CLAIMS

What is claimed is:

1. A method for reporting outage information in a multi-layer mesh network, the method comprising:

detecting, by a first node in layer *N* of the multi-layer mesh network, an outage condition;

after detecting the outage condition, waiting for a predetermined sustained outage period;

after the predetermined sustained outage period expires, continuing to wait for a layer-specific time interval, wherein the layer-specific time interval is based on a topology of layer *N*;

receiving a last gasp from a second node in layer *N*+1 of the multi-layer mesh network, wherein the last gasp includes a second identifier for the second node and an indication of layer *N*+1; and

after the layer-specific time interval expires, transmitting a consolidated last gasp, wherein the consolidated last gasp includes a first identifier for the first node, an indication of layer *N*, the second identifier for the second node, and the indication of layer *N*+1.

2. The method of claim 1, further comprising:

receiving, by a powered node, the consolidated last gasp; and

transmitting, by the powered node, a consolidated outage message to a head-end, wherein the consolidated outage message includes outage information associated with the consolidated last gasp.

3. The method of claim 2, wherein the powered node is a root node in a first layer, the root node comprising a collector, and further comprising:

after the layer-specific time interval expires, transmitting the consolidated outage message to the head-end via a separate communications network.

4. The method of claim 1, further comprising:

receiving, by a third node in layer *N*–1 of the multi-layer mesh network, the consolidated last gasp.

5. The method of claim 1, wherein the last gasp comprises a last gasp packet that includes a timestamp corresponding to a time of the outage condition.

6. The method of claim 1, wherein the outage condition is a first outage condition, the consolidated last gasp is a first consolidated last gasp, and further comprising:

determining, by the first node, the last gasp from the second node is a second consolidated last gasp that includes a third identifier for a third node and an indication of layer *N*+2;

determining, by the first node, a second outage condition of the third node based on the second consolidated last gasp; and

generating, by the first node, the first consolidated last gasp, wherein the first consolidated last gasp includes the third identifier for the third node and the indication of layer *N*+2.

7. The method of claim 1, wherein the last gasp is a first last gasp, and further comprising:

receiving, by the first node, a second last gasp from a third node in layer *N*+2 of the multi-layer mesh network, wherein the second last gasp includes a third identifier for the third node and an indication of layer *N*+2; and

generating, by the first node, the consolidated last gasp, wherein the consolidated last gasp includes the third identifier for the third node and the indication of layer *N*+2.

8. The method of claim 7, further comprising:

determining, by the first node, the second last gasp from the third node includes a duplicate message; and

before generating the first consolidated last gasp, de-duplicating, by the first node, the second last gasp by removing a copy of the duplicate message.

9. The method of claim 7, further comprising:

determining, by the first node, the second last gasp from the third node includes a duplicate message; and

de-duplicating, by the first node, the first consolidated last gasp by removing a copy of the duplicate message.

10. The method of claim 7, further comprising:

generating, by the first node, the first consolidated last gasp by concatenating the first last gasp and the second last gasp into the first consolidated last gasp.

11. A system, comprising:

a first node in layer *N* of a multi-layer mesh network, the first node configured to:

detect an outage condition;

after detecting the outage condition, wait for a predetermined sustained outage period;

after the predetermined sustained outage period expires, continue to wait for a layer-specific time interval, wherein the layer-specific time interval is based on a topology of layer *N* in the multi-layer mesh network;

receive a last gasp from a second node in layer *N*+1 of the multi-layer mesh network, wherein the last gasp includes a second identifier for the second node and an indication of layer *N*+1; and

after the layer-specific time interval expires, transmit a consolidated last gasp, wherein the consolidated last gasp includes a first identifier for the first node, an indication of layer *N*, the second identifier for the second node, and the indication of layer *N*+1.

12. The system of claim 11, further comprising a third node in layer *N*–1 of the multi-layer mesh network, wherein the third node is configured to:

receive the consolidated last gasp; and

transmit a consolidated outage message to a head-end, wherein the consolidated outage message includes outage information associated with the consolidated last gasp.

13. The system of claim 11, wherein the outage condition is a first outage condition, the consolidated last gasp is a first consolidated last gasp, and the first node is further configured to:

determine the last gasp from the second node is a second consolidated last gasp that includes a third identifier for a third node and an indication of layer *N*+1;

determine a second outage condition of the third node based on the second consolidated last gasp; and

generate the first consolidated last gasp, wherein the first consolidated last gasp includes the third identifier for the third node and the indication of layer *N*+1.

14. The system of claim 11, wherein the last gasp is a first last gasp, and further comprising:

receive a second last gasp from a third node in layer *N*+1 of the multi-layer mesh network, wherein the second last gasp includes a third identifier for the third node and an indication of layer *N*+1; and

generate the consolidated last gasp, wherein the consolidated last gasp includes the third identifier for the third node and the indication of layer *N*+1.

15. The system of claim 14, further comprising:

determine the second last gasp from the third node includes a duplicate message; and

before generating the first consolidated last gasp, de-duplicate the second last gasp by removing a copy of the duplicate message.

16. The system of claim 14, further comprising:

generate the first consolidated last gasp by concatenating the first last gasp and the second last gasp into the consolidated last gasp.

17. A first node in layer *N* of a multi-layer mesh network, comprising:

a processor configured to execute computer-readable instructions; and

a memory comprising the computer-readable instructions which, when executed by the processor, are configured to cause the processor to perform operations comprising:

detecting an outage condition;

after detecting the outage condition, waiting for a predetermined sustained outage period;

after the predetermined sustained outage period expires, continuing to wait for a layer-specific time interval, wherein the layer-specific time interval is based on a topology of layer *N*;

receiving a last gasp from a second node in layer *N*+1 of the multi-layer mesh network, wherein the last gasp includes a second identifier for the second node and an indication of layer *N*+1; and

after the layer-specific time interval expires, transmitting a consolidated last gasp, wherein the consolidated last gasp includes a first identifier for the first node, an indication of layer *N*, the second identifier for the second node, and the indication of layer *N*+1.

18. The first node of claim 17, wherein the outage condition is a first outage condition, the consolidated last gasp is a first consolidated last gasp, and the operations further comprising:

determining the last gasp from the second node is a second consolidated last gasp that includes a third identifier for a third node and an indication of layer *N*+2;

determining a second outage condition of the third node based on the second consolidated last gasp; and

generating the first consolidated last gasp, wherein the first consolidated last gasp includes the third identifier for the third node and the indication of layer *N*+2.

19. The first node of claim 17, wherein the last gasp is a first last gasp, and the operations further comprising:

receiving a second last gasp from a third node in layer *N*+2 of the multi-layer mesh network, wherein the second last gasp includes a third identifier for the third node and the indication of layer *N*+2; and

generating the consolidated last gasp, wherein the consolidated last gasp includes the third identifier for the third node and the indication of layer *N*+2.

20. The first node of claim 19, the operations further comprising:

determining the second last gasp from the third node includes a duplicate message; and

before generating the consolidated last gasp, de-duplicating the second last gasp by removing a copy of the duplicate message.

21. The first node of claim 19, the operations further comprising:

generating the consolidated last gasp by concatenating the first last gasp and the second last gasp into the consolidated last gasp.

22. The first node of claim 17, wherein the outage condition is a first outage condition, the last gasp is a first last gasp, and the operations further comprising:

during the layer-specific time interval, receiving:

a second last gasp from a third node in layer *N*+2 of the multi-layer mesh network, wherein the second last gasp includes a third identifier for the third node and an indication of layer *N*+2;

a third last gasp from a fourth node in layer *N*+3 of the multi-layer mesh network, wherein the third last gasp includes a fourth identifier for the fourth node and an indication of layer *N*+3; and

generating the consolidated last gasp, wherein the consolidated last gasp includes the first identifier for the first node, the indication of layer *N*, the second identifier for the second node, the indication of layer *N*+1, the third identifier for the third node, the indication of layer *N*+2, the fourth identifier for the fourth node, and the indication of layer *N*+3.

23. A first node in layer *N* of a multi-layer mesh network, comprising:

a processor configured to execute computer-readable instructions; and

a memory comprising the computer-readable instructions which, when executed by the processor, are configured to cause the processor to perform operations comprising:

detecting an outage condition;

after detecting the outage condition, waiting for a predetermined sustained outage period;

after the predetermined sustained outage period expires, continuing to wait for a layer-specific time interval, wherein the layer-specific time interval is based on a topology of layer *N* in the multi-layer mesh network;

receiving a last gasp from a second node in layer *N*+1 of the multi-layer mesh network, wherein the last gasp includes a second identifier for the second node and an indication of layer *N*+1; and

before the layer-specific time interval expires, transmitting a consolidated last gasp, wherein the consolidated last gasp includes a first identifier for the first node, an indication of layer *N*, the second identifier for the second node, and the indication of layer *N*+1.