

Midwest ISO PMU Deployment Approach

Terry Bilke– Midwest ISO
tbilke@midwestiso.org

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PMU Selection Approach

- Midwest ISO and its members had not intended on duplicating work of the NASPI PSTT
- Members make their own PMU selection decisions
 - There are over 1000 PMU-capable devices already in the footprint
 - Some are looking to add new equipment
- Midwest ISO has facilitated information-sharing webcasts with vendors
- Focusing on PMU types that have been successfully integrated into TVA
- Willing to entertain demonstration projects

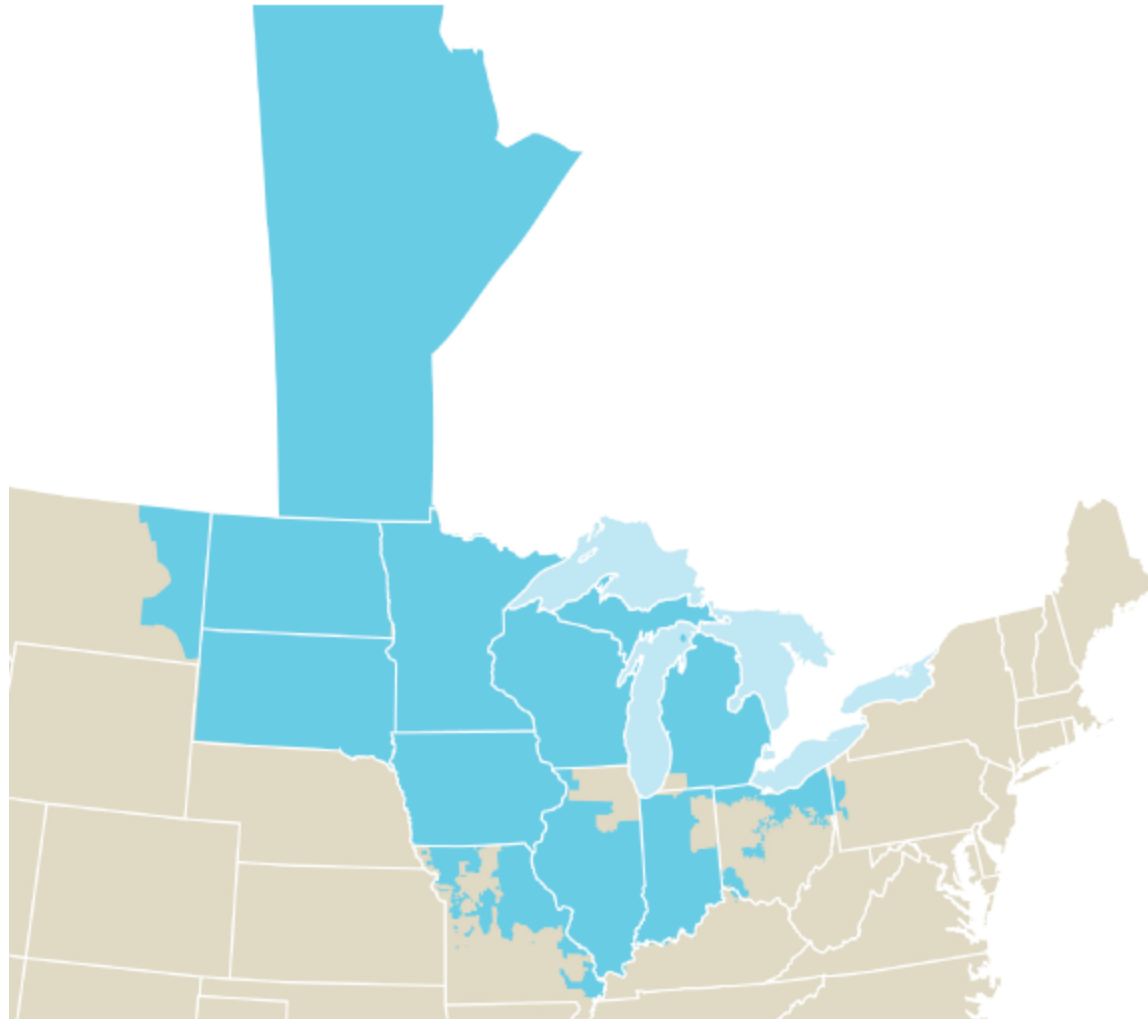
High Level Requirements

- 30 samples/second
- IEEE C37.118
- Availability based on PMU class
 - Control
 - Tool Quality
 - Research and Supplemental
 - Non-production (not validated or of unacceptable availability)
- Local storage, migrate to NERC disturbance monitoring requirements

PMU Site Selection Approach

- Maximize the deployment of PMUs (target 150 PMUs over 3 years)
- Ensure coverage at key locations
- Members make initial site selection based on their system knowledge
- Phase 1 criteria similar to that developed by the members and shared with the NASPI RITT
- Take advantage of low hanging fruit (PMU-capable devices in substations with readily available communications)
- Perform outreach on gaps identified in “Phase 1” analysis
- More detailed analysis in Phases 2 and 3

Midwest ISO Reliability Footprint



Criteria and Applications

Criteria	Targeted Applications					
	Situational Awareness	Event Analysis	Oscillation Detection	Stability	Model Validation	State Estimation
Large Generating Plants	X	X	X		X	X
Large Load Centers	X					X
Significant Interfaces/EHV Circuits	X	X	X	X		X
HVDC Terminals	X				X	X
Remote Buses		X				X
Voltage/Transient Stability				X		
Separation/Islanding Interfaces		X		X		
Power Swing Interfaces		X	X	X		
Intermittent (Wind) Resources					X	
Controllable Devices					X	
PMU Upgrades	X	X	X	X	X	X
High Number of Circuits	X	X	X	X	X	X

Current Member Plans

Company	# PMUs
MEC	2
IPL	7
ITC	12
Duke	19
Amern	7
OTP	6
MHEB	6
CWLP	1
Hoosier	9
ATC	75
Minnkota	1
Covert	1
MDU	1
Multiple (Fnet)	10
	157

Note: Some of the PMUs above are not part of the Midwest ISO SGIG Deployment Project

Issues/Recommendations

- CIP is a moving target and some participants may back away if PMUs are held to a higher standard than other metering devices
- Common approach for the small participants
- Who saves what data
- An analysis of data availability/quality based on PMU and PDC type, communication channel would be of value to the NASPI community