

B5 – PS3-3.03: What are power system challenges you face in protection application that could be solved by the application of system wide protection schemes?

For many system operators the demand for electricity is exceeding their supply capability. Such an increase in demand is pushing the stability limits of the network (a network that is already ageing) which ultimately can result in loss of supply or “black outs” as witnessed in recent years. The situation is further exacerbated by the steady growth in penetration of asynchronously connected renewable generation. As this generation is connected through inverters it reduces the inertia of the Grid and significantly changes how today’s power system operates and associated protection responds to disturbances.

These characteristics require shortened power system response time and strategies for dealing with the grid’s reduced inertia and weakened system strengths. One way to address these challenges is by adopting a system level approach such as advanced wide area protection and control (**WAMPAC**) solutions, thus contributing to a more reliable, stable, and green power system.

WAMPAC solutions address the challenges of connecting renewable resources by integrating distributed controls that respond in real time and by providing system operators with situational awareness needed to respond to power system disturbances.

- Utilize sensing and monitoring of power system characteristics at many points across the grid.
- Communicates measured characteristics with all distributed and centralized monitoring and control locations.
- Deploys distributed algorithms for enabling fast control to isolate and react to localized events.
- Provides enhanced visualization for real-time situational awareness.

Challenge	Existing Solution(s)
Oscillations	<ul style="list-style-type: none"> • Network Interconnection Protection • System oscillation defenses
Reduced Inertia	<ul style="list-style-type: none"> • Locational Fast Balancing • Out of step protection • HVDC services for AC grid
Weakened System Strength	<ul style="list-style-type: none"> • power electronics stability • volt-var management

In Conclusion:

- ✓ To ensure system integrity following a disturbance, discrete protection at grid level may not be adequate to counter the “newer” challenges of integrating renewable energy.
- ✓ Wide area measurements to aid in local decision making will become a necessity at system level.