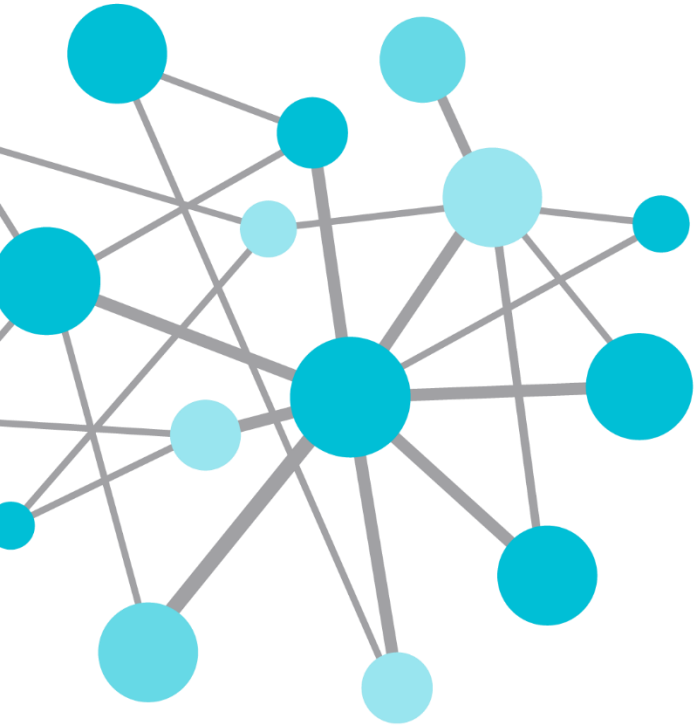


The Automation of Converting SCADA EMS Displays to PI WebParts

Presented by **Linda Stevens, Pepco Holdings, Inc**

Li Luo, Pepco Holdings, Inc

Pepco Holdings Inc

Pepco Holdings, Inc

- **Pepco Holdings, Inc. (PHI) is a holding company formed as a result of the merger between PEPCO and CONECTIV in 2002.**
- **One of the largest energy delivery companies in the Mid-Atlantic region, serving about 2 million customers in Delaware, the District of Columbia, Maryland and New Jersey.**
- **The PHI subsidiaries Pepco, Delmarva Power and Atlantic City Electric provide regulated electricity service; Delmarva Power also provides natural gas service.**
- **PHI also provides energy efficiency and renewable energy services through Pepco Energy Services.**

Linda Stevens

Supervisor of Control Systems Software, ACE/DPL - PHI

- 39 Years of Experience in System Operations, 35 yrs of EMS experience, over 20 years experience as a PI System integrator, administrator and software developer.
- Responsible for all aspects of operating and maintaining a GE Network Solutions XA21 EMS
- Led the successful integration of the PI System with various generations of EMS systems
- Developed several corporate Web interfaces using PI API and PI SDK

Li Luo

Sr. Systems Architect

- Join System Operations at PHI in 2011
- Primary focus on NERC/CIP compliance
- Lead the System Operations Web Development Effort

Agenda

- Background
- Business Challenge
- Solution
- Results and Benefits
- Future Plans

Background

- Corporate users were accustomed to viewing SCADA data with the same look and feel of EMS displays on the intranet via an in-house custom database and web interface
- The creator and developer of the web site and proprietary database, left the company. Maintenance became an increasingly challenging task. While slowly and surely approaching the inevitability of a catastrophic failure, no one was familiar enough with the software to keep it going.
- Corporate users, mainly Engineers and telecommunication employees, wanted to continue to view current and historical data with the same schematics and layout of an EMS display
- PI ProcessBook is a very useful tool in presenting EMS SCADA data, however, the manual process for developing and keeping changes up to date was an ongoing and very time consuming task
- Maintaining over 1800 displays and linking over 200,000 + points/tags manually, would obviously be prone to errors

Business Challenges

- Present EMS SCADA data, both current and historical, in a format that would mimic EMS one-line displays, to corporate users without having to connect to the EMS
- Provide an interface to corporate users that would be user friendly and utilized commercial products that are vendor supported, maintained and documented
- Make an automated process that is efficient and requires little or no dependency on manual intervention
- Provide centralized access to EMS SCADA PI System data for corporate users via the intranet

Solution

- Transference of real-time data from the EMS to PI System by using the GE Data Historian Interface subsystem that interfaces to PI API services
- Establishment of High Availability (Automated Failover Capability) by using a PI Server Collective
- Utilize Graphical User Interface using PI ProcessBook
- Internet Access (Intranet) using PI WebParts

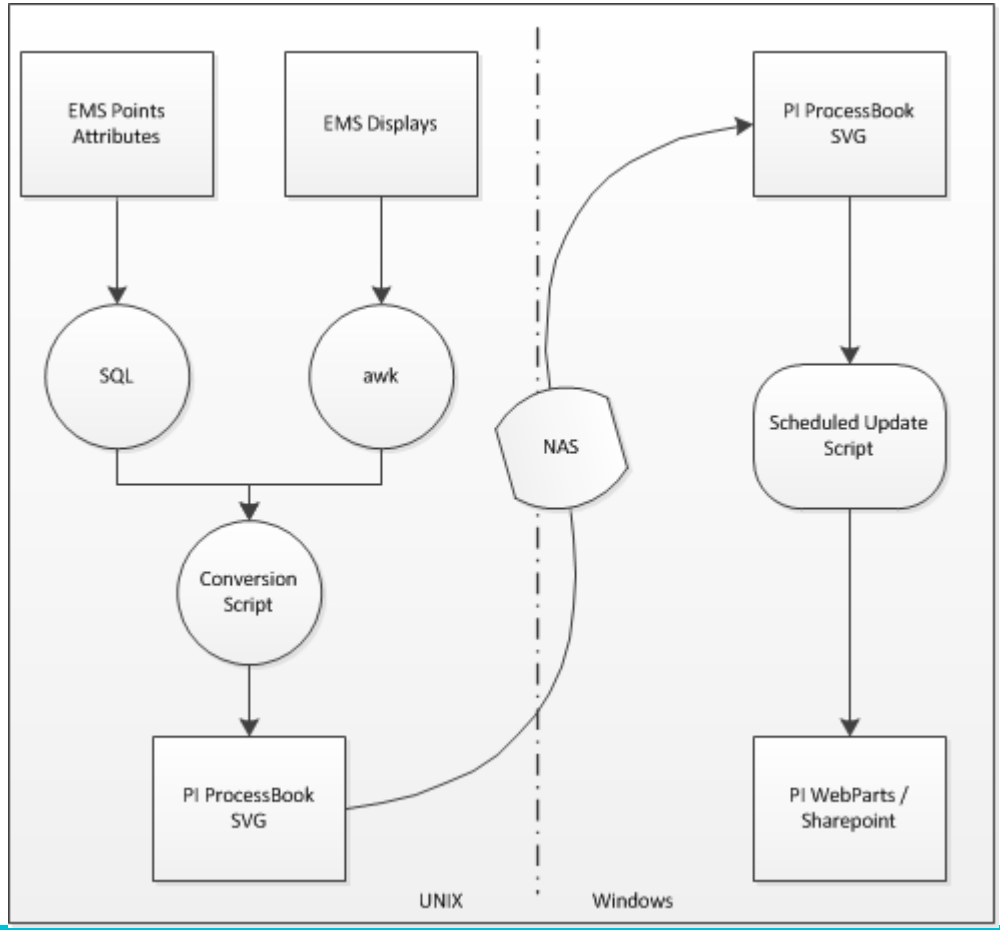
Solution (contd.)

- UNIX (AIX) to Windows conversion for file transfers
- GE XA21 EMS proprietary display format to PI ProcessBook svg display format
- EMS SCADA points cross referenced to PI Tags (values and quality codes)
- SCADA device symbols to PI ProcessBook symbols

- MS SharePoint

Solution (contd.)

Bridging between UNIX and Windows



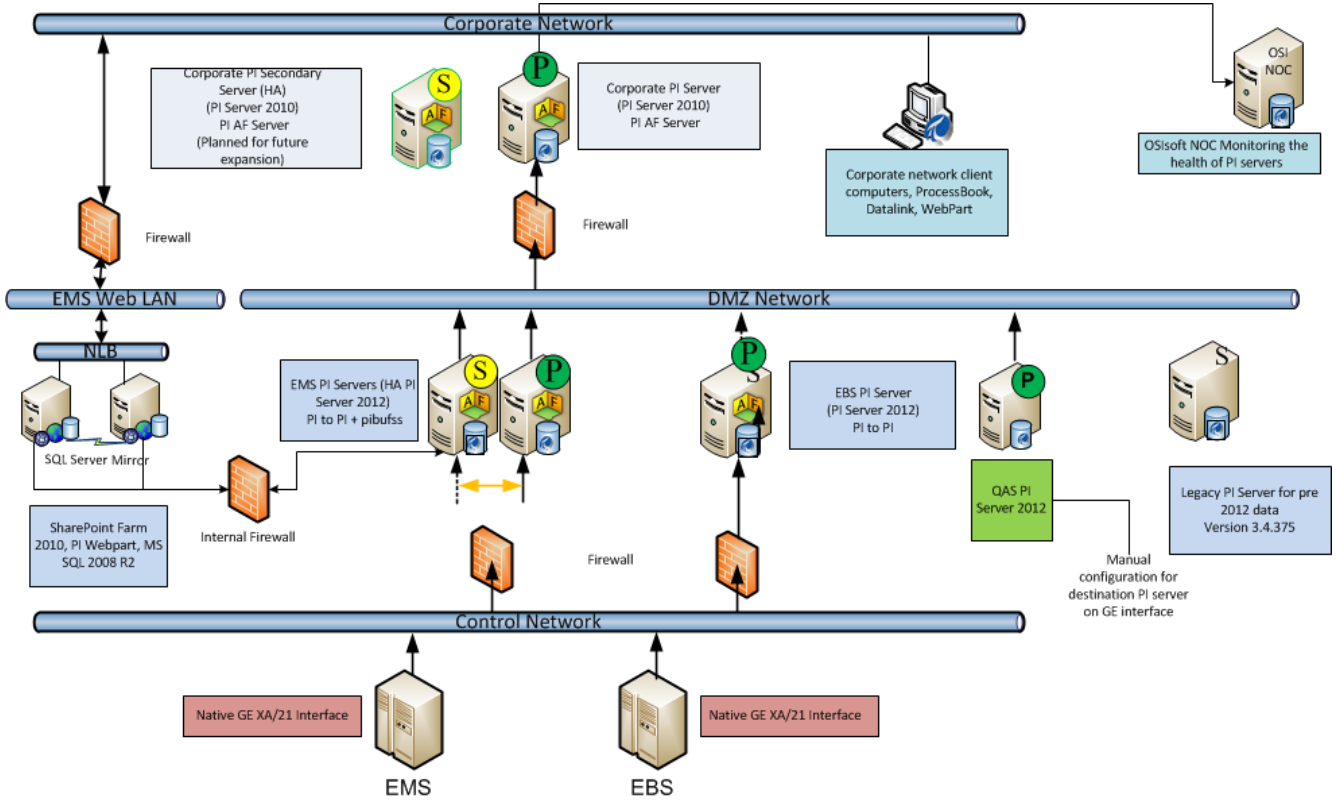
PI System

- Enterprise Agreement License with OSIsoft
- PI Server 2012
- PI WebParts 2012
- PI OLEDB Enterprise 2012
- PI ProcessBook 3.0
- PI to PI Interface
- PI Asset Framework (PI AF)
- PI DataLink
- PI Coresight

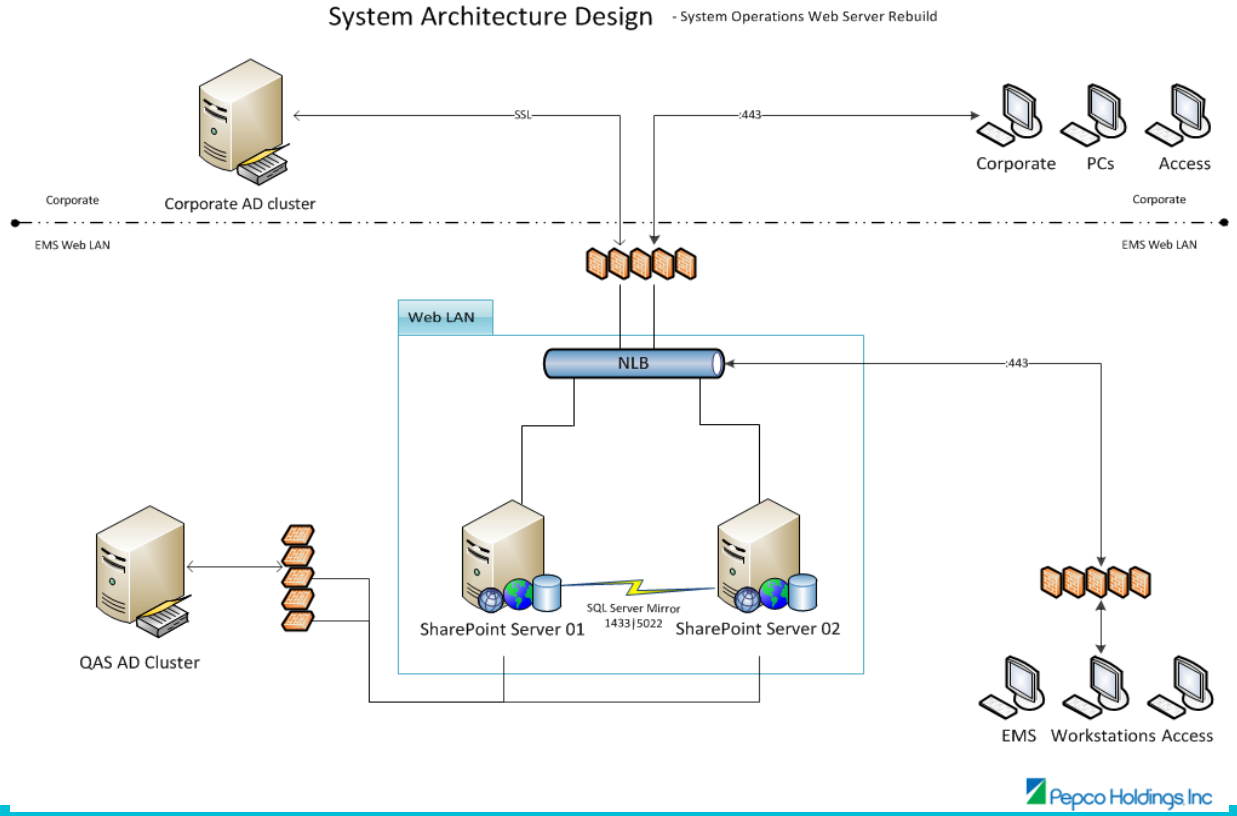
History with PI System

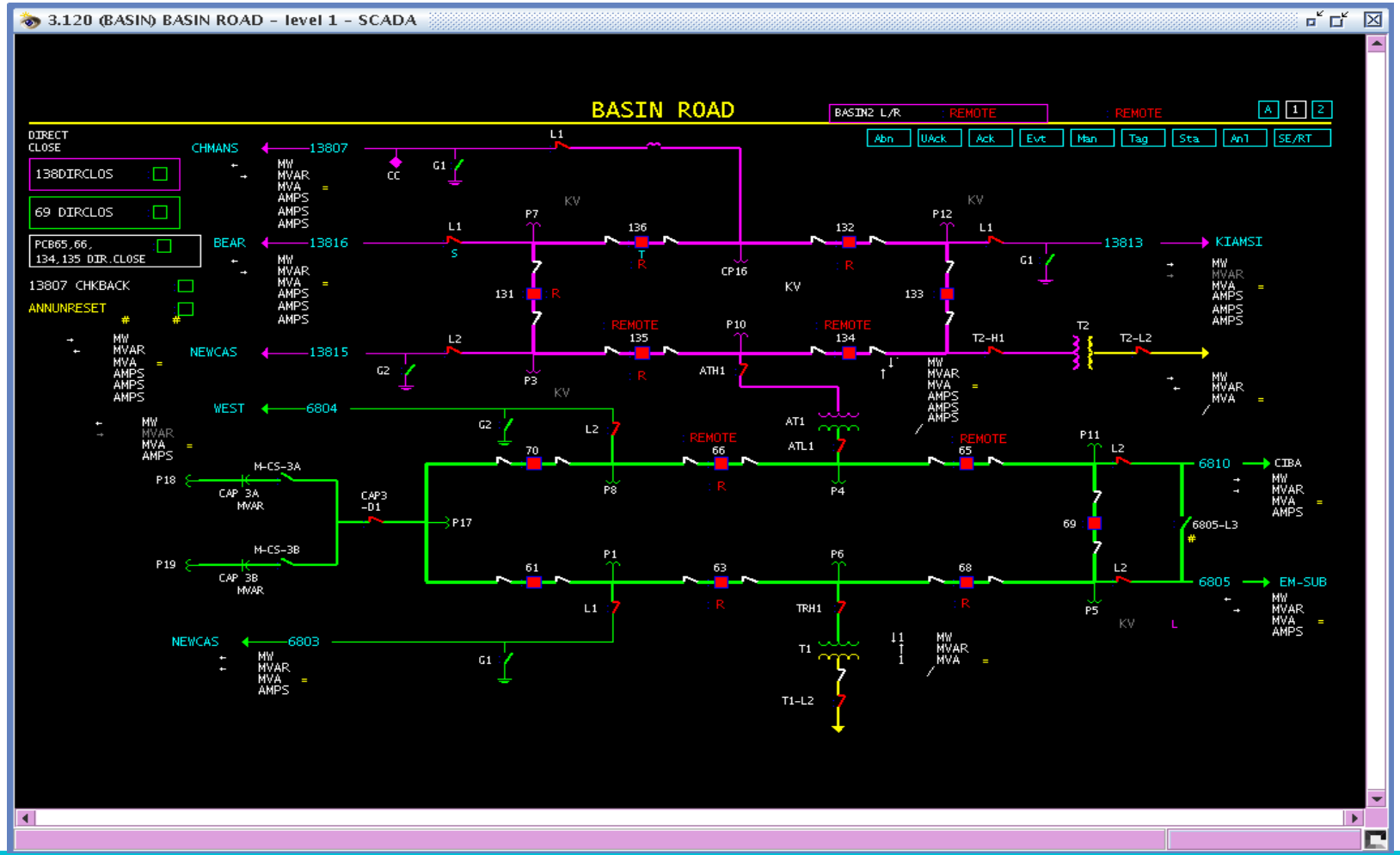
- Installed a 20k tag Plant Information (PI) System from OSIsoft in DPL System Operations around the mid 1990s.
- Delmarva already had PI System in several generating plants

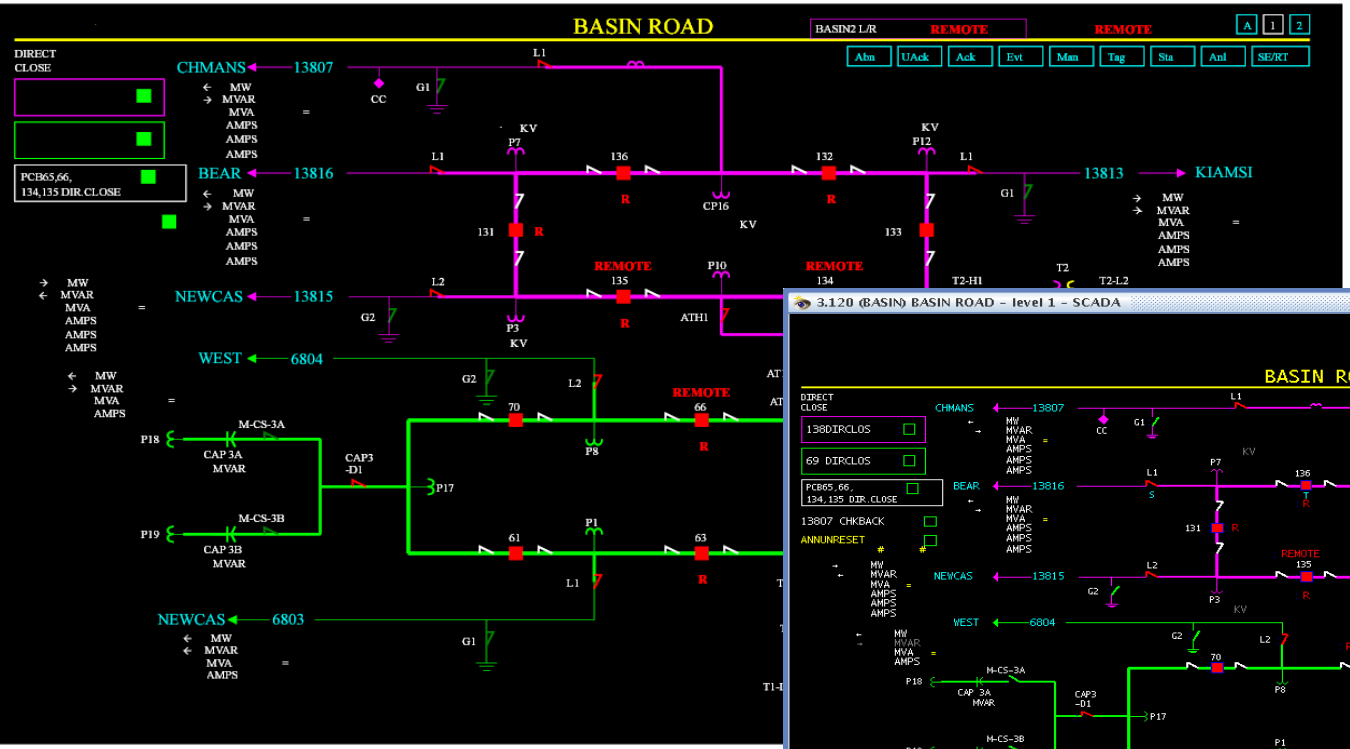
Architecture

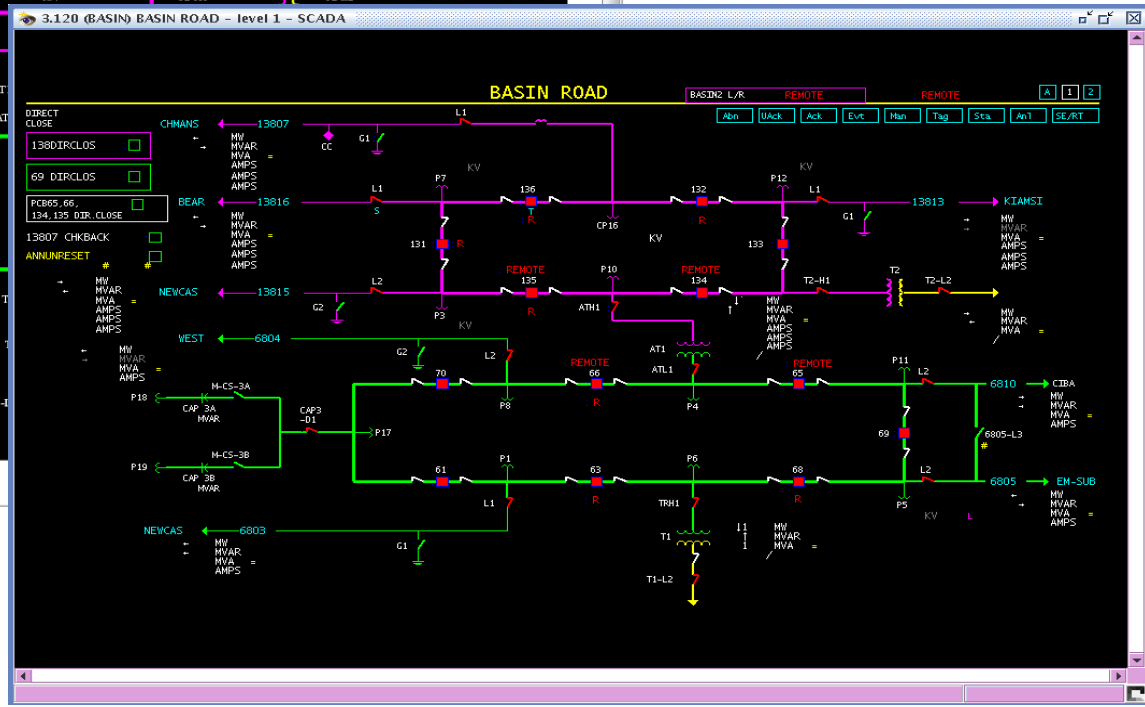


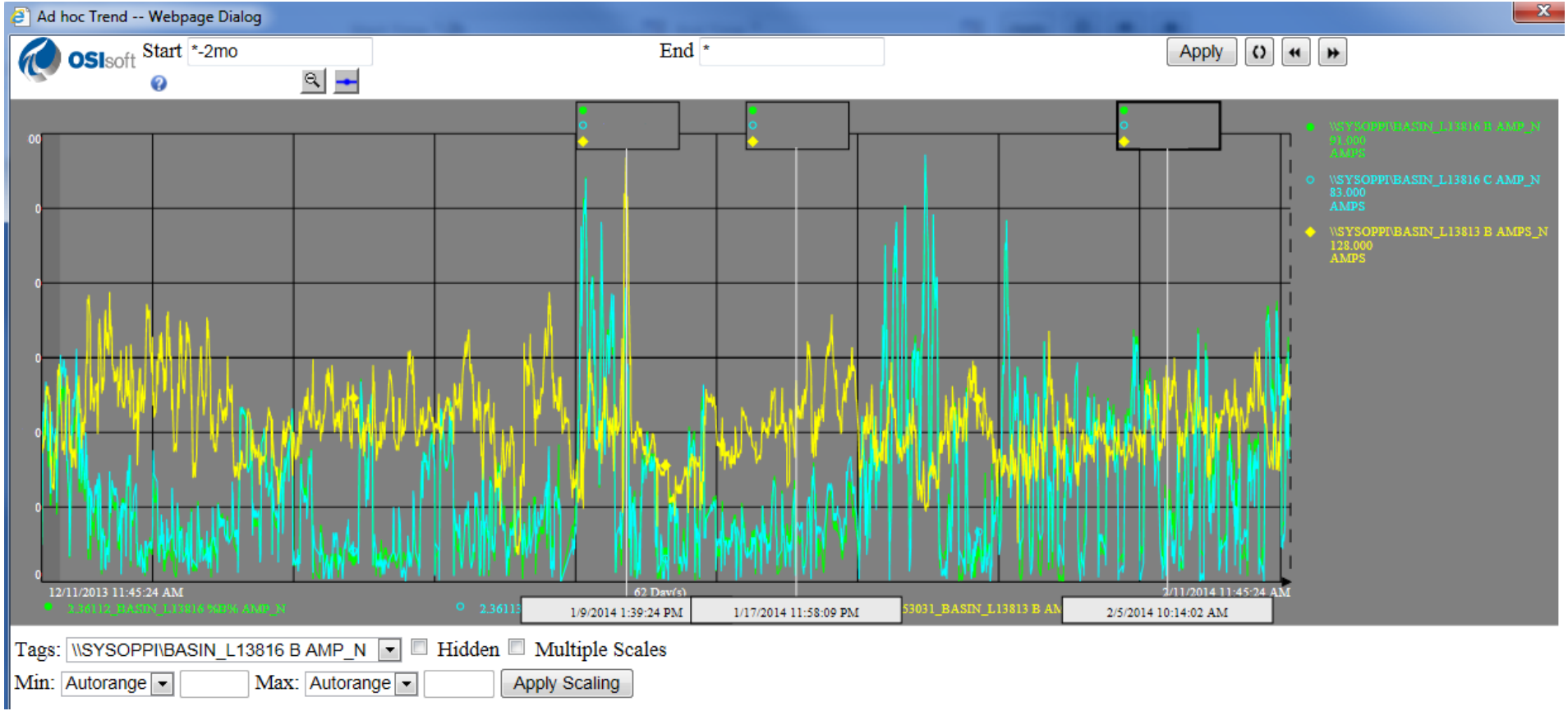
Architecture (contd.)











Alarm and Events

Start Date/Time
3/8/14 13:00
mm/dd/yy hh:mn [0-23h]
End Date/Time
3/8/14 17:00
Select Station(s) Submit Reset

- #2 FAATC TAP
- 12676 TAP
- 138TH STREET,MD
- 36190 TAP
- 8386 TAP
- ABSECON
- ABSECON DA
- AC Convention Center
- AC WALK
- ACE NSP
- ACE NSP PLUS
- AIR LIQUIDE
- ALLEN REA,MD
- ANCHOR HOCKING
- ANCHOR HOCKING PACKAGING
- ANNEX TAP ALT
- ARO CUSTOMER RTU
- ATCO
- ATL COUNTY SEWERAGE AUTHORITY
- ATL CTY UNDERGROUND NETWORK
- ATLANTIC CTY MEDICAL CENTER
- ATLANTIC CTY RAIL TERMINAL
- ATLANTIC PALACE
- B.L. ENGLAND
- BARNEGAT

START DATE/TIME - 3/8/14 13:00 END DATE/TIME - 3/8/14 17:00

Download

THE NUMBER OF ROWS RETURNED FROM YOUR REQUEST : 758

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NEXT

DATE and TIMESTAMP	STATION..POINTNAME ... EVENT TEXT ... < Timestamp > ...(t,p)
03/08/2014 13:00:01	DCTSta CHRGEN .AN Failed < 03/08/14 13:00:01 EST > (1,67744.0.0)
03/08/2014 13:00:16	DCTSta CHRGEN .A. Online < 03/08/14 13:00:16 EST > (1,67744.0.0)
03/08/2014 13:00:50	DCTSta CHRGEN .AN Failed < 03/08/14 13:00:50 EST > (1,67744.0.0)
03/08/2014 13:01:11	DCTSta 3351-53 .AN Failed < 03/08/14 13:01:11 EST > (1,67789.0.0)
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03/08/2014 13:04:41	DCTSta CHRGEN .AN Failed < 03/08/14 13:04:41 EST > (1,67744.0.0)
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03/08/2014 13:05:41	DCTSta CONCD2 .EN Failed < 03/08/14 13:05:41 EST > (1,67694.0.0)

Results and Benefits

- **Realtime/Historical Data Available in a Familiar Environment**

SCADA Data available to users without having the knowledge of how to use client applications and without having to know specific PI Tag names.

Information presented in a meaningful manner within proper context

Historical Data available to users for planning, troubleshooting, and studies

- **View of Schematic layouts of Substations**

Users are able to view in near real-time, SCADA data and calculations as it relates to the electrical system, in a format consistent with the actual electrical diagram of a substation (EMS Display).

- **Centralized Data Access Across all PHI regions**

EMS SCADA one-line displays with historical playback capability via the INTRANET

Enhances the actual visualization of troubleshooting events

Serves as a tool for field checking new equipment

Serves as a aide in decision making for system operators and engineers

Results and Benefits (contd.)

- **User Access Management**

  User access management becomes more efficient and manageable for administrators to comply with NERC and FERC guidelines.

- **Achieving High Availability through PI Server Collective and MS SharePoint Farm Cluster**

  The Failover design approach provides redundancy, reliability and maximum availability on every aspect of the system architecture.

End Users

- **System Operations**
  - Hourly Data to Market Settlement
  - Operator and engineer review of telemetered data and system conditions
  - Outage scheduling
- **Electrical Maintenance**
  - RTU error statistics, measurement verification, data validation, trouble Shooting
- **Electrical Testing and Communications**
  - RTU error statistics, measurement verification, data validation, trouble Shooting
- **System Protection**
  - Alarm and Events
  - Scenario playbacks for reviewing faults, lines out of service
- **System Planning**
  - Historical load flows for planning to put in new lines

Intangible Benefits

- Decision making becomes less cumbersome. Operators and engineers are able to accurately schedule work based on the historical information that is now conveniently available
- Corporate users with appropriate software and accessibility can monitor and view EMS displays on corporate PC/Laptop, from anywhere remotely
- System Operators can continuously monitor the bulk electric system during EMS HMI interface interruptions (NOT EMS interruptions)

As a Side Note:

- PHI uses the PI Interface for Batch File to enter hourly EMS SCADA data values into the PI System
- PHI also uses the PI Interface for Batch File to enter EMS SCADA alarms and events into PI System

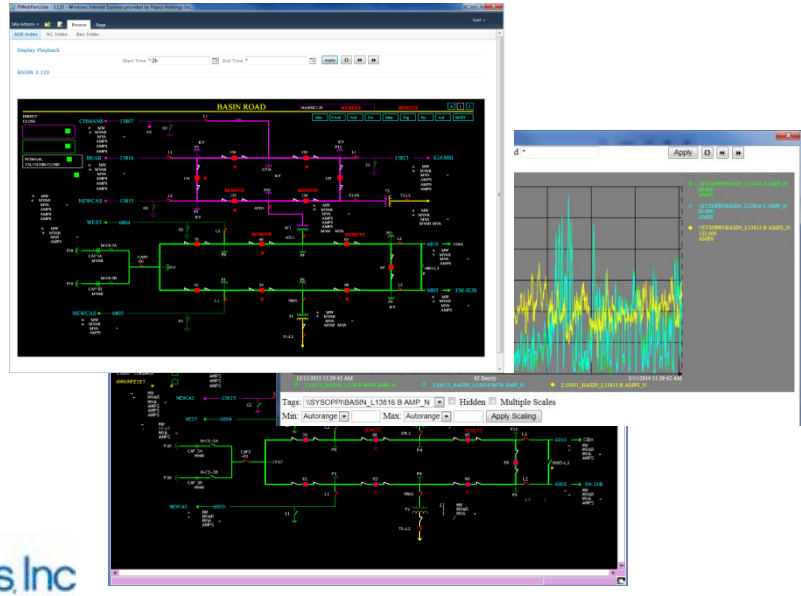
Future Plans

- **PI AF and PI Coresight migration**
  - System Operation Engineers are in the final phase of completing a PI AF model
  - Migrating to the newest version of PI Coresight
- **Mobile Platform Move**
  - Working with Corporate IT to allow mobile access to PI System data via PI Coresight Applications
- **Develop more web services to supplying data to the end users in various ways**
  - With the new technology provided by OSIsoft, we can create more SOA type of services for various ways to consume data
- **AMI work**
  - Storing data from AMI meters including KWH, Temperature, Voltage, and Meter Status. Building out a full AF model for the system to allow easy querying and reporting. Custom reports to find voltage and temperature exceptions. (Under consideration)

SUMMARY

Providing visibility to the end user with a centralized access to EMS SCADA data is the key to enhancing productivity, streamlining business processes, and providing customers outside of System Operations with a tool to keep users better informed of system conditions. Automation of the EMS display conversion to PI WebParts helps bridge the SCADA visibility gap between EMS users and corporate users requiring data to perform certain tasks.

Because of the ability to integrate different platforms externally and internally using a wide range of OSIsoft software, we were able to successfully implement an innovative approach to transition one legacy “homegrown” system by implementing more advanced and sophisticated technology.



Pepco Holdings Inc

Business Challenge

- View historical data with defined schematics of an EMS one line diagram
- Automate the process to convert an EMS display
- Centralize access to all users requesting to view EMS data

Solution

- XA21 to PI Server Collective
- EMS Display to PI ProcessBook Display
- EMS points to PI Tags
- Device symbols to PI ProcessBook symbols

Results and Benefits

- Realtime/Historical Data Available in a Familiar Environment
- View of Schematic layout of Substations
- Centralized Data Access / User Management
- High Availability

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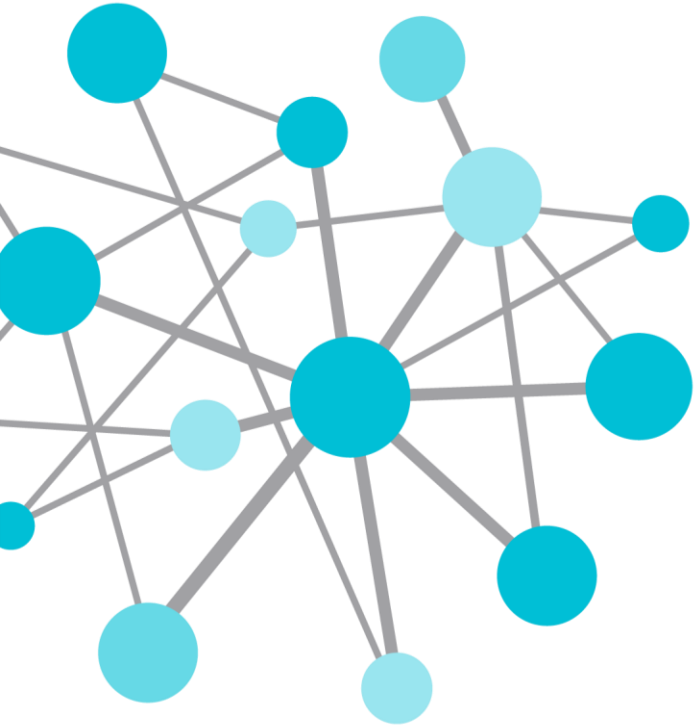
Questions ~



THANK YOU

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