circuits, called lateral circuits, which branch from the feeder circuits. The management of the local distribution network often relies on telephone calls from consumers when an outage occurs or relies on field workers analyzing the local distribution network.

[0006] Power companies have attempted to upgrade the power grid using digital technology, sometimes called a "smart grid." For example, more intelligent meters (sometimes called "smart meters") are a type of advanced meter that identifies consumption in more detail than a conventional meter. The smart meter may then communicate that information via some network back to the local utility for monitoring and billing purposes (telemetering). While these recent advances in upgrading the power grid are beneficial, more advances are necessary. It has been reported that in the United States alone, half of generation capacity is unused, half the long distance transmission network capacity is unused, and two thirds of its local distribution is unused. Therefore, a need clearly exists to improve the management of the power grid.

BRIEF SUMMARY

[0006a] According to a first aspect of the present invention, there is provided a method of determining a fault type in a multi-phase power grid, the method comprising: receiving phase and magnitude data for each phase in the multi-phase power grid, wherein the phase and magnitude data is indicative of a fault on the multi-phase power grid, comparing the phase and magnitude data for each phase in the multi-phase power grid to a first set of predetermined criteria, wherein the first set of criteria includes predetermined inter-phasor angle criteria and predetermined relative inter-phasor angle change criteria; and determining a fault type based on the comparison of the phase and magnitude data for each phase in the multi-phase power grid to the first set of predetermined criteria.

[0006b] According to a second aspect of the present invention, there is provided a system for determining a fault type in a multi-phase power grid by receiving phase and magnitude data for each phase in the multi-phase power grid, wherein the phase and magnitude data are indicative of a fault on the multi-phase power grid, the system comprising: a fault intelligence application executable on at least one processor, the fault intelligence application configured to: compare the phase and magnitude data for each phase in the multi-phase power grid to a first set of predetermined criteria, wherein the first set of criteria includes predetermined inter-phasor angle criteria and predetermined relative inter-

phasor angle change criteria; and determine a fault type based on the comparison of the phase and magnitude data for each phase in the multi-phase power grid to the first set of predetermined criteria.

[0007] An outage management system for a power grid is also disclosed. The outage management system may include an outage intelligence application executable on one or more processors configured to receive event messages from various devices and portions of the power grid. The event messages may allow the outage intelligence application to determine when outage conditions may be present for a particular device or portion of the power grid. The outage intelligence application may determine a state of operation for one, some, or all of the devices and portion of the power grid that transmit the event messages. The outage intelligence application may receive data related to current demand conditions of the power grid and physical configuration of the power grid to confirm that an outage associated with the power grid is present upon receipt of an event message indicating such. The outage intelligence application may notify a central power authority of an outage occurrence enabling location and correction of the outage. The outage intelligence application may suspend processing messages received from a portions of the power grid experiencing outage conditions based on receipt of the event messages and may resume such processing when the outage conditions are no longer present.

[0008] As also disclosed, a fault intelligence application executable on at least one processor may be configured to receive phasor data (magnitude and

6. The method of claim 1, wherein receiving the phase and magnitude data for each phase in the multi-phase power grid comprises receiving the phase and magnitude data at a plurality of time instants;

wherein, comparing the phase and magnitude data for each phase in the multi-phase power grid comprises comparing the phase and magnitude data for each of the plurality to time instants; and

wherein, selecting the fault type comprises selecting the fault type when the phase and magnitude data for each of the plurality of time instants is within the first predetermined criteria for a predetermined number of consecutive time instants.

7. A system for determining a fault type in a multi-phase power grid by receiving phase and magnitude data for each phase in the multi-phase power grid, the phase and magnitude data are indicative of a fault on the multi-phase power grid, the system comprising:

a fault intelligence application executable on at least one processor, the fault intelligence application configured to:

compare the phase and magnitude data for each phase in the multi-phase power grid to a first set of predetermined criteria, wherein the first set of criteria includes predetermined inter-phasor angle criteria and predetermined relative inter-phasor angle change criteria; and

determine a fault type based on the comparison of the phase and magnitude data for each phase in the multi-phase power grid to the first set of predetermined criteria.

8. The system of claim 7, wherein the fault intelligence application is further configured to compare the phase and magnitude data for each phase in the multi-phase power grid to the first set of predetermined criteria comprising comparing the phase and magnitude data for each phase in the multi-phase power grid to a first set of predetermined criteria that includes predetermined phasor magnitude criteria.

9. The system of claim 8, wherein the fault intelligence application is further configured to compare the phase and magnitude data for each phase in the multi-phase power grid to a

first set of predetermined criteria comprising comparing the phase and magnitude data for each phase in the multi-phase power grid to a first set of predetermined criteria that includes predetermined relative phasor magnitude change criteria.

10. The system of claim 7, wherein the fault intelligence application is further configured to determine a fault type comprising selecting a fault type from a group of fault types based on the comparison of the phase and magnitude data for each phase in the multi-phase power grid to the first set of predetermined criteria.

11. The system of claim 10, wherein the fault intelligence application is further configured to select the fault type comprising eliminating fault types included in the group of fault types from consideration as the selected fault type based on comparison of the phase and magnitude data for each phase in the multi-phase power grid to the first set of predetermined criteria.

12. The system of claim 7, wherein the fault intelligence application is further configured to receive the phase and magnitude data for each phase in the multi-phase power grid comprising receiving the phase and magnitude data at a plurality of time instants;

compare the phase and magnitude data for each phase in the multi-phase power grid comprising comparing the phase and magnitude data for each of the plurality to time instants; and

select the fault type comprising selecting the fault type when the phase and magnitude data for each of the plurality of time instants is within the first predetermined criteria for a predetermined number of consecutive time instants.