



Decision Ready in Real-time

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Senior Project Manager



Topics

- **About NYISO**
- **New State-of-the-Art Control Room**
- **NYISO PI System Infrastructure**
- **Dynamic Data Response**

Roles of the New York ISO



Reliable operation of the bulk electricity grid

- *Managing the flow of power on 11,000 circuit-miles of transmission lines from more than 700 generating units*



Administration of open and competitive wholesale electricity markets

- *Bringing together buyers and sellers of energy, capacity and related products and services*



Planning for New York's energy future

- *Assessing needs over a 10-year horizon and evaluating projects proposed to meet those needs*



Advancing the technological infrastructure of the electric system

- *Developing and deploying information technology and tools to make the grid smarter*

NYISO PI System History

- ◆ **PI System was first adopted at NYISO in 2001**
 - *Began as EMS historian software (ICCP to PI, single server)*
- ◆ **PI System environment grew with SMD2 (RANGER) initiative 2003-2005**
 - *Two collectives (Secure and Corporate)*
- ◆ **High Frequency telemetry (Phase 1) data historized beginning in 2006**
 - *Standalone system using OPC*
- ◆ **Provided new opportunities:**
 - *Multiple data streams to multiple PI collectives*
 - *PI useful for real-time visualization and reporting*
 - *Engineering, operations, and planning teams engaged*

Business Processes Served

- ◆ **Real Time Operations Visualization and Alerting**
 - *PI DataLink, PI ProcessBook, PI AF, PI Notifications, PI AN SDK*
- ◆ **Engineering and Planning Data**
 - *PI DataLink, PI ProcessBook, PI ODBC, PI OLEDB (SAS integration)*
- ◆ **Billing and Settlements**
 - *Custom Java application feeding billing and settlements system (PI JDBC)*
- ◆ **Load Forecasting**
 - *Load feed (PI JDBC) and diagnostics (X-Drivers) used for validating real-time load data and calibrating forecasts (PI AFSDK Applications)*
- ◆ **Training/Simulation (Integration with DTS to replay events in training)**

Data Historized with the PI Data Server at NYISO

- ◆ EMS/BMS Measurements and Calculations (RANGER)
- ◆ Custom Calculations (Performance Equations)
- ◆ Vaisala Lightning Data Feed (Custom NYISO Interface)
- ◆ Analog Telemetry Data @ 10 Hz
 - *Data acquired from Programmable Logic Controller (PLC) using PI MODBUS over Ethernet Interface*



NYISO PI System Standards

- ◆ **Consistent PI Tag naming convention that simplifies the search for users (Substation Name, Generator/Voltage Code, Switch/Line Number, Engineering Unit)**
 - ◆ **Example MANHATTAN_138_5TH-49TH_AV**
 - ◆ **No 'Big Bang' Asset Framework (AF) Data Migration – Independent AF databases for project needs**
- ◆ **Hierarchy of assets normally broken down by region/zone**
- ◆ **Notifications and elements are derived from global templates**

Old Power Control Center



**New York Power Pool
Power Control Center
1970**

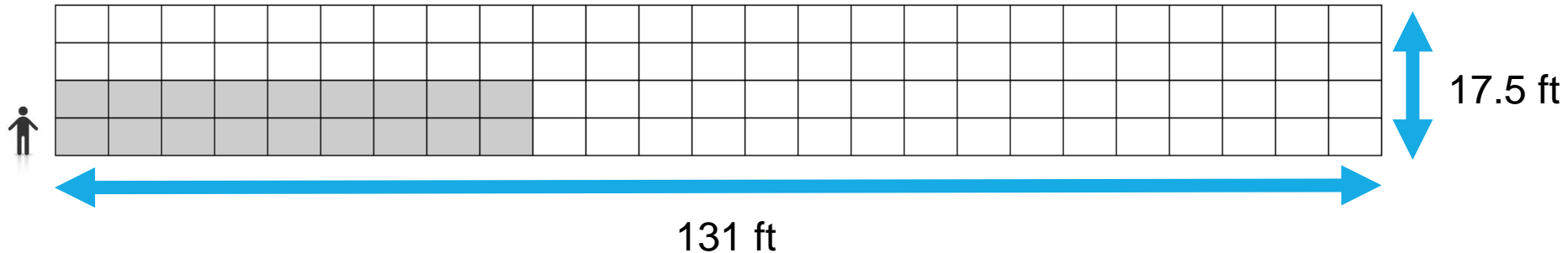


Building a New Control Center

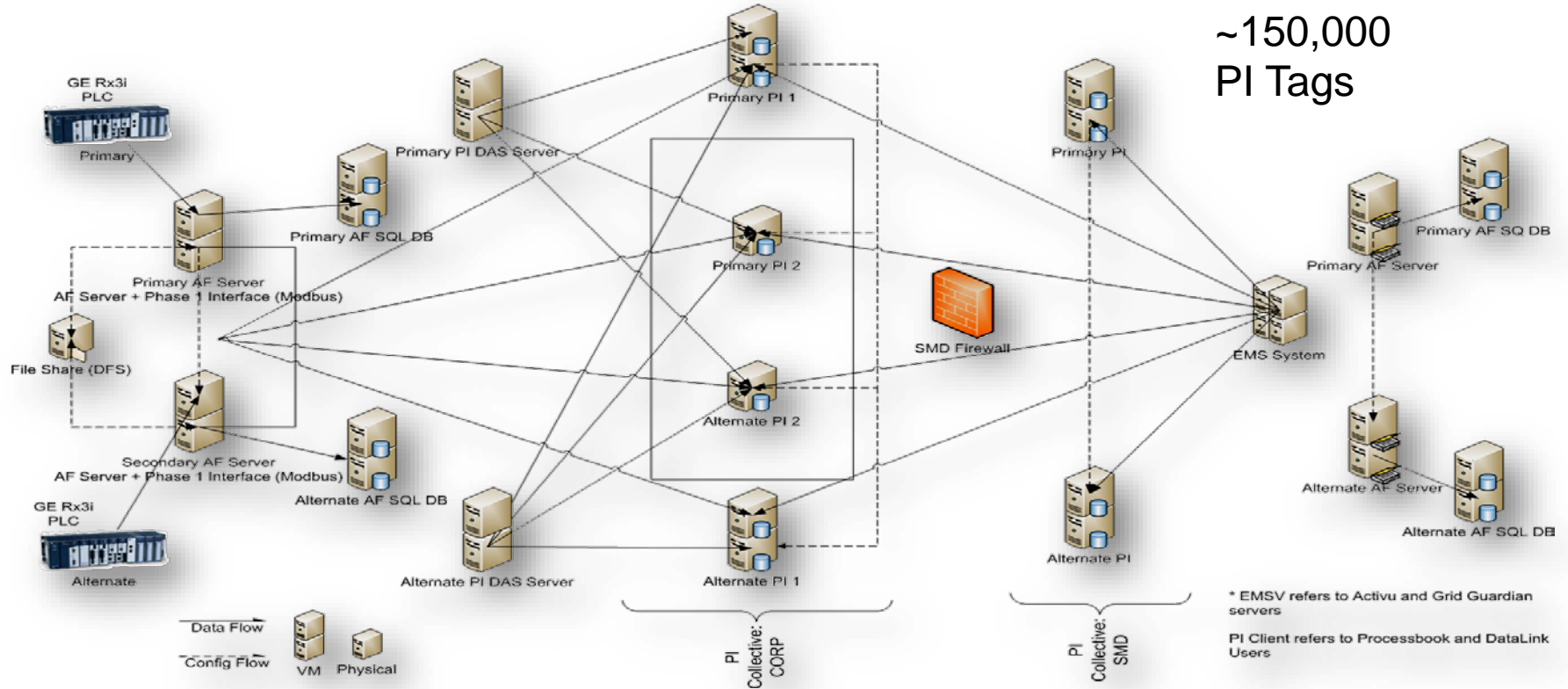


...An All Digital Control Center

- **100 - 80" Mitsubishi LED cubes**
- **147 Megapixels of flexible canvas**
- **Fully redundant system with <100ms failover**



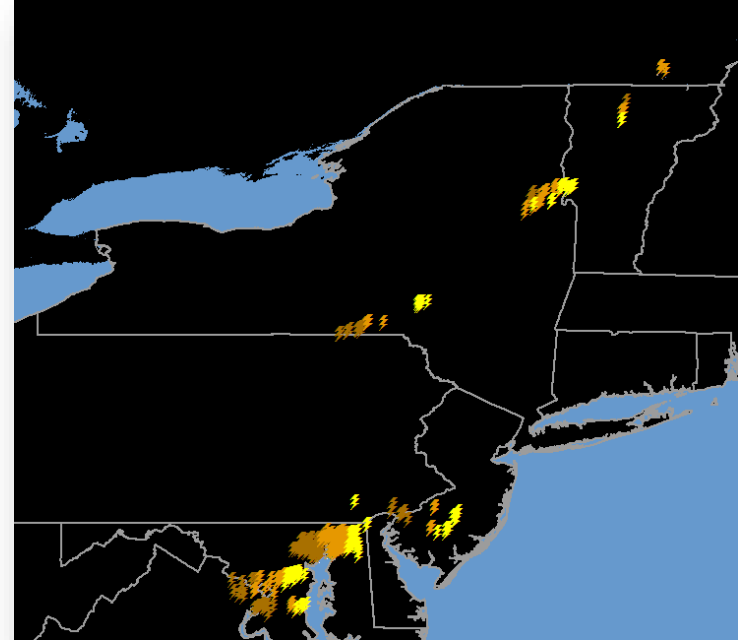
Robust HA Build Out



Lightning Data Collection

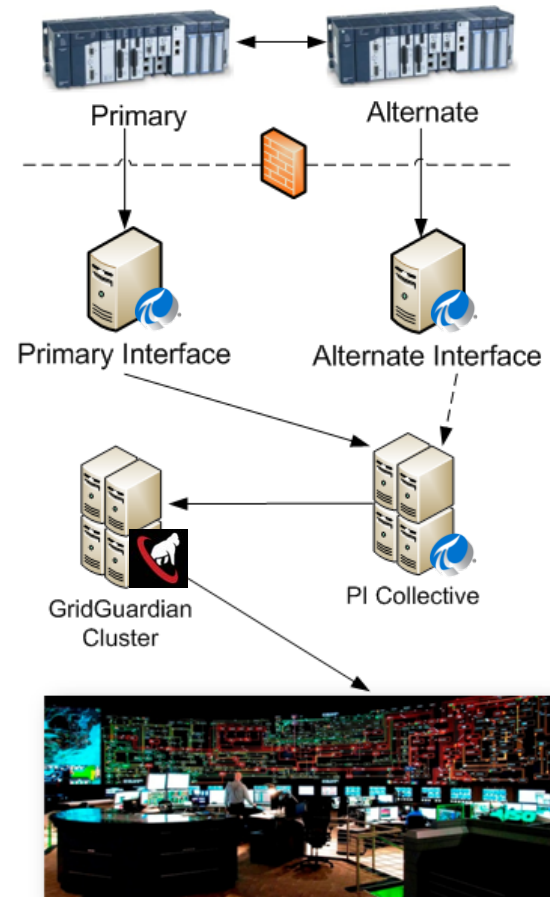


- ◆ **Information provided via live feeds**
 - *Location (Latitude, Longitude)*
 - *UTC Time (nanosecond)*
 - *Amplitude & Multiplicity*
 - *Type and Strike Angle*
- ◆ **Custom PI SDK Application (Migration to AF SDK in Future)**
- ◆ **NYISO Uses**
 - *Real Time Visualization*
 - *Planning Studies*



Phase 1 Data Collection

- ◆ **Key New York Control Area Telemetry Info**
 - *Tie Line Flows*
 - *Bus Voltages (230 kV and above)*
 - *Large Generation Units (≥ 500 MW)*
 - *System Frequencies*
- ◆ **System Wide Calculations Included**
 - *Area Control Error*
 - *Control Sub-setters*
- ◆ **Enhances the main one line display**
 - *Redundant data source to backup EMS and ICCP measurements and calculations*
 - *Phase 1 data used in any chart on the wall*



PI Asset Framework – Generator Tracking

Example Generator 1

General | Child Elements | Attributes | Ports | Version

Filter

Name Value

Category: AGC Outputs

| | |
|----------------------------------|-------|
| Gen Security Constraint Flag | NONE |
| Generator 10-Mn N-Spin Res Flag | 0 |
| Generator 10-Mn Spin Res Flag | 1 |
| Generator 10-Mn Total Res MWs | 12.93 |
| Generator Operating Limit | 340.3 |
| Generator Regulation Margin | 30 |
| Generator Response Rate | 6 |
| Initial calculated POD | 286.0 |
| RTD On-Control (regulating) Flag | 0 |
| Unit 6-sec Ramped Basepoint MW | 326.6 |
| Unit Actual Generation | 327.0 |
| Unit Ramp Flag | NONE |

Category: General Info

| | |
|-------------|-------|
| Lower Limit | 0 MW |
| Substation | Subst |
| Unit Type | THRM |
| Upper Limit | 398.2 |
| Zone | Zone |

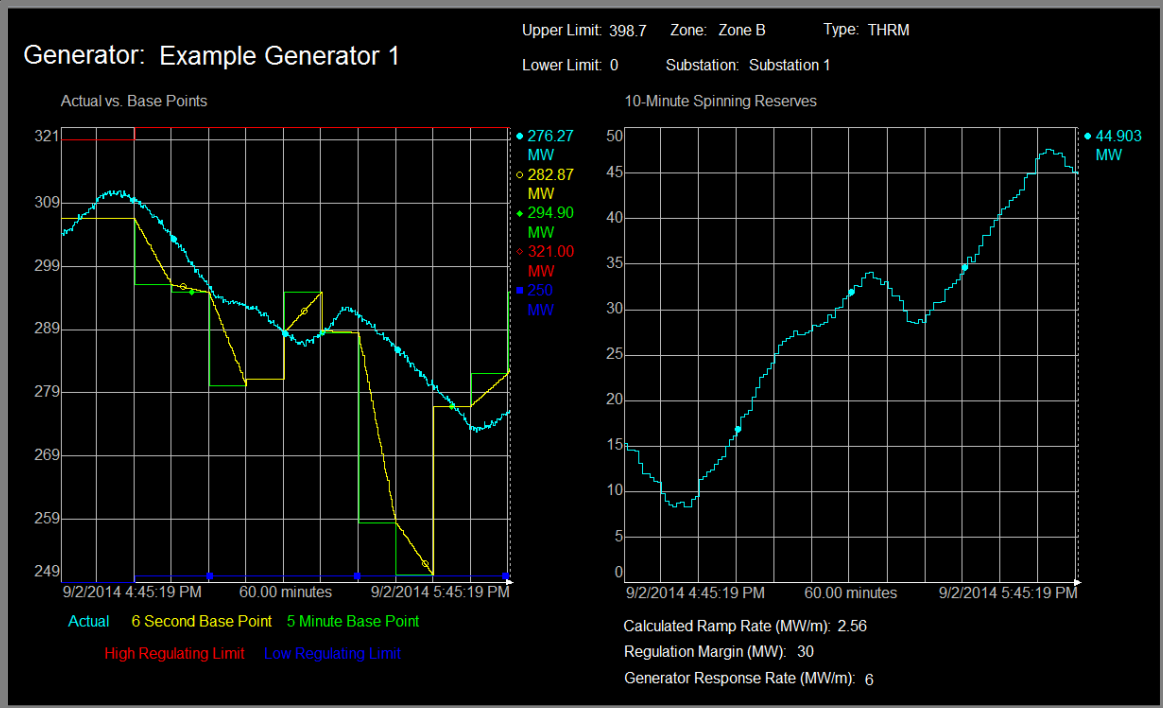
Category: Telemetry

| | |
|--------------------------------|------------|
| 5 Min. Base Point | 326.6 |
| 5 Min. Base Point Quality Flag | Normal |
| 6 Sec. Base Point | 326.6 |
| 6 Sec. Base Point Quality Flag | Normal |
| Actual Generation | 326.893555 |
| Actual Generation Quality Flag | Normal |

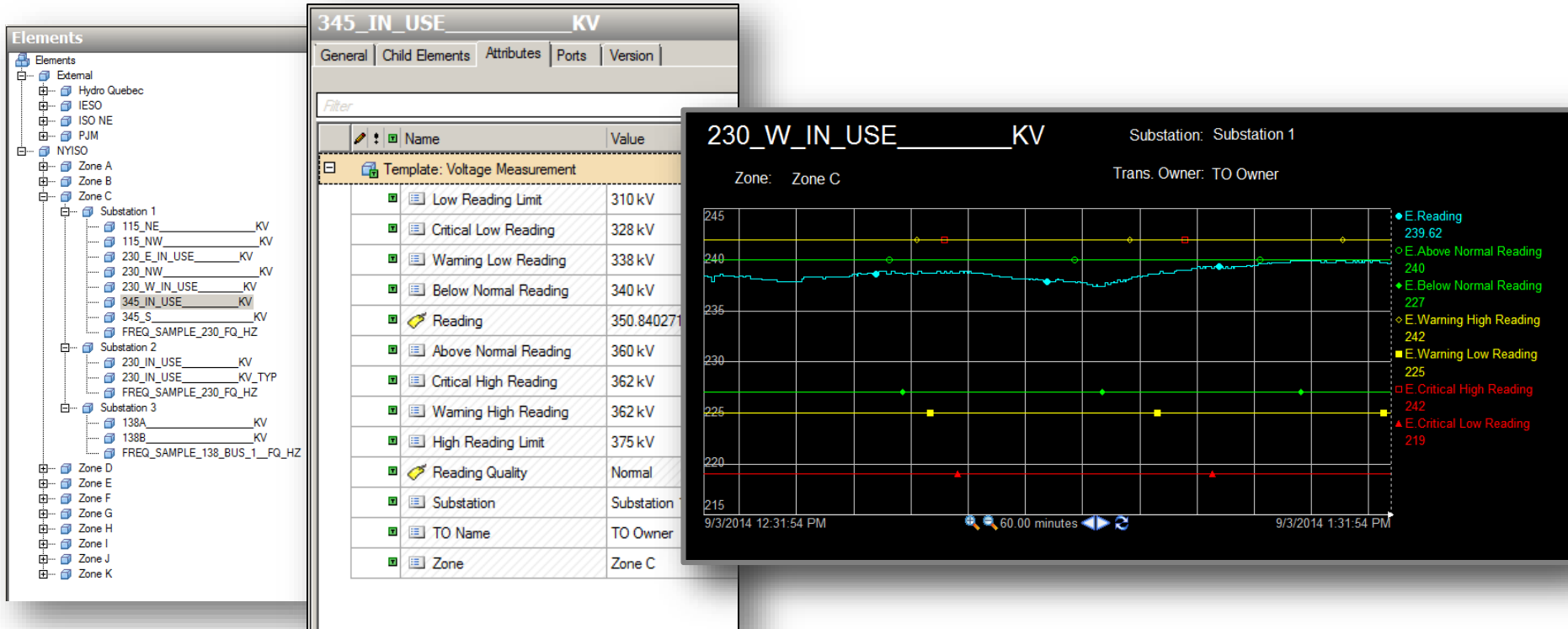
Elements

Elements

- External
 - Hydro Quebec
 - IESO
 - ISO NE
 - PJM
- NYISO
 - Zone A
 - Zone B
 - Example Generator 1
 - Example Generator 2
 - Example Generator 3
 - Zone C
 - Zone D
 - Zone E
 - Zone F
 - Zone G
 - Zone H
 - Zone I
 - Zone J
 - Zone K

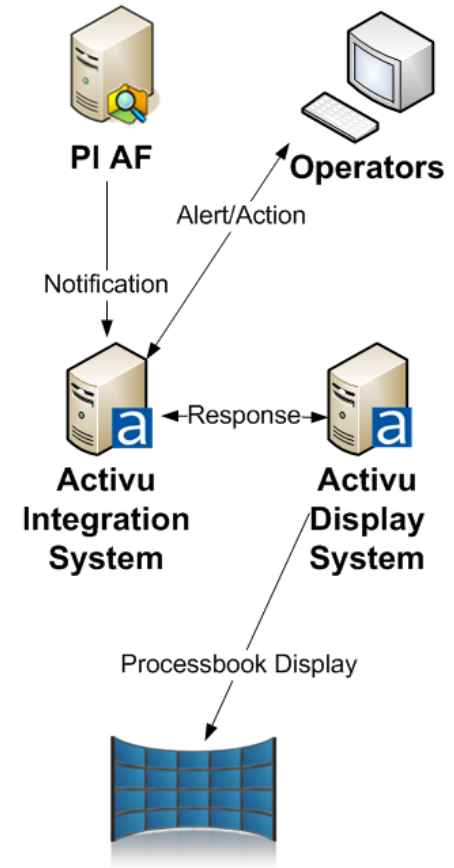


PI Asset Framework – Substation Alerting



NYISO Dynamic Data Response

- ◆ **PI AF and Notifications provide a base for the dynamic data infrastructure**
- ◆ **Almost every wall display is or will be powered by PI Server data**
- ◆ **PI Notifications and PI Event Frames (future) on top of PI AF are driving our dynamic visualization responses**
- ◆ **Using the AN software development kit, a custom delivery channel was created for Notification, context and priority integrated into the display system**



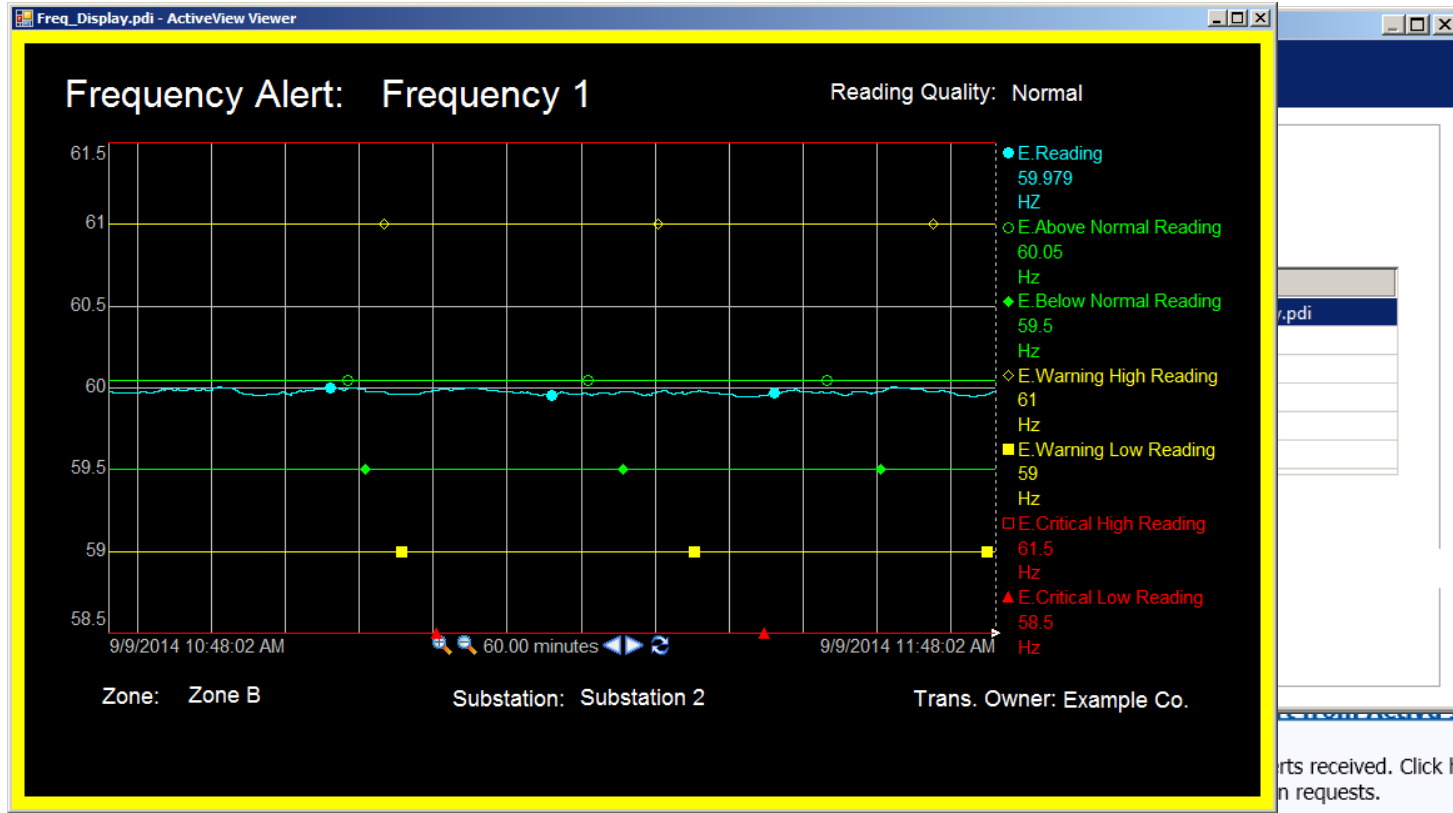
Activu and PI Notifications

The screenshot displays the 'Activu Alert Configuration' application interface. The main window is titled 'Activu Alert Configuration' and features a sidebar with navigation options: 'Users', 'Activu Systems', and 'Alert Responses'. The 'Alert Responses' section is currently selected.

The main content area is divided into several panes:

- Alert-Response Properties:** This pane contains fields for 'Third Party Alert' (set to 'NYISO'), 'Name' (set to 'NYISO'), and 'Description' (set to 'ACE'). There is a checkbox for 'Require User Confirmation' which is checked. Below these fields is a 'Confirmation time' field.
- Select an Alert:** This pane shows a search bar with the text 'Test' and a list of alerts. The list includes: '115KV Test', '230KV Test', '345KV Test', '765KV Test', 'Test Frequency 1', 'Test Frequency 2', 'NYISO ACE Test', and 'Test Voltage 1'.
- Add an Alert-Response Mapping:** This pane is the active dialog box. It has tabs for 'General', 'Start Responses', and 'End Responses'. The 'General' tab is selected. It contains the following fields:
 - Type of Response:** A dropdown menu set to 'Remove Source'.
 - Activu System:** A dropdown menu set to 'ActivuGallery'.
 - Activu Wall:** A dropdown menu set to 'WALL'.
 - Template Position:** A dropdown menu set to 'P1'.
 - Action Identifier:** An empty text field.
 - Action Parameter:** An empty text field.
 - Minimum wall time:** A numeric input field set to '30' with the unit 'seconds'.At the bottom of the dialog are 'Add Response' and 'Cancel' buttons.

Activu and PI Notifications



[Integrator](#)

Alerts received. Click here to display
in requests.

Current and Future Work



Conclusions

- ◆ **The PI System continues to provide quick and easy access to several NYISO data sources**
- ◆ **Dynamic data response is the next big thing**
- ◆ **PI AF databases and Notifications integrate multiple data sources and add depth to NYISO alerts**
- ◆ **Decision making information is increasingly available to operators and business units through PI Server based automation.**

NYISO Project Summary

COMPANY and GOAL

As the amount of information power system operators, engineers and business units face continues to grow, we are working with OSIsoft and other industry partners to develop new ways of dynamically visualizing and delivering pertinent information to the user.



CHALLENGE

Tens of thousands of meter points with just as many comparisons created an environment of too much data to quickly and accurately analyze.

- Information Overload
- Difficult to find information

SOLUTION

Simple AF models intelligently build relationships between meters and limits; custom software presents pertinent information in a timely and automated fashion.

- PI Notifications and PI Event Frames leveraging AF
- Custom software allows data to 'present itself' to the user

RESULTS

Historically, alarms and events would not provide much context. Finding that information was an exercise of minutes. Now it is available instantaneously with the alarm.

- Improved Situational Awareness
- Less burden on system operators

Contact Information

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Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

Please don't forget to...

Complete the Survey for this session



The Power of Data
DECISION READY IN REAL-TIME

Evaluation Form (Seminar Location - Date)

Name: _____ Company: _____

Email: _____

| Quality and content of the presentations | Poor | Good | Excellent | N/A |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| Welcome | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The Journey To Real-Time Operational Intelligence | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The Power of Connection | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tank Level Management System | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Using the FI System to Aid in Troubleshooting Operational Aspects of Oil and Gas Well Drilling and Completion | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Unleash your Infrastructure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Information on the Spot | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Wrap-up/Seminar Conclusion | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Quality and organization of the seminar | | | | |
| Choice of date | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Time allowed for lunch/breaks | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Choice of presentations | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Break time allowed for the presentation | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado



The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.

nyiso.com