CLAIMS

1. A quantum key distribution network comprising:

a source configured to generate photon pairs based on spontaneous parametric downconversion;

a splitter configured for splitting photons generated by the source into different optical links;

a plurality of nodes configured to receive the photons via respective ones of the optical links, the plurality of nodes comprising three or more nodes, each of the plurality of nodes configured to derive a quantum key from quantum signals; and

a communication link between the nodes for exchanging timing information about the reception of the photons between the nodes;

wherein the network is configured for determining which two of the plurality of nodes received photons of one pair of photons based on the timing information.

2. The network of claim 1, wherein the source is configured to generate the photon pairs at random times.

3. The network of claim 2, wherein the source comprises a pump laser for passing a laser beam through a nonlinear medium with chi-2 nonlinearity.

4. The network of claim 3, wherein the pump laser is configured for operating in continuous-wave mode.

5. The network of any one of claims 1 to 4, wherein the network is configured to provide the timing information about the reception of the photons as a time synchronization service.

6. The network of any one of claims 1 to 5, wherein the optical links between the splitter and the nodes are direct.

7. The network of claim 6, wherein the optical links are built entirely out of passive components.

8. The network of any one of claims 1 to 7, wherein an optical source link between the source and the splitter is direct.

9. The network of claim 8, wherein the optical source link is built entirely out of passive components.

10. A method of quantum key distribution in a network, comprising the steps of:

generating photon pairs based on spontaneous parametric downconversion using a source;

splitting photons generated by the source into different optical links using a splitter;

providing a plurality of nodes configured to receive the photons via respective ones of the optical links, the plurality of nodes comprising three or more nodes, each of the plurality of nodes configured to derive a quantum key from quantum signals;

providing a communication link between the nodes for exchanging timing information about the reception of the photons between the nodes; and

determining which two of the plurality of nodes received photons of one pair of photons based on the timing information.

11. The method of claim 10, comprising generating the photon pairs at random times using the source.

12. The method of claim 11, comprising passing a pump laser beam through a nonlinear medium with chi-2 nonlinearity.

13. The method of claim 12, wherein the pump laser beam is operated in continuous-wave mode.

14. The method of any one of claims 10 to 13, comprising provide the timing information about the reception of the photons as a time synchronization service.

15. The method of any one of claims 10 to 14, wherein the optical links between the splitter and the nodes are direct.

16. The method of claim 15, wherein the optical links are built entirely out of passive components.

17. The method of any one of claims 10 to 16, wherein an optical source link between the source and the splitter is direct.

18. The method of claim 17, wherein the optical source link is built entirely out of passive components.