CLAIMS

1. An optical routing circuit comprising:

a first node;

a second node; and

a third node, wherein a first optical signal channel optically couples the first node to the second node, wherein a second optical signal channel optically couples the first node to the third node; and

a node control system, wherein a first node control channel electrically couples the first node to the node control system, and wherein a second node control channel electrically couples both the second node and the third node to the node control system, wherein when the second node is activated and the third node is deactivated:

control of the second node by the node control system through the second node control channel is enabled;

control of the third node by the node control system through the second node control channel is disabled; and

control of the first node by the node control system through the first node control channel is enabled such that the first node directs an optical signal to the second node through the first optical signal channel rather than to the third node through the second optical signal channel; and wherein when the second node is activated and the third node is activated:

control of the second node and the third node by the node control system through the second node control channel is enabled; and

control of the first node by the node control system through the first node control channel is enabled such that the first node is arranged to direct an optical signal to the second node through the first optical signal channel and an optical signal to the third node through the second optical signal channel.

2. The optical routing circuit of claim 1, wherein the first node is electrically coupled to the second node by a first electrical signal channel, and wherein the first

node is arranged to activate or deactivate the second node by directing a first electrical activation signal to the second node through the first electrical signal channel.

3. The optical routing circuit of claim 2, wherein the first node is electrically coupled to the third node by a second electrical signal channel, and wherein the first node is arranged to activate or deactivate the third node by directing a second electrical activation signal to the third node through the second electrical signal channel.

4. The optical routing circuit of claim 2, wherein the node control system is arranged to direct the first electrical activation signal to the first node through the first node control channel.

5. The optical routing circuit of claim 2, wherein:

the second node control channel comprises a plurality of sub-channel groups;

the first electrical activation signal comprises sub-channel group selection information; and

the second node is arranged to select, based on the sub-channel group selection information, a sub-channel group of the plurality of sub-channel groups for control of the second node by the node control system.

6. The optical routing circuit of claim 1, wherein activating the second node is based on a node identifier in an electrical signal to the second node matching a node identifier of the second node.

7. The optical routing circuit of claim 1, wherein the first node comprises an optical switch controlled by the node control system to direct the optical signal to the second node or the third node.

8. The optical routing circuit of claim 1, wherein the second node is arranged to direct an electrical feedback signal to the node control system through the second node control channel.

9. The optical routing circuit of claim 8, wherein:

the second node comprises a photodetector;

the electrical feedback signal is based on an electrical monitoring signal output by the photodetector; and

the node control system is arranged to control at least one of the first node, the second node, or the third node based on the electrical feedback signal.

10. A node of an optical routing circuit, the node comprising a node optical unit and a node electronic unit, wherein:

the node optical unit comprises an optical switch;

the node optical unit is electrically coupled to the node electronic unit;

the node electronic unit is electrically coupled to a node control channel;

when the node is activated, the node electronic unit enables control of the node optical unit by a node control system through the node control channel such that the optical switch directs an optical signal at the node optical unit to at least one of a first optical signal channel coupled to the node optical unit or a second optical signal channel coupled to the node optical unit;

when the node is deactivated, the node electronic unit disables control of the node optical unit by the node control system through the node control channel; and the node electronic unit is arranged to direct an electrical feedback signal to the node control system through the node control channel.

11. The node of claim 10, wherein enabling control of the node optical unit by the node control system comprises establishing an electrical connection between the node optical unit and the node control channel, whereas when the node is deactivated, the control of the node optical unit by the node control system is disabled by cutting off the electrical connection between the node optical unit and the node control channel.

12. The node of claim 10, wherein the node electronic unit is arranged to receive an electrical activation signal, and wherein the node is activated or deactivated based on the electrical activation signal.

13. The node of claim 12, wherein the node electronic unit is arranged to receive the electrical activation signal from the node control system through the node control channel.

14. The node of claim 12, wherein the node electronic unit is further electrically coupled to an electrical signal channel, and wherein the node electronic unit is arranged to receive the electrical activation signal from the electrical signal channel.

15. The node of claim 12, wherein

the node control channel comprises a plurality of sub-channel groups;

the electrical activation signal comprises sub-channel group selection information; and

the node electronic unit is arranged to select, based on the sub-channel group selection information, a sub-channel group of the plurality of sub-channel groups for control of the node optical unit by the node control system.

16. The node of claim 12, wherein:

the electrical activation signal further comprises a node identifier; and

the node is arranged to activate when the node identifier in the electrical activation signal matches a node identifier of the node.

17. The node of claim 10, wherein

the node optical unit comprises a photodetector; and

the electrical feedback signal is based on an electrical monitoring signal output from the photodetector.

18. The node of claim 10, wherein, when the node is deactivated, the node electronic unit cuts off a power supply to the optical switch.

19. A method for routing an optical signal, the method comprising:

configuring, through a first node control channel electrically coupled to a first node of an optical routing circuit (ORC) and a node control system, the first node to direct, through a first optical signal channel optically coupled to the first node and a

second node of the ORC, an optical signal to the second node rather than to a third node of the ORC through a second optical signal channel optically coupled to the first node and the third node when the second node is activated and the third node is deactivated;

controlling, through a second node control channel electrically coupled to the second node, the third node, and the node control system, the second node when the second node is activated and the third node is deactivated;

controlling, through the second node control channel, the third node when the third node is activated and the second node is deactivated; and directing, by the second node, an electrical feedback signal to the node control system through the second node control channel.

20. The method of claim 19, further comprising:

activating, through the second node control channel, the third node; and

configuring the first node through the first node control channel such that the first node directs an optical signal to the third node through the second optical signal channel.

21. The method of claim 19, further comprising communicating, from the first node and through a first electrical signal channel electrically coupled to the first node and the second node, a first electrical activation signal to the second node to activate the second node.

22. The method of claim 19, further comprising communicating, from the first node and through a second electrical signal channel electrically coupled to the first node and the third node, a second electrical activation signal to the third node to activate the third node.

23. The method of claim 19, wherein the first node comprises an optical switch, wherein the optical switch directs the optical signal to the second node.

24. The method of claim 19, further comprising:

producing, by a photodetector in the second node, an electrical monitoring signal, wherein the electrical feedback signal is based on the electrical monitoring signal; and

controlling, by the node control system, at least one of the first node, the second node, or the third node based on the electrical feedback signal.