

Midwest ISO Smart Grid Investment Grant Overview

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Project Overview

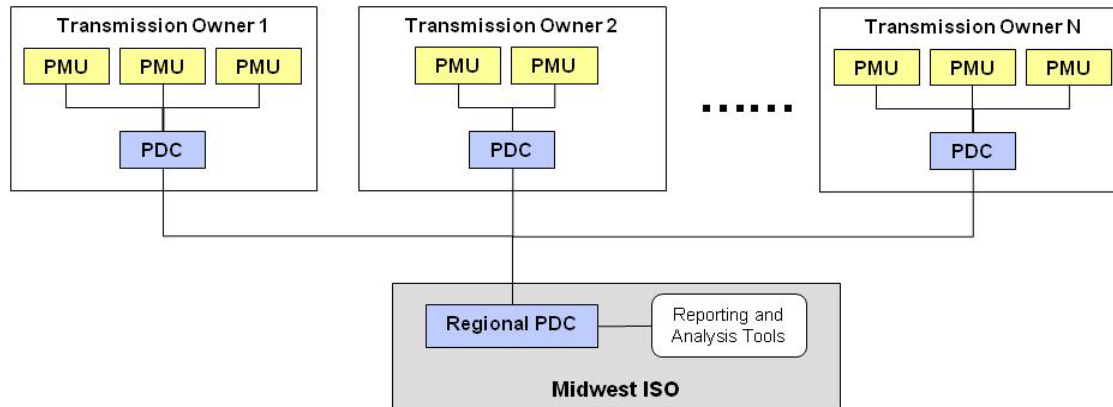
- The purpose of this Project is to improve the dispatch of energy, system reliability and planning capabilities by strategically deploying phasor measurement units (PMUs) and phasor data concentrators (PDCs) across the Midwest ISO footprint.
- Funding – Project budget total \$34.5M
(Midwest ISO 49.9%(\$17.2M), EPRI .1%(<50K), DOE 50.0%(17.3M))

Project Goals

	Phase I	Phase II	Phase III
	Initiate Project and Complete Pilot <ul style="list-style-type: none"> • Run pilot with small number of PMUs, PDCs and transmission owners • Establish Midwest ISO PDC • Analyze data to inform PMU placement decisions 	Second Round Deployment and Application Integration <ul style="list-style-type: none"> • Move into full production mode on Phase I PMUs • Continue PMU footprint build out • Collect & analyze data to inform Phase III placements 	Full Deployment <ul style="list-style-type: none"> • Move into full production mode on Phase II PMUs • Final PMU footprint build out • Incorporate PMU data and apps into RT operations
Transmission Owners	<ul style="list-style-type: none"> • Add 15-20 PMUs and corresponding PDCs* • Likely small number of transmission owners involved 	<ul style="list-style-type: none"> • Add 50-100 PMUs and corresponding PDCs* • Additional transmission owners involved 	<ul style="list-style-type: none"> • Add 40-80 PMUs and corresponding PDCs* • Additional transmission owners involved
Midwest ISO	<ul style="list-style-type: none"> • Implement initial PDC • Begin collecting PMU data • PMU application development and integration • Run PMU placement study 	<ul style="list-style-type: none"> • Full PDC implementation • Hardware and software integration development • Data capture reporting and monitoring testing 	<ul style="list-style-type: none"> • Integration into Midwest ISO architecture • Inter-RTO connectivity • Business continuity implementation and demonstration
PMU Placement Team (Midwest ISO & TOs)	<ul style="list-style-type: none"> • Analyze results • Recommend enhancements for Phase II • Make PMU placement decisions 	<ul style="list-style-type: none"> • Analyze results • Recommend enhancements for Phase III • Make Phase III PMU placement decisions 	<ul style="list-style-type: none"> • Analyze results • Continue recommendations and improvements

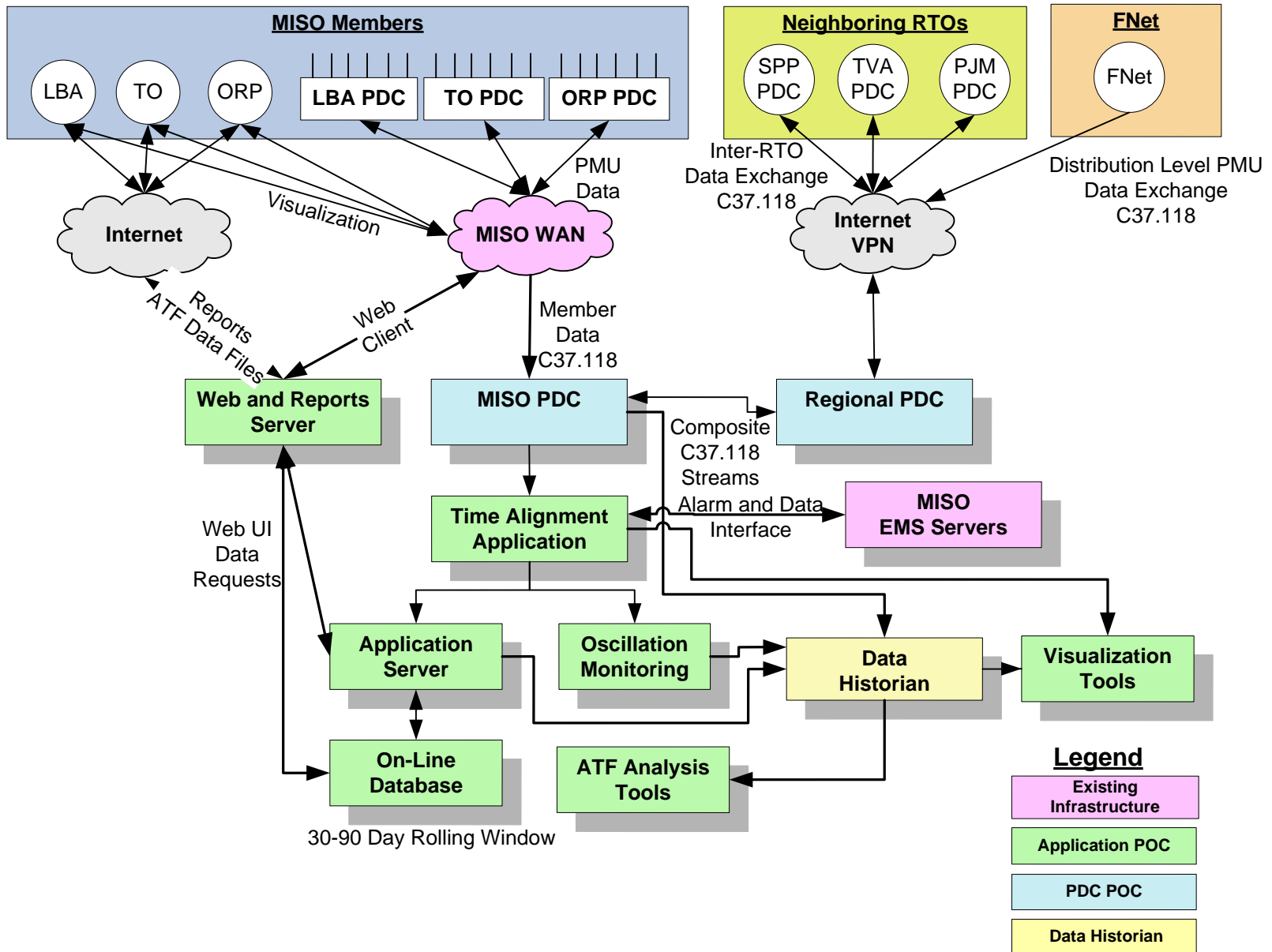
* PMU allocations are dependant on analysis from prior phase and may deviate from these ranges

System Design Elements



- o Installation, testing, integration and monitoring of approximately 150 PMUs and corresponding PDCs at strategic locations across the Midwest ISO footprint
- o Installation, testing, integration and monitoring of a “regional PDC” and related technologies (e.g., visualization tools) centrally located at Midwest ISO
- o Research on collected phasor data completed by two leading academic institutions

Synchrophasor Applications



This project is special because...

- The number of PMUs installed (target 150)
- Includes deployment of distribution level PMUs (FNet)
 - Supporting research and tools
 - Interoperability between FNet and NASPI
- Data integrated into EMS
- Additional research project to:
 - Assess the dynamic system state
 - Use PMU data for real time fault detection which could eventually help avoid zone-3 mis-operation

Project Participants

Project lead

- Midwest ISO
- David Zwergel
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Technical contributors

- Terry Bilke – Project Support
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- Brian Carlson – Infrastructure
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- Curtis Reister – Infrastructure
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- Joe Reddoch – PMU placement analysis
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Midwest ISO Synchronphasor Project Plan

PMUs and Owners

- # PMUs to be installed
 - Total # PMUs covered (150 target)
 - Total under grant will vary based on cost
 - There will be other PMUs (some don't want SGIG\$)
 - Total # channels (TBD)
 - Depends on vendor (members choose their own PMU)
 - Total # stations (TBD)
 - List utilities (or other) PMU owners and expected number of PMUs for each
- Location selection criteria?
 - Phase 1 – Member selected sites (low-hanging fruit)
 - Phase 2 – Topology analysis
 - Phase 3 – Detailed engineering analysis

Security Approach

Physical security

- Follow NERC standards
- Additional Attestation from Members

Cyber-security

- Follow NERC Standards
- Additional Attestation from Members
- Supplemented by Risk Assessment Tool developed with Members

Any concerns?

- Some members backing away based on signal sent in PG&E order
- Need common vision for transition to NASPI net
- Open questions on Regional Data Concentrators
- Centralized management of integration into Interconnection tools and repository

Project Timeline

Summary:

- Phase I – 6 months. 15-20 PMUs, Initial PDC, PMU application and development
- Phase II – 12 months. Add 50 – 100 PMUs, Full PDC implementation, hardware and software integration, Data capture reporting and monitoring testing
- Phase III – 18 months. Add 40 – 80 PMUs, integrate into MISO architecture, Inter-RTO connectivity, Business Continuity Implementation and demo
- Negotiation of final DOE Award is in process. Project is subject to final agreement with the DOE.