened?

Information from the Transfer Switch matters even when it isn’t energized by a Normal or Emergency source.

▪ Is there a communications error?
▪ Is there an alarm condition with the equipment preventing power to be available to the load?
▪ Is the switches automatic functions active?
▪ If the switch is non-automatic or have non-automatic accessories do personnel need to act?
Gateways

Enables communication between components inside and around the transfer switch to outside monitoring systems and users.
Hardware Gateway
Accessory 72EE & 72EE2

Hardware Gateway with Monitoring Capabilities

- Web app provides real-time status information
- Email notification provides an alarm for the transfer switch the module is mounted within
- Provides data critical for monitoring transfer switch state to ASCO Monitoring Systems
- Functions as an ethernet switch internal to the transfer switch and allowing monitoring systems a single point to land networking cables
System Gateway
5701 8-Device Gateway (Accessory 107G)

Monitor a Transfer Switch and connected power equipment
- Engine-generators
- Utility power meters
- Surge protection
- Circuit breakers

Central point of information
- Provide Modbus, BACnet and SNMP information for all monitored equipment to a facility monitoring system
- Send alarm notifications and NFPA reports via email for all monitored equipment
How is the Data Transmitted

Different Mediums

RS485
Legacy method that is still used in many facilities

Ethernet
Allow for multiple monitoring systems and protocols to access a transfer switch.

Fiber Optics
Long haul solution that works with ethernet.

Wireless
Connect devices without running cables.
RS485

Legacy Approach

Benefits:

- Legacy medium already deployed in many sites.
- A single run can go 4000ft without requiring an extender.
- A single device going down does not affect the rest of the loop.

Hurdles:

- Supports one monitoring system without the use of converters.
- Single protocol is supported.
- Low bandwidth, limiting the data resolution (100kbps).
RS485
Design Considerations

- 2 Wire vs 4 Wire
- Quantity of devices on this networks.
- Quantity of monitoring systems.
Ethernet
Flexible Solution

Benefits:

- Transmission rate is greater than RS485.
- Reliable transmission of data.
- Multiple data types can be transmitted simultaneously.
- Multiple monitoring systems can be supported.
- Used in conjunction with many of the other medium.

Hurdles:

- 328 feet limitation without adding additional network equipment.
- Network equipment needs to be energized.
- Not all facilities have installed Ethernet.
Managed networks provide redundancy and best pathways for data.

Unmanaged switches cannot be used in networks that have redundant connections such as Ring or Mesh.

Ethernet daisy chaining of devices can be economical but if one device goes down, the rest after it are taken off-line.
Ethernet
Design Considerations

Types of cables:
- Cat5: 100 Mbps, legacy
- Cat5e: 350 Mbps, standard
- Cat6: 1 Gbps
- Cat6a: 10 Gbps

Types of connectors:
- RJ45
Fiber Optics
For Distance

Benefits:
- Transmits massive quantity of data.
- A single run can go for 6500 ft.
- Less interference than traditional wiring

Hurdles:
- Network equipment needs to be energized.
- Not all facilities have installed fiber optics.
Fiber Optics
Design Considerations

Types of cables:
- Single-Mode: long distance, 80KM
- Multi-mode: medium distance, 2KM

Connector types:
Wireless
For Applications With Less Cables

Benefits:
- Cables do not need to be installed.
- Monitoring devices like smartphones, tablets and laptops can be brought in range for monitoring.

Hurdles:
- Network equipment needs to be installed and energized.
- Additional security requirements need to be put in place.
- Less cables, but not the elimination of all cables.
- Power connects still need to be provided.
Accessing the Data

How can you get to the data in a transfer switch

- **Computer Data**: Provided to 3rd party monitoring system
- **Visual Interface**: Optimized for monitoring Transfer Switches
Computer Data

Open Protocols

Open protocols are defined and standardized formats for transmitting data over mediums like RS485 or Ethernet.

Modbus
Parameters that are polled by a monitoring system.

BACnet
Self identifying parameters are polled by a monitoring system.

Simple Network Management Protocol (SNMP)
Provides broadcasted notification over a network called traps and parameters that are polled by a monitoring system.

API
Used by services and applications.
Modbus
Industry Standard

Background:
- Standard was published in 1979.
- Used extensively.

Function:
- Data must be polled from a monitoring system

Medium:
- Ethernet – Modbus TCP/IP
- RS485 - Modbus RTU

Supported ASCO gateways:
- Acc 72EE
- Acc 72EE2
- Acc 107G
BACnet
Self Identified Parameters

Background:
- Became a standard in 1995.
- Fastly adopted into the HVAC industry.

Function:
- The protocol has self identifying parameters - objects
- Data polled by a monitoring system

Medium:
- Ethernet – BACnet/IP
- RS485 – BACnet/MSTP

Supported ASCO gateways:
- Acc 107G
Simple Network Management Protocol (SNMP)

Broadcasted Notifications

Background:
- SNMPv1 appearing in 1988.
- Used in networking equipment.

Function:
- Data polled by a monitoring system.
- Pushes traps into the network for the monitoring system to accept.

Medium:
- Ethernet

Supported ASCO gateways:
- Acc 72EE
- Acc 72EE2
- Acc 107G
Critical to the Communication Chain and the Power Chain

Bridging the Gap Between Operational Technologies and Information Technologies

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**Smart Facility Equipment**

- Generators
- Transfer Switches
- Circuit Breakers
- Protective Relays
- Power Meters

**Producer output interface – Communications Protocols & Mediums**

- Serial
- Encrypted
- Modbus
- RS-485
- ION

**Critical Power Management Appliance**

**Consumer input interface -**

- BACnet/IP
- SNMP
- RESTful API
- Modbus
- OPC

**Consumers IoT Systems**

- Building Monitoring Systems
- IT Management Systems
- Cloud IoT Applications
- Energy Management
- Industrial Monitoring System

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Life Is On
Computer Data

Visual Interface
Optimized for monitoring and control of a Transfer Switch and power equipment

Alerts
Immediate notification

Real-Time Monitoring
See status and analog parameters

Historical Information
Used for forensics analysis

Reports
For compliance and analysis

Controls
Operation of Equipment
Alerts
Immediate Notifications on the Interface and Email

Configurability:
- For individual alerts
- Severity levels
- Auto-acknowledge
- For local server or service

Email:
- Does it consolidate the alerts

Interface:
- Audible horn
- Log acknowledgement
Real-time Monitoring
Status and Analog Parameter

Transfer Switch Information:
- Oneline On Dashboard And Details Screens
- Source Availability
- Switch Position
- Switch Status
- Metered Values
- Settings and Configurations
Historical Information

Forensic Analysis

Power and Energy Trending:
Trend power metering parameters to gain better understanding of energy usage and anticipate future needs.

Power Quality Analysis:
Identify, analyze and understand and address power quality issues to prevent damage to customers’ equipment.

Detailed Events Logging:
Intelligent filtering enables quicker understanding and better insight.
Tested and Available When Needed:

- Record key test parameters like generator run time, exhaust temperature, oil temperatures and fuel levels to ensure reliability of generators.
- Mitigate human error in testing procedures and reporting through automatic reporting based on standards.
- Reduce time-consuming testing and documentation efforts to focus maintenance teams on proactive maintenance.

Energy Usage for Equipment and Load:

- Trending and reporting for historical loading.
- Inform operations and decision-makers about changes in energy for expansions or modifications.
Controls

Operations of Equipment

Operate electrical equipment remotely to reduce arc flash and shock exposure:

▪ Control an ASCO Transfer Switch & generator
▪ Access equipment operational data remotely
▪ Minimize exposure to hazardous electrical conditions

Remote & Scheduled Testing:

▪ Comply with NFPA requirements while Improving operator safety and efficiency by enabling remote control and test of generators, transfer switches, circuit breakers, and load banks.
Securing Transfer Switch

Network Communication:
- Credential requirement
- User activity tracking and logging
- Signal encryption
- Robustness against Denial of Service (DoS) attack
- Physical barriers
Summary

Consider these points for sites and projects:

- Backup power source to maintain communication
- How many monitoring systems will the site be supporting
- How much data needs to be transmitted
- Distance between equipment
- Redundancy requirements
- Existing infrastructure
- Protocol requirements
- Interface requirements
Objectives

- Why communicate to a Transfer Switch
- What data is inside a Transfer Switch
- How is that data collected in a Transfer Switch
- How is the data transmitted from a Transfer Switch
Thank you for your participation on today’s Webinar.

There will be further ASCO Learning Series sessions in the future so please keep checking our website - www.ascopower.com for further details. Please complete the follow up survey to provide us with valuable feedback for future sessions.
Thank You!

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