

WISP

Western Interconnection Synchrophasor Program

Vickie VanZandt NASPI Work Group Meeting October 12-13, 2011





Western Electricity Coordinating Council Assuring reliability in the Western Interconnection

Key Activities

• WECC's "Western Interconnection Synchrophasor Program" is installing more than 300 phasor measurement units (PMUs) and 60 phasor data concentrators (PDCs) across the Western Interconnection.

Aims and Strategies

- Provide grid operators and reliability coordinators with more frequent and time-synchronized system information.
- Better system visibility will help system operators avoid large-scale regional outages, better utilize existing system capacity, and enable greater utilization of intermittent renewable generation resources.

Results and Benefits

- 19 organizations are participating in the project, providing 100% coverage for the Western Interconnection.
- Real-time information and automated controls being deployed will enable grid operators to allow an additional 100 MW of operational capacity on the California-Oregon Intertie (COI). Similar system benefits are possible in other parts of the system.

Transmission System Modernization



Phasor Measurement Unit

Facts & Figures

Total Project Budget: \$107,780,000

Federal Share: \$53,890,000

Project Area:

Western Interconnection, 1.8 million square miles

Project Team: 19 utility organizations

Program Participants

- WECC Program Awardee
 - Program Director:
 - Linda Perez <u>lperez@wecc.biz</u>
 - Program Manager:
 - Vickie VanZandt <u>vrvanzandt@gmail.com</u>
 - Technical Delivery Manager:
 - Eric Whitley <u>ericwhitley@wecc.biz</u>
 - Technical Architect:
 - Dan Brancaccio <u>dbrancaccio@wecc.biz</u>
 - Participant Liaison:
 - Vic Howell <u>vhowell@wecc.biz</u>

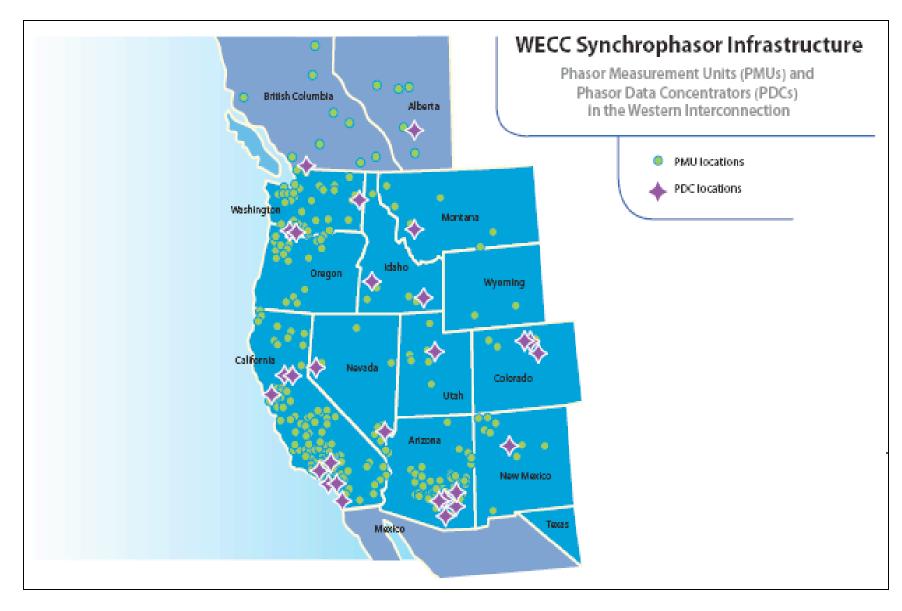


Program Participants (cont.)

 Cost Share Participants 	PMU	s PDCs
 Bonneville Power Administratio 	on 132	4
 California ISO/CEC 	0	2
 Idaho Power Corporation 	4	1
 NV Energy 	14	5
 Pacific Gas & Electric 	158	26
 PacifiCorp 	3	2
 Salt River Project 	21	2
 Southern California Edison 	32	gateways
o WECC		6
TOTAL	364	48
4		WECC

Program Participants (cont.)

•	10 Additional Participants in WISP	PMUs	PDCs
	Alberta Electric System Operator	6	1-2
	Arizona Public Service	21	1-2
	British Columbia Hydro	9	1-2
	Los Angeles Dept of Water & Power	6	1-2
	 Northwestern Energy 	4	1-2
	Public Service of New Mexico	4	1-2
	San Diego Gas and Electric	16	1-2
	 Tri-State G&T 	1	1-2
	Tucson Electric	2	1-2
	Western Area Power Admin	6	1-2
	TOTAL	75	10-20
5			WECC





WISP Milestone Schedule

WECC Project Tasks	Start	Finish		20	011			20)12		20	13	
WECC Project Tasks	Start	FINISN	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	
WECC Data Center Expansion													
Data Center Expansion - Vancouver	Nov-10	Apr-11											
Data Center Expansion - Loveland	Mar-11	Oct-11											
IT Infrastructure Deployment													
IT Test Environment Build (Vancouver, WA)	Mar-11	Jun-11											
IT Production Environment Build (Vancouver, WA)	Sep-11	Jul-12					1						
IT Production Environment Build (Loveland, CO)	May-12	Aug-12						1					
Wide Area Network Deployment													
WAN Core Network Deployment	Jun-11	Nov-11											
WAN Router Installation & Configuration	Oct-11	Apr-12					-						
PDC to PDC Communications Testing	Jan-12	Aug-12						1					
Application Delivery													
Modal Analysis Software (Montana Tech Solution)	Aug-10	Sep-12		1				1					
Installation & Acceptance of Alstom Grid / Psymetrix vQ3 2011	Aug-11	Nov-11											
Installation & Acceptance of Alstom Grid / Psymetrix vQ1 2012	Jan-12	Mar-12				·							
Installation & Acceptance of Alstom Grid / Psymetrix vQ2 2012	Jun-12	Oct-12											
Systems Integration and Testing	Sep-11	Dec-12						1	1				
Application Development													
System Prototype Deployment	Jun-10	Apr-11											
WECC RC.Org and PMU Registry	Oct-10	Oct-11		1									
Historical Data Archive & Reporting	Apr-11	Jun-12					1						
Wide Area View Application	Aug-11	Jun-12											
NASPInet Phasor Gateway Demonstration	Jan-12	Aug-12											
System Acceptance & Cutover													
RC and IT Readiness & Training Activities	Jun-12	Dec-12											
Business Acceptance & Pre-Operations Test	Oct-12	Mar-13											
Final RC Acceptance & Go-Live	Mar-13	Mar-13											

PMUs

- 18 Transmission Owners will deploy over 400 PMUs (some outside the WISP grant)
 Each entity will select its own vendor
- 100% coverage of Western Interconnection

 Coverage depends on application
- Variety of Types • Stand alone
 - o DFR
 - o Relay-based



PMUs (cont.)

- 244 Substations with PMUs
- Sampling Rate 30-120 sps
- Installation Rate:
 - o 2011 Q3 22
 o 2011 EOY 38
 o 2012 EOY 267
 o 2013 Q1 362



PDCs

- RC centers with PDCs
- BA/TO control centers with PDCs
- Field PDCs
- Archive/database

• Storage duration and capacity:

- All Data On-Line 3 months 20 TB
- All Data Off-Line 15 months 100 TB
- Disturbances forever TBD



2

21

25

Communications

- Dedicated, private Wide Area Network (WAN)
- Provided by Harris Corporation
 - WAN from RCs up to TOs/ISOs edge routers under contract to WECC
 - Centralized management
 - Core Network Deployment: Nov. 2011
 - PDC to PDC Communications Testing: Aug. 2012
- Enables peer-to-peer communication
- Will facilitate NASPInet phasor gateway pilot Aug. 2012

PMU/PDC/Signal Registry & Wide Area View (WAV)

- WECC In-house development: Oct. 2011
- Release 1 complete (Agile development, 8 Sprints).
 - Includes initial release of WECCRC.org.
 - PMU Registry general application layout and styling completed.
 - PMU Registry device element structure and attributes complete.
 - Network security model complete.



PMU/PDC/Signal Registry & Wide Area View (WAV) – (cont.)

• Release 2 complete (Sprint 9).

Includes initial release of WAV, PMU
 Registry map and tree view.

- o Completed WAV high-level requirements.
- Technology selection for the WAV user interface is complete.



PMU Registry **Demonstration Tomorrow**

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Victure

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KEELER

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KLAMCOGN

- MULIN PMILISON MULTIN BUSINGO DF HISRCI

MALIN BUS NSO FH21 MALINIBUS SSIRLDF HoSeci MALINERUSSSOOFHEL MALINEUSSSOPEON MALIN CP 1500 DSEQ AL WILINIDE GRIZ, MULH JS LA DERO

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MARJON	
MCNARY	
MONROE	
- NAPAVINE	
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GetLOV Returned Data

Station	MALIN

RCO:		Station Type:	Substation	•
O Abbr:		Owner:	BPA	×
EMS:		Operator:	BPA	*
SCADA:		NERC Region:	WECC	۲
Owner:				
Tech Nam	e:	Tech Info:	[
Location				
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SHAREPOINTS

Major Operational Applications

- Number of TOs/ISOs sharing phasor data: 18
- Wide-Area Situational Awareness: Jun./Oct. 2012
 - Alstom/Psymetrix General visualization, monitoring, alarming and archiving.
 - Montana Tech/University of Wyoming/PNNL, Psymetrix, Washington State University – Oscillation Monitoring.
 - Vendor selection underway Voltage Stability.



Major Operational Applications

- Wide Area View: June 2012

 WECC in-house development Telerik mapping, Silverlight display.
- Automated Report Generation: June 2012

 System performance following events.
 For baselining, model validation, trending.
- Response-Based Controls: BPA March 2015
 Fast reactive switching.
 - Primary and total reactive requirements for wind power plants.

Challenges and lessons learned

- Biggest Technical Challenge
 - Data mining tools for information retrieval.
- Biggest Programmatic/Execution Challenges
 - Took much longer than originally expected:
 - Execute agreements among participants.
 - Finalize contracts for infrastructure and applications.
 - Begin infrastructure construction.

Need an additional Data Sharing Agreement

 To protect source data other than synchrophasors for WAV.



Acknowledgement and Disclaimer

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