



WECC Reliability Coordinator Website

OVERVIEW: KEY APPLICATIONS

—presented by—

Kirk Stewart, Manager Applications

Agenda

- WECCRC.org Website
- Wide-Area Views (WAV)
- Historical Data Archiving and Reporting
- My Reporting
- Registry
- Questions

WECCRC.org Website

Promoting Bulk Electric System Reliability



WECC Reliability Coordinator Website

Summary Overview

- Community outreach website:
 - Provides unique opportunity for information sharing
 - Demonstrates WECC's commitment for ensuring bulk electric system reliability
 - Provides accurate and current information related to:
 - System-wide events
 - Reliability coordination studies
 - Operating procedures

Users and Key Components

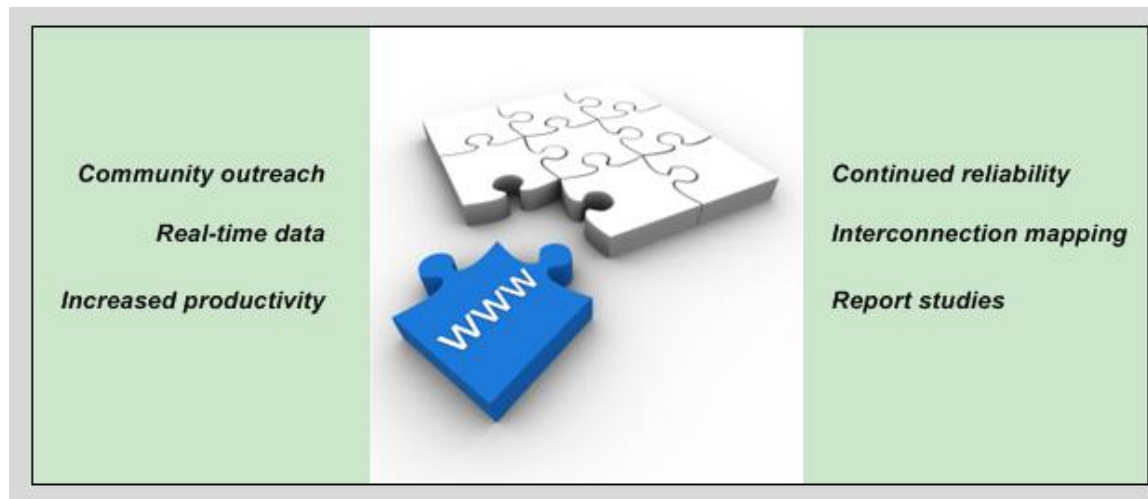
- Typical users include:
 - Reliability Coordinators (RCs)
 - Balancing Authorities (BAs)
 - Transmission Operators (TOPs)
 - Study and engineering groups
 - WECC technical staff resources

Users and Key Components, continued

- Eight key site components:
 - Account request
 - Administrator's Guide
 - PMU Registry
 - Operating Procedures
 - Next-Day Submissions
 - Wide-Area View (WAV)
 - Historical Data Archiving and Reporting
 - Situation Awareness

Wide-Area View (WAV)

Promoting Bulk Electric System Reliability



WECC Reliability Coordinator Website

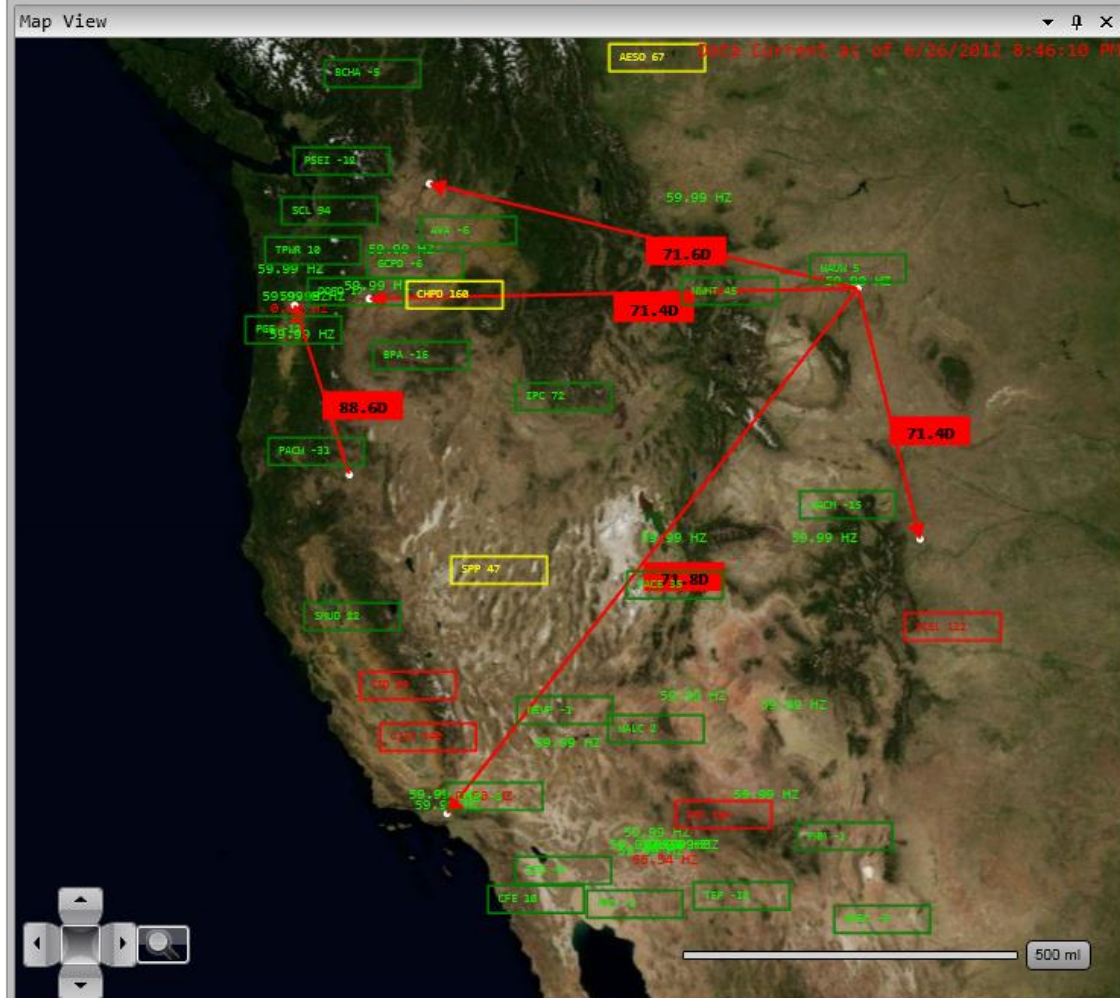
Wide-Area View (WAV)

- Objectives:
 - Provide displays to all WISP participants (overall view of Western Interconnection beyond individual footprints)
 - Enable RCs, BAs and TOPs operators to “be on the same page” (enhance communication)
 - Provide insight into the PMU applications to WISP participants without any PMU applications in their control centers

Wide-Area View (WAV), continued

- Content (note all driven from PI):
 - Path display (shows WECC paths loading)
 - Mode display (shows damping for WECC major modes of oscillations)
 - Voltage display (major voltages)
 - Frequency display (frequency within different BAs)
 - PMUs display (shows PMUs and their status)
 - Angle display (indicates angle differences among preselected voltages)





Map Click List

<input type="checkbox"/>	Time Clicked	Name	Description
<input type="checkbox"/>	9/11/2012 10:39:18 AM	WAUW 5	
<input type="checkbox"/>	9/11/2012 10:39:14 AM	Phase Angle Difference	W036COLSTRIP__01 W07

Delete

Alarms List

Alarm Date	Alarm Text			
9/11/2012 7:23:40 AM	WESTHILL	230	KV LN	STEG_WEST_1230
9/11/2012 7:21:43 AM	MIGUEL	500	KV XF	BNK_81
9/11/2012 7:20:40 AM	ETIWANDA	66	KV XF	BNK_7A
9/11/2012 7:19:11 AM	ETIWANDA	66	KV XF	BNK_7A
9/11/2012 7:15:09 AM	BROCKLEHURST	138	KV LN	BKL__SVA__1138
9/11/2012 7:15:09 AM	MICA	500	KV LN	MICA_NIC__29A
9/11/2012 7:11:08 AM	MICA	500	KV LN	MICA_NIC__29A
9/11/2012 7:10:11 AM	DOSEMOND	805	600B	

Mode Damping



Site Actions Browse Page Publish

Home Model Reliability Study Administration Historian Jeff's Playground Reporting Outages

Status: Published and visible to all readers Note: You are viewing a published version of this page, but this page is also being edited and is checked out exclusively to Vidyadhar Ramanujapuram. Publication Start Date: 5/9/2012 6:50 PM

Home > Reliability > WAV

Alarms

Paths

Modes

Voltage

Frequency

Phase Angle

ACE

Settings

Overlays

ACE

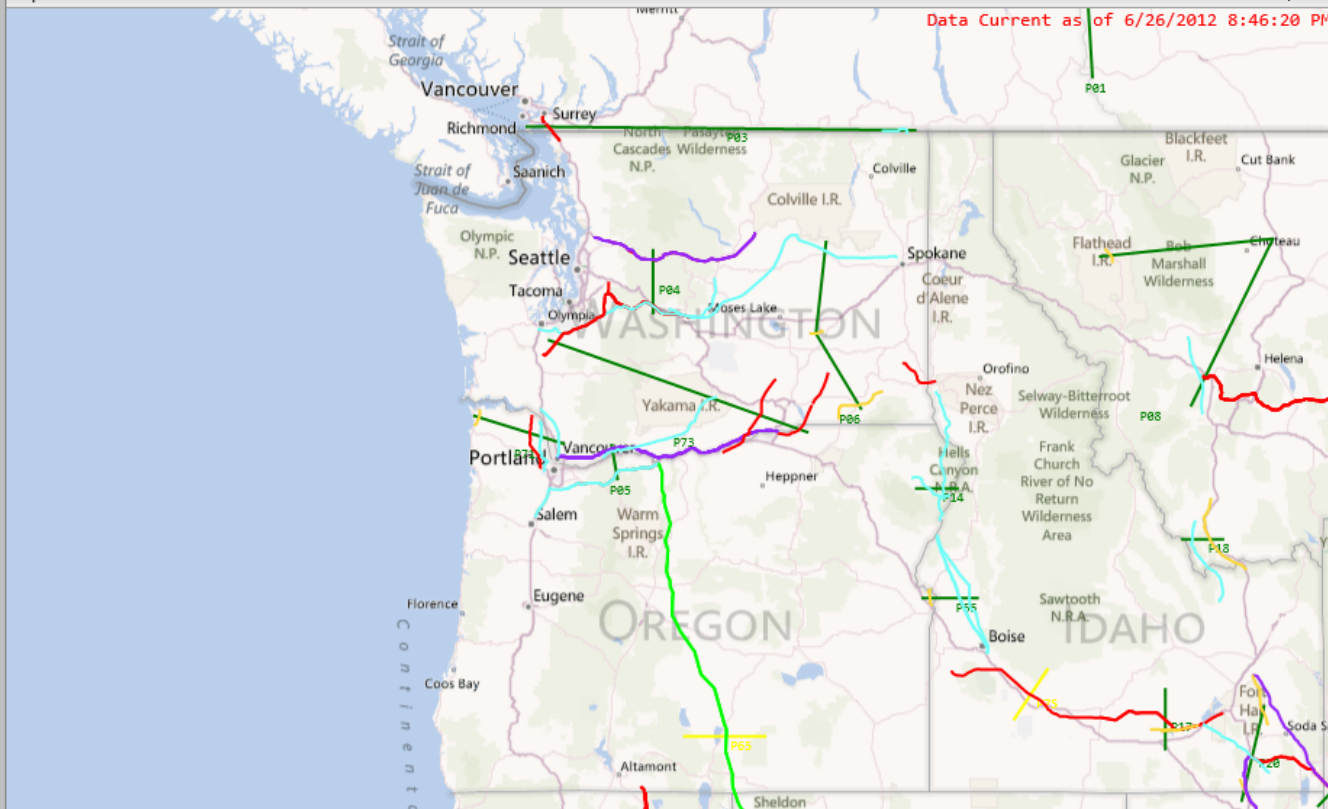
Paths

Modes

PMU

Voltage

Map View



Map Click List

<input type="checkbox"/>	Time Clicked	Name	Description
<input type="checkbox"/>	9/12/2012 9:56:59 AM	P03	Northwest-B
<input type="checkbox"/>	9/12/2012 9:56:49 AM	P71	South of A1
<input type="checkbox"/>	9/12/2012 9:56:45 AM	P04	West of Cas
<input type="checkbox"/>	9/12/2012 9:56:35 AM	P05	West of Cas

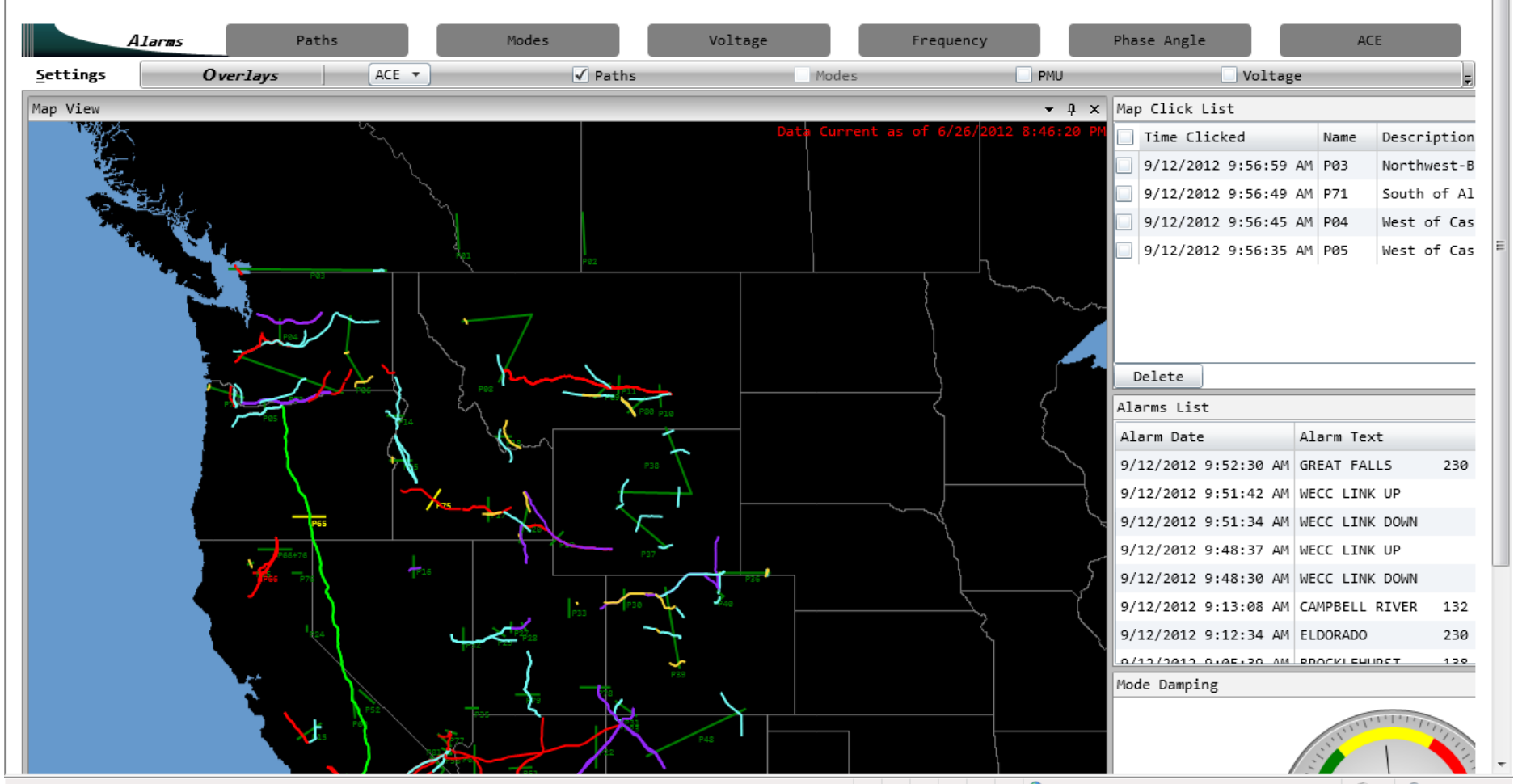
Delete

Alarms List

Alarm Date	Alarm Text	
9/12/2012 9:52:30 AM	GREAT FALLS	230
9/12/2012 9:51:42 AM	WECC LINK UP	
9/12/2012 9:51:34 AM	WECC LINK DOWN	
9/12/2012 9:48:37 AM	WECC LINK UP	
9/12/2012 9:48:30 AM	WECC LINK DOWN	
9/12/2012 9:13:08 AM	CAMPBELL RIVER	132
9/12/2012 9:12:34 AM	ELDORADO	230
9/12/2012 9:05:20 AM	ROCKLEBURST	132

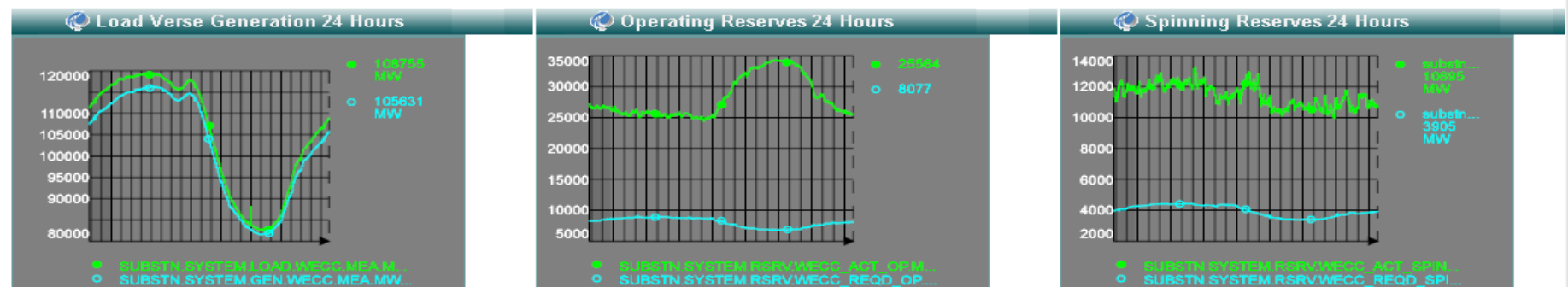
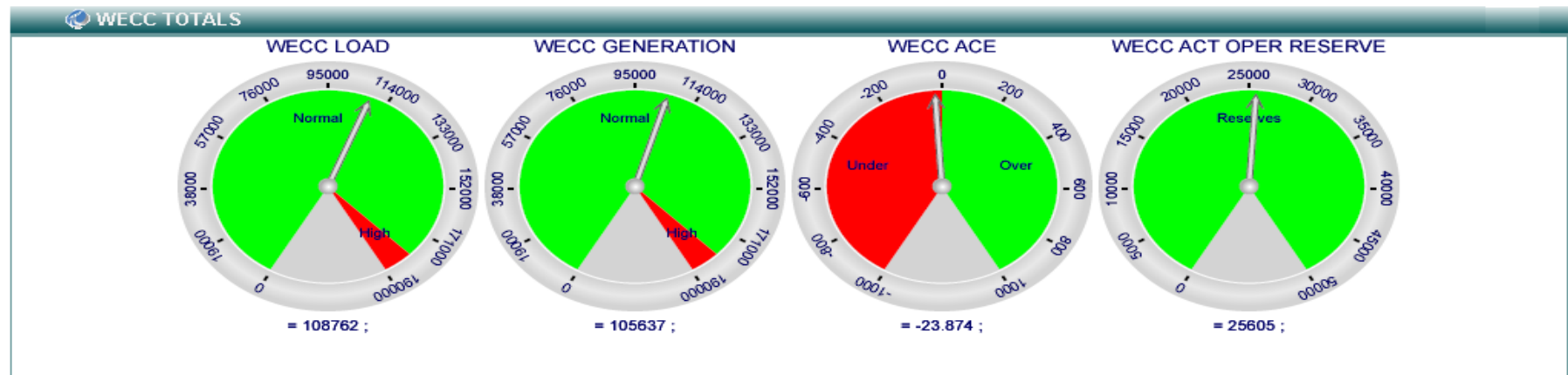
Mode Damping





Status: Checked out and editable. Publication Start Date: Immediately

Home > Reliability > Real Time Displays



The WECC RC maintains a vast array of applications to perform the Reliability Coordination function. This section of the site makes available many of the same displays the RC

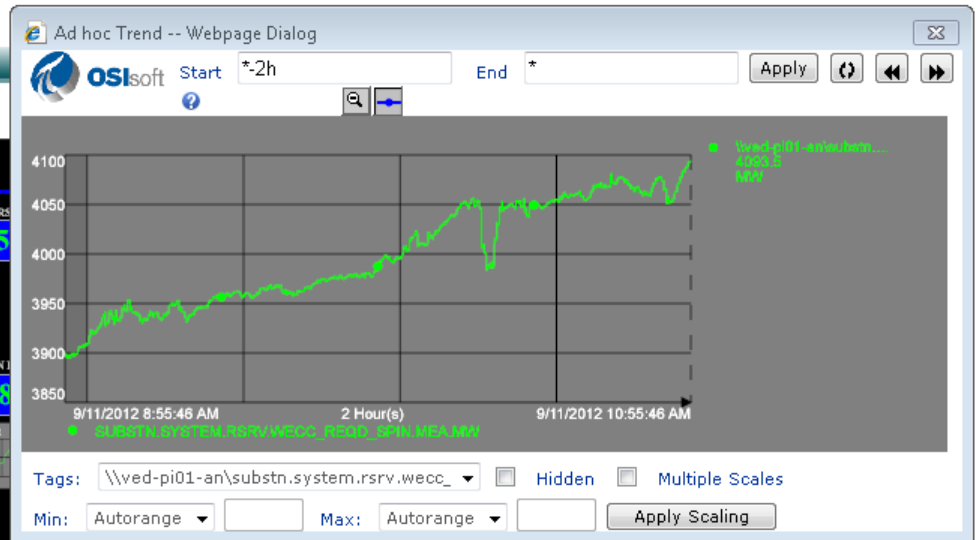
WECC Reliability Coordination

- Home
- Model
- Reliability
- Study
- Administration
- Historian
- Jeff's Playground
- Reporting
- Outages

Status: Checked in and viewable by authorized users. Publication Start Date: Immediately

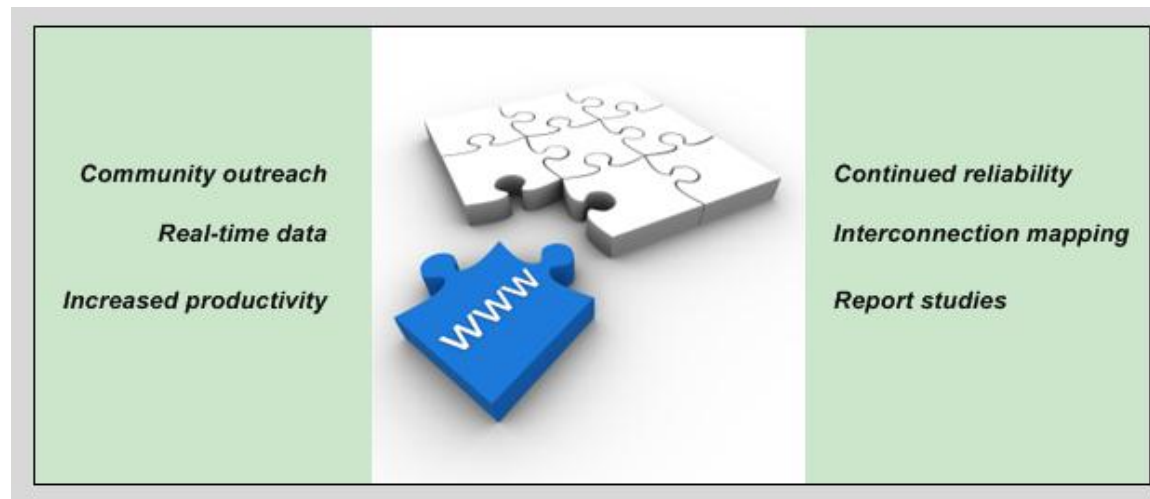
Home > Reliability > WECC AGC Totals

WECC AGC Totals



Historical Data Archiving and Reporting

Promoting Bulk Electric System Reliability



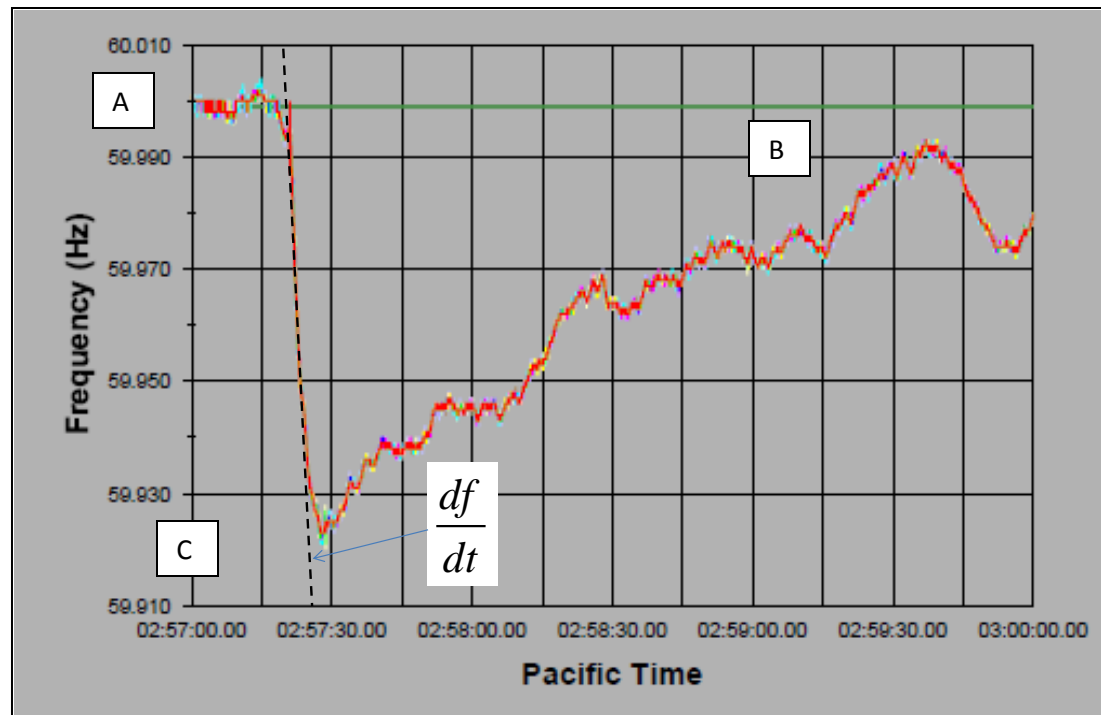
WECC Reliability Coordinator Website

Historical Data Archiving and Reporting

- WECC receives many data requests from BAs and TOPs
- Each BA and TOP needs specific data
- WECC RCO is developing tool for automatic report generation
- Each report is issued automatically (based on a triggering event)
- Each report contains time-domain plots and high-resolution PMU data



- Report includes:
 - Clean frequency plot for each BA marking – A, B, & C points (A=pre, B=settling, C=nadir/low)
 - Exact time of the generation trip
 - Total WECC generation
 - Total wind generation
 - MW/0.1 Hz response



Historical Data Archiving and Reporting

- Example: Tracking Oscillatory Dynamic
- Objective:
 - Provide critical information on system oscillatory behavior
- Benefits:
 - Base-lining inter-area modes of oscillations versus system-operating conditions (correlation analysis)
 - Model validation

Historical Data Archiving and Reporting

- Triggering Events:
 - Insertion of Chief Joseph Brake
 - Unit trips at Palo Verde
 - Alberta separation
 - Any oscillation event (oscillation trigger).
- Report includes:
 - Time of the event and system total generation
 - Modal display (damping, mode frequency)
 - MW flow for major WECC paths
 - Major voltages

Historical Data Archiving and Reporting

- Example: Tracking System Events
- Objective:
 - Provide critical information about system disturbance
- Triggering Events:
 - Alberta separation
 - Loss of generation or load (1000MW or more)
 - Greater than +/- 0.15 Hz frequency deviation

Historical Data Archiving and Reporting

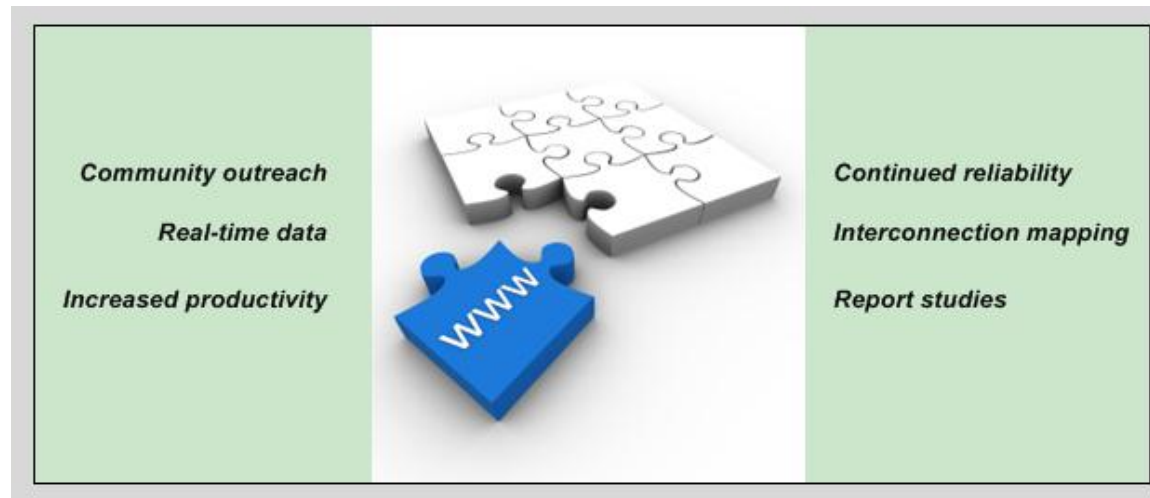
- Steps or swings in tieline power
- Large change, or rate of change, in bus voltage
- Unusual oscillations in the system
- Chief Joseph Brake application
- Pacific HVDC Intertie power block of greater than 1,000MW
- System separation/ islanding events
- Large increase in system noise level

Historical Data Archiving and Reporting

- Report include (e.g., 15 minutes of data):
 - Bus Voltages
 - Angles and frequencies at key transmission substations
 - Power flow on key transmission paths and flowgates
 - Voltage and frequency of major power plants
 - Voltage and frequency of major controlled elements (such as HVDC systems and SVCs)
 - Voltage and frequency of several loads in a major load center

My Reporting

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WECC Reliability Coordinator Website

My Reporting

- Enables users to subscribe to events and be notified via e-mail when they have occurred
- Generates automatic reports from pre-defined events
- Provides download links to event-related data for post-mortem analysis using offline tools

Subscribe Events Screen

This screen enables users to subscribe to pre-defined events and have email notifications delivered to their email address when the event occurs.

Event Type Name	Event Type Description	Subscribe	Email Alert
Loss of generation	Loss of generation or load(1000MW or more)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Frequency deviation	Greater than +/- 0.15 Hz frequency deviation	<input type="checkbox"/>	<input type="checkbox"/>
Bus voltage change	Large change, or rate of change, in bus voltage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Separation/Islanding	System Separation/Islanding events	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Noise Level	Large increase in system noise level	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Oscillation	Unusual Oscillations in the system	<input type="checkbox"/>	<input type="checkbox"/>

The event type such as Breaker Trip or Frequency Deviation

Submit

Cancel

Check to subscribe. Event will show up using My Events Filter on View Events Screen.

Click the check box to have email notifications sent to your inbox.

Subscribe Events Screen, continued

WISPMangeEvents

Clicking Submit displays the Confirmation screen.

Event Type Name	Event Type Description	Subscribe	Email Alert
Loss of generation	Loss of generation or load (1000MW or more)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Frequency Deviation	Greater than +/- 0.15 Hz frequency deviation	<input type="checkbox"/>	<input type="checkbox"/>
Bus voltage change	Large change, or rate of change, in bus voltage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Separation/Islanding		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Noise Level		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Oscillations		<input type="checkbox"/>	<input type="checkbox"/>

You have successfully subscribed to below Events:

Loss of generation
Bus voltage change
Separation/Islanding
Noise Level

OK

View Events Screen

Select a start and end date to restrict the event list to a specific time period.

WISPViewer

By default, it displays only events that have occurred that you have subscribed to. Clicking and Selecting View will display all events.

Click to view data files.

Click to view reports.

Start-Date/Time

End-Date/Time

Select Events

<M/d/yyyy>



<M/d/yyyy>



View My Events



Submit

Event Type	Event Details	Date Time	Reports	DataFiles
Loss of generation	Loss of generation or load(1000MW or more)	9/27/2011 4:00:00		
Frequency Deviation	Greater than +/- 0.15 Hz frequency deviation	9/27/2011 4:00:00		
Bus voltage change	Large change, or rate of change, in bus voltage	10/3/2011 4:00:00		
Separation/Islanding	System Separation/Islanding events	10/3/2011 4:00:00		
Noise Level	Large increase in system noise level	10/3/2011 4:00:00		
Oscillations	Unusual Oscillations in the system	10/3/2011 4:00:00		

View Events Screen, continued

WISPVIEWER

Clicking Reports Displays the view Reports screen..

Start-Date/Time

End-Date/Time

Select Events

<M/d/yyyy> 15

<M/d/yyyy> 15

View My Events

Submit

WISPVIEWER

X

Event Type

Loss of generation

Frequency Deviation

Bus voltage change

Separation/Islanding

Noise Level

Oscillations

ReportName

Loss of Generation 10202011.docx

Loss of Generation 09032011.xlsx

Cancel

Time

Reports

DataFiles

2011 4:00:00



2011 4:00:00



2011 4:00:00



2011 4:00:00



2011 4:00:00



2011 4:00:00



View Events Screen, continued

WISPViewer

Clicking Data Files Icon displays download data files window.

Start-Date/Time End-Date/Time Select Events

<M/d/yyyy> 15 <M/d/yyyy> 15 View My Events ▼ Submit

Event Type	Time	Reports	DataFiles
Loss of generation	2011 4:00:00		
Frequency Deviation	2011 4:00:00		
Bus voltage change	2011 4:00:00		
Separation/Islanding	2011 4:00:00		
Noise Level	2011 4:00:00		
Oscillations	2011 4:00:00		

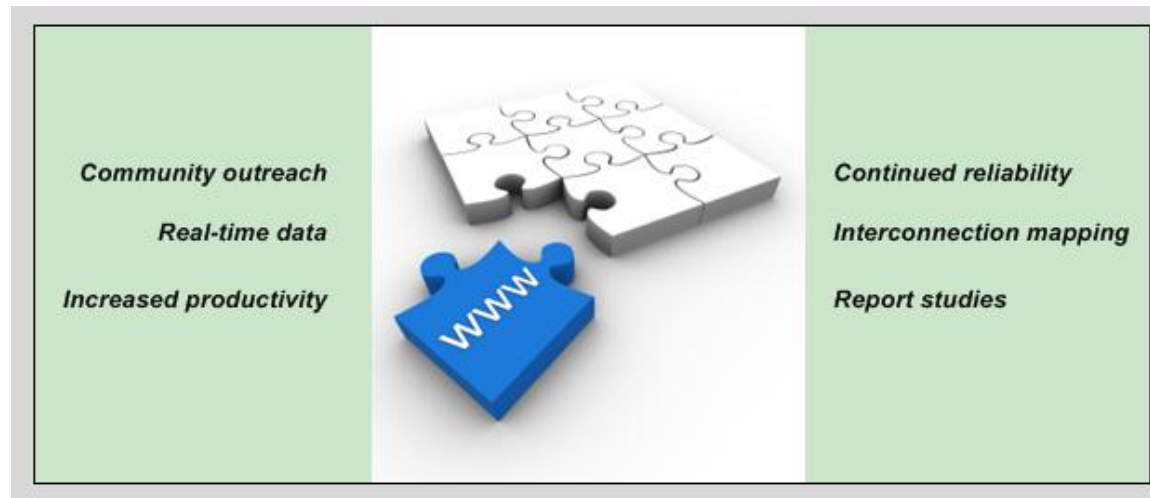
WISPFiles

Download	Filename
<input type="checkbox"/>	file://Loss_of_generation_102202011.d
<input type="checkbox"/>	file://Loss_of_generation_09102011.xls

Download Cancel

Registry

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WECC Reliability Coordinator Website

What is a Registry at its Core?

- WECC's Registry Approach:
 1. A listing of Devices with an associated set of META data that defines each device.
 2. A listing of Measurements with an associated set of META data defining the measurement.
 3. A hierarchy that defines how the Devices and Measurements relate to each other.

WECC Registry Breakdown

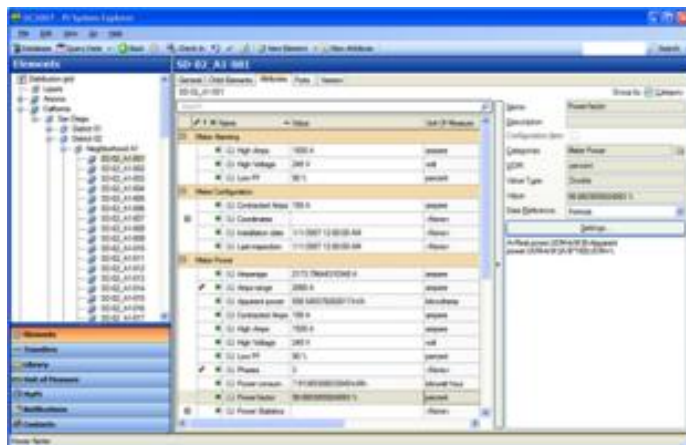
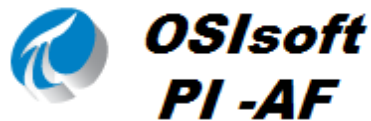
- Templates- A predefined named grouping of fields that define a particular object.
 - PMU Template
 - Measurement (Signal) Template
 - PDC Template
 - Line Template
 - Measurement (MW,MVAR, ETC) Template

WECC Registry Breakdown, continued

- Hierarchy – A tree view relationship to group devices in a logical manner.
 - Our tree breakdown:
 - Company
 - Substation
 - Device
 - Measurements

WECC Selected Vendors

- Back End



Front End

[HTTPS://WWW.WECCRC.ORG](https://www.weccrc.org)



PMU META Data

RegistryEditor

PMU MALIN.PMU.500.1

Description
PMU: MALIN - MALIN PMU 500.1

Common

RCO: Owner:

RCO Abbr: Operator:

EMS:

SCADA:

Owner:

RCO Station:

Contacts

Location

Longitude: Latitude:

GISSource: GISSourceId:

Time Zone:

Device

Virtual: ☒

Manufacturer: Model:

Serial Number: Revision:

Net IP Address:

Protocol: Protocol Id:

Clock Time Zone:

Install Date:

In Service Date:

Retired Date:

Status

CIP Compliant: ☒

GetLOV Returned Data...

ALPHA/scropley Admin SHAREPOINT5



Home

Model

Reliability

Study

Administration

Historian

Jeff's Playground

Reporting

Outages

Home > Model > Registry

Registry

Save + Add ▾ Refresh Work Queue

Registry

Areas

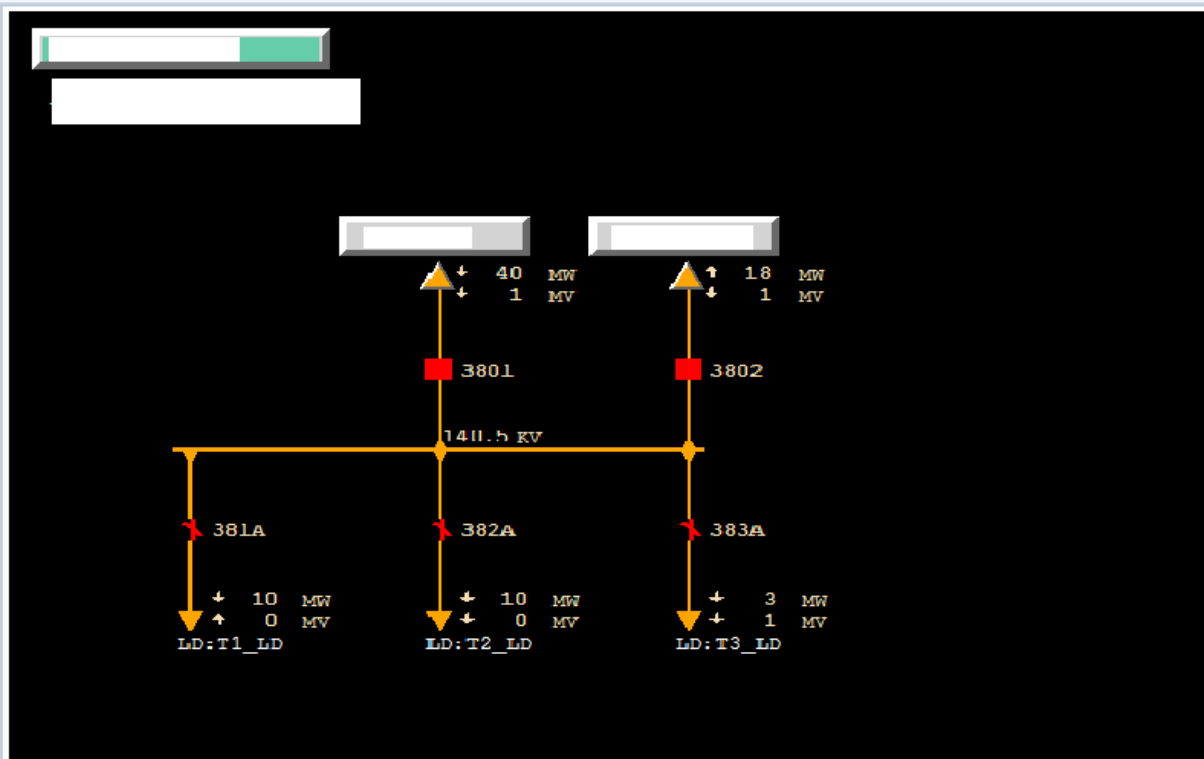
- ▶ AESO
- ▶ APS
- ▶ AVA
- ▶ BC-HYD
- ▲ BPA

Assets

Lines

Substations

19TH_ST
2ND ST
7_AVENUE
72ND_CC
99TH_ST
ABERDEEN
ABERDTP
ACTON
ADAM
ADAMS 3
ALBANY

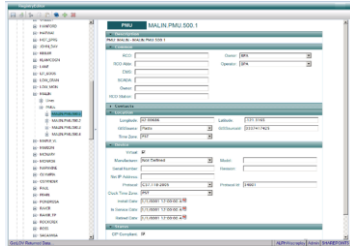


Ready

User Account: DEMS\kstewart

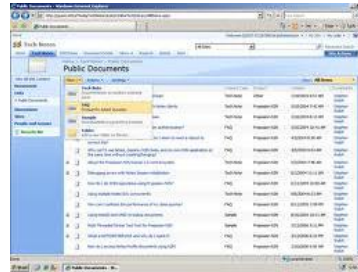


Member
Weccrc.org
Add/Update/Delete



Workflow

Change added
to Sharepoint
List



RC Impact



Updates Systems

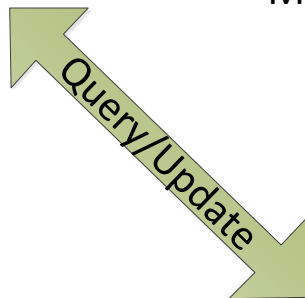
ALSTOM



RC Staff

If no RC system
impacts, PI-AF
updates instantly

Sharepoint Workflow
notifies responsible RC
Staff of Change and keeps
Member up to date on
status



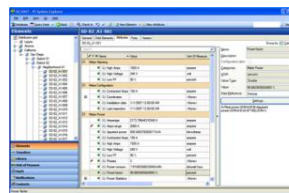
Query/Update



NASPI



WCF

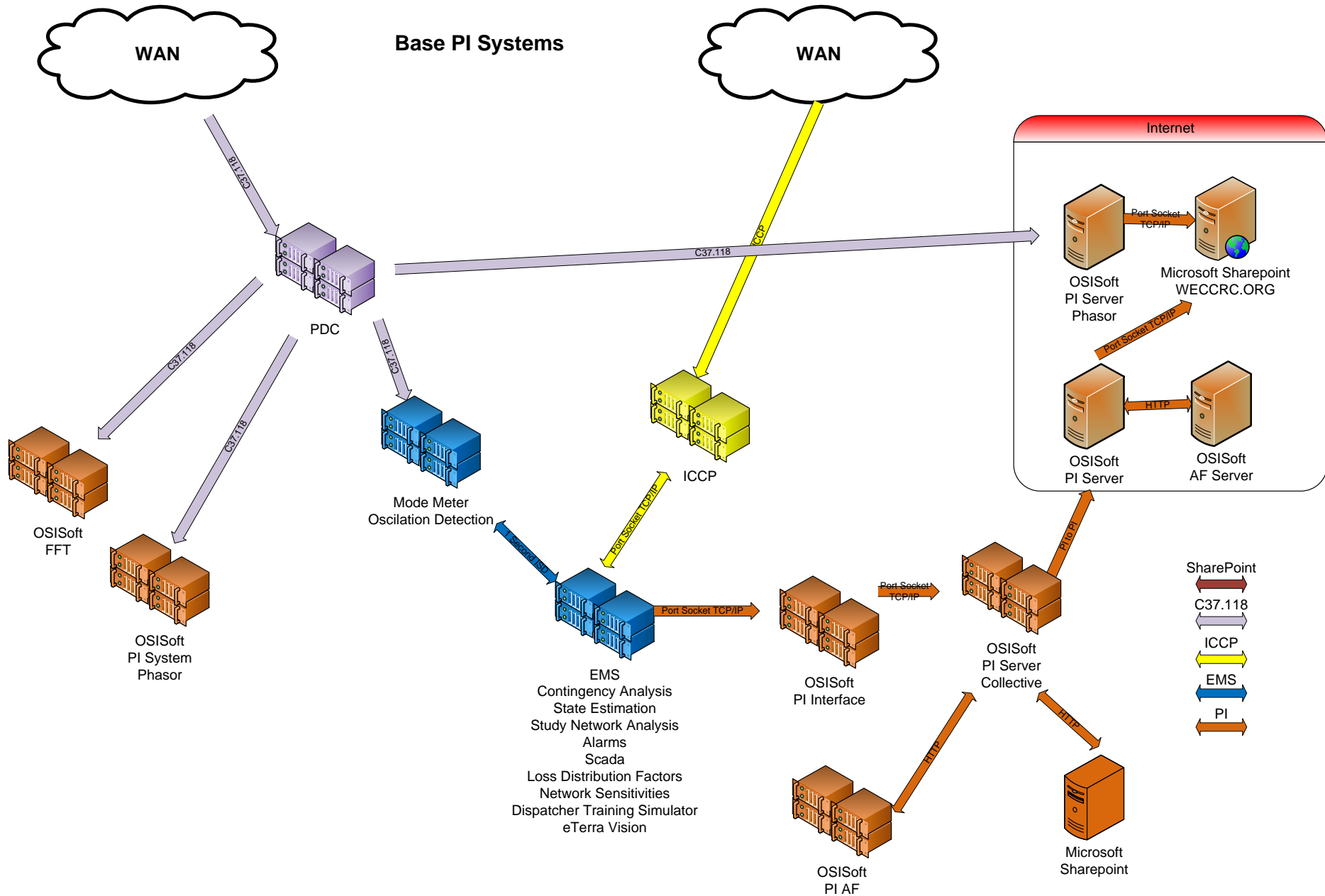


PI-AF



Contents:

1. All equipment in the West Wide System Model
2. GIS Mapping Data for WSM
3. Outage System (COS) cross reference to WSM
4. WSM Names to Member name equivalents
5. ICCP Mapping to WSM
6. PMU/PDCs/Signals



Questions

