



## Digital Energy

# Wide Area Monitoring System (WAMS): PhasorPoint Applications

*Applications for advanced energy management*

## INCREASE VISIBILITY ACROSS THE GRID TO MAKE INFORMED DECISIONS

GE's advanced suite of power system performance and dynamics applications provides system operators with the capability to not just respond, but excel, in an increasingly volatile environment

### Overview

GE PhasorPoint is a real-time synchrophasor-based measurement and monitoring solution for system operators and transmission companies in the key areas of online stability, situational awareness, security analysis, grid planning and asset optimization. PhasorPoint standard applications provide a fundamental sets of WAMS applications and visualization tools while advanced applications provide foremost analytic and visualization solution for monitoring the dynamics of the power system.

### Standard Applications

#### Symmetrical Components

Positive, negative and zero sequence phasor can be calculated for PMU that only provides Phase A, Phase B and Phase C phasor measurements.

#### Dynamic Angle Reference

Dynamic angle reference to avoid random perturbations and sudden changes in the reference angle thereby providing a better representation of oscillation and disturbance events

#### Active & Reactive Power Monitoring

The Active (P) and Reactive Power (Q) Application monitors P & Q levels associated with configured circuits including configurable alert and alarm states across the entire monitored network.

#### Frequency & Rate of Change of Frequency Monitoring

Displays the frequency and rate of change of frequency (ROCOF) states across the entire monitored network. A user can also review the live maximum and minimum frequency deviation

#### Voltage Magnitude & Angle Difference Monitoring

A graphical representation of the real-time voltage phasor measurement of the system. This is provided in terms of voltage magnitudes and angle. Angle difference between any two difference voltage nodes can also be configured.

#### System Condition Monitoring

System Condition Monitoring provides a colour gradient view of voltage, frequency and angle deviations.

#### Composite Events

Composite Events are user-defined events that are triggered only when a specified combination of underlying events occurs

#### Replay

If licensed, Replay functionality allows user to play back selected visualization periods of historical data.

#### User Defined Calculations

Allows user to create new data streams calculated from existing data originating from PMUs. The new data streams appear in both the live and historical data views for display in custom charts

#### Rate of Change

Allows monitoring the rate of change of specified measurements, generating and visualizing alerts and alarms in the WAMS and informing operators of the potential presence of energy imbalance and location of network disturbances.

#### My Views

The My Views Manager provides the tools to create custom chart Views. The custom charts can display any live or historical time series data available to PhasorPoint.

#### Data Export

Users can export data to either CSV or COMTRADE formats for post-event analysis and processing purposes.

# Wide Area Monitoring System (WAMS): PhasorPoint Applications

Applications for advanced energy management

## Advanced Applications

### Islanding, Resync & Blackstart

The Islanding, Resynchronization, and Blackstart (IRB) Advanced Application provides a real-time tool for identifying islanding and providing information valuable in performing a successful resynchronization.

### Oscillatory Stability Monitoring

The Oscillatory Stability Management (OSM) Advanced Application provides foremost analysis and visualization tools for monitoring the dynamics of the power system through a study of its oscillatory modes in the frequency range of 0.04 to 4 Hz.

### Asynchronous Systems

The Asynchronous Systems Advanced Application (ASC) provides the tools and mechanisms for grouping PMUs according to which synchronous area they are measuring, and for defining separate angle references for each area.

### System Disturbance Management

System Disturbance Management (SDM) detects sudden disturbances in the network. This advanced application monitors the rate of change in various measurements, generating and visualising alerts and alarms in the WAMS and informing operators of the potential presence of network disturbances. It is available with 2 optional modules with differing capabilities.

- **General Rate of Change (RoC)**

The application identify the closest disturbance location based on the principle that during a transient disturbance, the frequency and angle of the power system move more rapidly close to source of the disturbance.

- **Disturbance Characterization**

The application identify the disturbance type based on the disturbance influence on the angle and frequency behaviour in the grid.

### Short Circuit Capacity

The Short Circuit Capacity (SCC) Advanced Application carries out measurements of the sub-transient short circuit capacity at specific bus locations in the network providing system operators with increased insight of the operational situation that can be used during the start up of HVDC terminals, and in protection design.

### Sub-synchronous Oscillation Monitoring

The Sub-Synchronous Oscillations (SSO) Advanced Application analyses oscillations in the frequency range of 4 to 46 Hz. This can be used for observing long term behaviour of oscillations and identifying torsional, as well as online alarms for poorly damped or large amplitude oscillations.

### Very Low Frequency

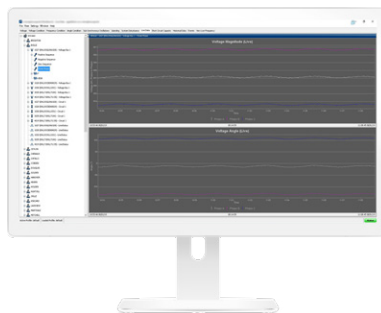
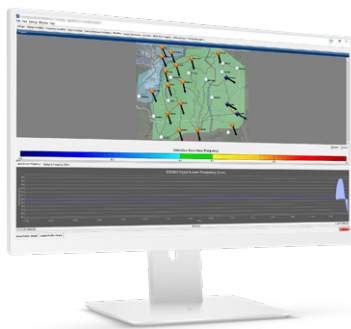
The Very Low Frequency (VLF) Advanced Application analyses frequency measurements from PMUs to obtain the amplitude and frequency of oscillations in the frequency range of 0.0019 to 0.16Hz.

### Line Parameter Estimation

The Line Parameter Estimation (LPE) Advanced Application uses Phasor Measurement Unit (PMU) voltage and current measurements from two ends of a transmission line to estimate the line parameters.

### Power Angle Stability

The PhasorPoint Power Angle Stability (PAS) Advanced Application presents the operating state of a transmission boundary between two areas, in terms of the total aggregate power flow and a derived voltage angle difference. This angle difference is derived from the center of inertia from one area compared to the center of inertia from another area.



## Contact Us

[ge.com/digital/sales-contact-me](http://ge.com/digital/sales-contact-me)

© 2019, General Electric Company. GE Proprietary Information - This document contains General Electric Company (GE) proprietary information. It is the property of GE and shall not be used, disclosed to others or reproduced without the express written consent of GE, including, but without limitation, in the creation, manufacture, development, or derivation of any repairs, modifications, spare parts, or configuration changes or to obtain government or regulatory approval to do so, if consent is given for reproduction in whole or in part, this notice and the notice set forth on each page of this document shall appear in any such reproduction in whole or in part. The information contained in this document may also be controlled by the US export control laws. Unauthorized export or re-export is prohibited. This presentation and the information herein are provided for information purposes only and are subject to change without notice. NO REPRESENTATION OR WARRANTY IS MADE OR IMPLIED AS TO ITS COMPLETENESS, ACCURACY, OR FITNESS FOR ANY PARTICULAR PURPOSE. All relative statements are with respect to GE technology unless otherwise noted.