

WHAT IS CLAIMED IS:

1. A method comprising:

under control of a node of a multi-channel network configured with computer-executable instructions:

sending, by the node, a request-to-send (RTS) message to a neighbor node, the request to send message designating a sequence of channels to test;

receiving, at the node, a clear-to-send (CTS) message from the neighbor node, indicating that the neighbor node is available to receive transmissions;

sending, by the node, test data packets to the neighbor node according to the sequence of channels to test; wherein test data packets are sent on different channels;

receiving, at the node, test data packets from the neighbor node according to the sequence of channels to test; ~~and~~

computing a link quality of a link between the node and the neighbor node based on the test data packets received from the neighbor node.

2. The method of claim 1, further comprising:

comparing the computed link quality between the node and the neighbor node with a predetermined threshold quality; and

qualifying the link between the node and the neighbor node in response to determining that the link quality of the link between the node and the neighbor node meets the predetermined threshold quality.

3. The method of claim 1, wherein the sequence of channels to test is designated by a beginning channel number to test, a step interval between channels to test, and a number of channels to test.

4. The method of claim 1, further comprising sending, by the node, a confirmation packet including a number of test data packets the node received from the neighbor node, the confirmation packet being usable by the neighbor node to evaluate the link quality between the node and the neighbor node.

5. The method of claim 1, wherein each test data packet includes an indication of a cost in time of transmission through the link.

6. The method of claim 1, wherein ~~evaluating~~ computing the link quality comprises evaluating a transmission quality of multiple channels between the node and the neighbor node.

7. The method of claim 1, wherein ~~evaluating~~ computing the link quality comprises computing an expected transmission time (ETT) according to the following equation:

$$ETT = \frac{S}{B} \times ETX,$$

$$\text{where } ETX = \frac{1}{1-P}$$

$$P = 1 - (1 - Pf) \times (1 - Pr),$$

P is a loss rate on a link,

Pf is a probability that a data packet successfully arrives at the neighbor node,

Pr is a probability that a confirmation from the neighbor node is successfully received,

S is packet size of the respective data packet, and

B is a bandwidth of the link between the node and the neighbor node.

8. The method of claim 1, further comprising:

sending, by the node, a RTS message to another neighbor node, the request to send message designating a sequence of channels to test;

receiving, at the node, a CTS message from the another neighbor node, indicating that the another neighbor node is available to receive transmissions;

sending, by the node, test data packets to the another neighbor node according to the sequence of channels to test;

receiving, at the node, test data packets from the another neighbor node according to the sequence of channels to test; and

~~evaluating~~ computing a link quality between the node and the another neighbor node based on the test data packets received from the another neighbor node.

9. The method of claim 8, further comprising repeating the acts of claim 8 until the node has identified a predetermined number of links satisfying a predetermined link quality threshold.

a qualification module stored in the memory and executable on the one or more processors to:

determine a link quality of links between the network computing device and each of one or more other network computing devices; wherein the link quality of links is determined based on test data packets sent on different channels;

qualify one or more of the links between the network computing device and the respective network computing devices in response to the determining that the link quality of the one or more links meets the predetermined threshold quality; and

store a list of qualified links in the memory of the network computing device; and

a routing module stored in the memory and executable on the one or more processors to route transmissions via one or more of the qualified links.

15. The network computing device of claim 14, further comprising:

a multi-channel radio capable of sending and receiving communications on multiple different channels;

a frequency hopping module configured to switch between the multiple different channels in accordance with a predefined frequency hopping pattern of the multi-channel communication network; and

a metrology module stored in the memory and executable by the one or more processors to collect resource consumption data, the resource consumption data