

Wide area measurement systems - WAMS

Power grids and major problems seen today

Deregulation, competition and increase in complexity of today's power networks have exacerbated power system stability issues. The specific problems they face today are system wide disturbances, which are not ably covered by existing protection and network control systems. As power grids get even more heavily loaded by sudden bulk power transfers, the system becomes very vulnerable and even minor equipment failures can result in cascade tripping and eventually, blackouts.

The need for real time monitoring & control

To ensure system stability in a heavily loaded system, all or most installed components should remain in service and right actions must be taken quickly if the system has not recovered after a serious event.



To cater to this requirement, the solution is to have real time monitoring. Such a wide area measurement system provides operators with real time knowledge of various instability issues and events as and when they occur. This early warning system provides operators with much needed time for counteraction as well as choices for action. Eventually, such a system can provide leading operator guidance on the best course of action as well as a base for automatic wide area control.

Many utilities, government organizations and a few manufacturers have been working with this technology and approach for the last decade concluding that real time monitoring with WAMS is the answer for transmission reliability. Implementation has however been hampered by a variety of reasons, cost or availability of standard solutions being the most minor amongst them. It was also determined that having an adaptable system is better than just network strengthening. To achieve this adaptability, real time information is a must.

Wide area measurement systems

A typical wide area measurement or WAMS system is built up on a reliable communication system connecting power stations, network control centers and sub stations. The GPS satellite system is used for timing accuracy and a number of Phasor measurement units are deployed across the power network. The Phasor measurement unit or PMU streams the required real time data through the communication link to the WAMS. In some cases, PMU's could even include local instability protection schemes.



Phasor measurement unit

ABB has developed highly accurate technology working in close relation with knowledgeable customers and subject matter experts in a number of universities. The technology was developed with ABB's expertise and by utilizing a decade of experience in applying microprocessors for relaying and control. To achieve value from the accurate and reliable data streams coming from these PMU devices, ABB has now introduced the **PSGuard wide area measurement system**. The PSGuard system can be implemented in stages, paving the way towards automatic wide area measurements by transmission companies. Application functionality packages can be chosen and implemented based on utility needs with the system being built on standard PC hardware and operating systems and having the required security standards built in.

Highly qualified engineers and experts in this field of WAMS working in research departments throughout the world developed the PMU product and the PSGuard system. Installations proving the technology and its reliability are in service. Further developments enhancing the use of WAMS are taking place throughout the world.

The return on investment is quick and enormous

Avoiding billions of dollars of lost revenue from unnecessary loads shed or shut downs, outages or blackouts, is paramount justification. System wide real time information helps transmission owners determine the order of investment, at the right time. System wide disturbance analysis is available immediately rather than in months.

