delays to the threshold relative to the minimum value of the first and subsequent packet trip delays, calculating a second offset based on the comparison, and providing the second offset between the master clock and the slave clock based on the first packet trip delay.

**[0007]** Calculating the first skew between the first pair of the plurality of packets at the slave device and the second skew between the first pair at the master device and calculating the ratio between the first skew and the second skew may comprise $Rms = (T_{22} - T_{21})/(T_{12} - T_{11})$ wherein Rms is the slave frequency rate, $T_{22}$ is a time that the slave device receives a second packet of the first pair from the master device, $T_{21}$ is a time that the slave device receives a first packet of the first pair from the master device, $T_{12}$ is a time the master device transmits the second packet of the second pair, and $T_{11}$ is a time the master device transmits the first packet of the second pair.

**[0008]** Calculating the third skew between a second pair of the plurality of packets at the slave device and the fourth skew between the second pair at the master device and calculating a ratio between the third skew and the fourth skew may comprises $Rsm = (T_{32} - T_{31})/(T_{42} - T_{41})$ wherein Rsm is a reverse slave frequency rate, $T_{32}$ is a time that the slave device transmits a second packet of the third pair from the master device, $T_{31}$ is a time that the slave device transmits a first packet of the third pair from the master device, $T_{42}$ is a time the master device receives the second packet of the second pair, and $T_{41}$ is a time the master device receives the first packet of the second pair.

**[0009]** Calculating a first packet trip delay by using the time that the master device initiates sending the packet of the plurality of packets to the slave device, the time the master device receives the response from the slave device, a corrected time the slave device receives the packet, and the corrected time the slave device initiates sending the response may comprise $RTD = \frac{(T_4 - T_1) - (T_3 - T_2) \times R}{2}$ wherein $T_4$ is the time that the master device receives the response ~~form~~ from the slave device, $T_1$ is the time the master device initiates sending the packet to the slave device, $T_3$ is the time the slave device initiates sending the response, $T_2$ is the time the slave device receives the packet, and R is the ratio between the first skew and the second skew.

**[0010]** Calculating the first offset between the master clock and the slave clock based on the first packet trip delay may comprise $offset = T_2 - T_1 - RTD$ wherein $T_2$ is the time the slave device receives the packet, $T_1$ is the time the master device initiates sending the packet to

the slave device, and RTD is the first packet trip delay. Calculating the first offset between the master clock and the slave clock based on the first packet trip delay may comprise $offset = T_3 - T_4 + meanRTD$ wherein $T_3$ is the time the slave device initiates sending the response, $T_4$ is the time that the master device receives the response ~~form~~ from the slave device, and RTD is the first packet trip delay.

**[0011]** An exemplary system for synchronizing a master clock and a slave clock may comprise a communication module, a frequency rate module, a rate correction module, a packet trip delay module, and a time correction module. The communication module may be configured to transmit a plurality of packets between a master device with the master clock and a slave device with the slave clock. The frequency rate module may be configured to calculate a first skew based on times between a first pair of the plurality of packets received at the slave device and a second skew between the first pair at the master device and to calculate a ratio between the first skew and the second skew. The rate correction module may be configured to provide a slave clock frequency correction of the slave clock to the slave device to allow the slave device to correct a slave clock frequency. The packet trip delay module may be configured to calculate a first packet trip delay by using a time that the master device initiates sending a packet of the plurality of packets to the slave device, a time the master device receives a response from the slave device, a corrected time the slave device receives the packet, and a corrected time the slave device initiates sending the response. The time correction module may be configured to calculate a first offset between the master clock and the slave clock based on the first packet trip delay and to provide the first offset to the slave device.

**[0012]** An exemplary computer readable medium may executable instructions. The instructions may be executable by a processor to perform a method of synchronizing a master clock and a slave clock. The method may comprise transmitting a plurality of packets between a master device with the master clock and a slave device with the slave clock, calculating a first skew between a first pair of the plurality of packets at the slave device and a second skew between the first pair at the master device, calculating a ratio between the first skew and the second skew, providing a slave clock frequency correction of the slave clock to the slave device to allow the slave device to correct a slave clock frequency, calculating a first packet trip delay by using a time that the master device initiates sending a packet of the plurality of packets to the slave device, a time the master device receives a response from the slave device,

a time the master device receives the second packet of the second pair, and $T_{41}$ is a time the master device receives the first packet of the second pair.

11. The method of claim 1 wherein calculating a first packet trip delay by using the time that the master device initiates sending the packet of the plurality of packets to the slave device, the time the master device receives the response from the slave device, a corrected time the slave device receives the packet, and the corrected time the slave device initiates sending the response comprises $RTD = \frac{(T_4 - T_1) - (T_3 - T_2) \times R}{2}$ wherein $T_4$ is the time that the master device receives the response ~~form~~ from the slave device, $T_1$ is the time the master device initiates sending the packet to the slave device, $T_3$ is the time the slave device initiates sending the response, $T_2$ is the time the slave device receives the packet, and R is the ratio between the first skew and the second skew.

12. The method of claim 1 wherein calculating the first offset between the master clock and the slave clock based on the first packet trip delay comprises $offset = T_2 - T_1 - RTD$ wherein $T_2$ is the time the slave device receives the packet, $T_1$ is the time the master device initiates sending the packet to the slave device, and RTD is the first packet trip delay.

13~~14~~. The method of claim 1 wherein calculating the first offset between the master clock and the slave clock based on the first packet trip delay comprises $offset = T_3 - T_4 + meanRTD$ wherein $T_3$ is the time the slave device initiates sending the response, $T_4$ is the time that the master device receives the response ~~form~~ from the slave device, and RTD is the first packet trip delay.

14~~15~~. A system for synchronizing a master clock and a slave clock, the system comprising:

a communication module configured to transmit a plurality of packets between a master device with the master clock and a slave device with the slave clock;

a frequency rate module configured to calculate a first skew based on times between a first pair of the plurality of packets received at the slave device and a second skew between the first pair at the master device and to calculate a ratio between the first skew and the second skew;

a rate correction module configured to provide a slave clock frequency correction of the slave clock to the slave device to allow the slave device to correct a slave clock frequency;

a packet trip delay module configured to calculate a first packet trip delay by using a time that the master device initiates sending a packet of the plurality of packets to the slave device, a time the master device receives a response from the slave device, a corrected time the slave device receives the packet, and a corrected time the slave device initiates sending the response; and

a time correction module configured to calculate a first offset between the master clock and the slave clock based on the first packet trip delay and to provide the first offset to the slave device.

15~~16~~. The system of claim ~~15~~ 14wherein the frequency rate module is further configured to iterate calculations of an other skew based on times associated between a subsequent pair of the plurality of packets at the slave device and a subsequent skew between the first pair at the master device and calculating a ratio between the other skew and the subsequent skew.

16~~17~~. The system of claim ~~15~~ 14 wherein the frequency rate module is further configured to calculate a third skew based on times between a second pair of the plurality of packets at the slave device and a fourth skew between the second pair at the master device, calculating a ratio between the third skew and the fourth skew.

17~~18~~. The system of claim ~~17~~ 16 wherein the rate correction module configured to provide the slave clock frequency correction of the slave clock to the slave device comprises the rate correction module configured to provide the slave clock frequency correction of the slave clock to the slave device if the ratio between the first skew and the second skew approximates the ratio between the third skew and the fourth skew.

18~~19~~. The system of claim ~~18~~ 17 wherein the ratio between the first skew and the second skew approximates the ratio between the third skew and the fourth skew when the difference between the ratios is less than a predetermined threshold.

19~~20~~. The system of claim ~~15~~ 14 wherein the packet trip delay module is further configured to iteratively calculate subsequent packet trip delays utilizing a subset of the plurality of packets.

20~~21~~. The system of claim ~~20~~ 19 wherein the packet trip delay module is further configured to determine a minimum value of the first and at least some subsequent packet trip delays.

21~~22~~. The system of claim ~~21~~ 20 wherein the packet trip delay module is further configured to obtain a threshold relative to the minimum value of the first and subsequent packet trip delays, compare one or more subsequent packet trip delays to the threshold relative to the minimum value of the first and subsequent packet trip delays, calculate a second offset based on the comparison, and provide the second offset between the master clock and the slave clock based on the first packet trip delay.

22~~23~~. The system of claim ~~15~~ 14 wherein the frequency rate module configured to calculate the first skew between the first pair of the plurality of packets at the slave device and the second skew between the first pair at the master device and calculating the ratio between the first skew and the second skew comprises $Rms = (T_{22} - T_{21})/(T_{12} - T_{11})$ wherein Rms is the slave frequency rate, $T_{22}$ is a time that the slave device receives a second packet of the first pair from the master device, $T_{21}$ is a time that the slave device receives a first packet of the first pair from the master device, $T_{12}$ is a time the master device transmits the second packet of the second pair, and $T_{11}$ is a time the master device transmits the first packet of the second pair.

23~~24~~. The system of claim ~~15~~ 14 wherein the frequency rate module configured to calculate the third skew between a second pair of the plurality of packets at the slave device and the fourth skew between the second pair at the master device and calculating a ratio between the third skew and the fourth skew comprises $Rsm = (T_{32} - T_{31})/(T_{42} - T_{41})$ wherein Rsm is a reverse slave frequency rate, $T_{32}$ is a time that the slave device transmits a second packet of the third pair from the master device, $T_{31}$ is a time that the slave device transmits a first packet of the third pair from the master device, $T_{42}$ is a time the master device receives the second packet of the second pair, and $T_{41}$ is a time the master device receives the first packet of the second pair.

24~~25~~. The system of claim ~~15~~ 14 wherein the packet trip delay module configured to the first packet trip delay by using the time that the master device initiates sending the packet of the plurality of packets to the slave device, the time the master device receives the response from the slave device, a corrected time the slave device receives the packet, and the corrected time

the slave device initiates sending the response comprises $RTD = \frac{(T_4 - T_1) - (T_3 - T_2) \times R}{2}$ wherein $T_4$ is the time that the master device receives the response ~~form~~ from the slave device, $T_1$ is the time the master device initiates sending the packet to the slave device, $T_3$ is the time the slave device initiates sending the response, $T_2$ is the time the slave device receives the packet, and R is the ratio between the first skew and the second skew.

25~~26~~. The system of claim ~~15~~ 14 wherein the time correction module configured to calculate the first offset between the master clock and the slave clock based on the first packet trip delay comprises $offset = T_2 - T_1 - RTD$ wherein $T_2$ is the time the slave device receives the packet, $T_1$ is the time the master device initiates sending the packet to the slave device, and RTD is the first packet trip delay.

26~~27~~. The system of claim ~~15~~ 14 wherein the time correction module configured to calculate the first offset between the master clock and the slave clock based on the first packet trip delay comprises $offset = T_3 - T_4 + meanRTD$ wherein $T_3$ is the time the slave device initiates sending the response, $T_4$ is the time that the master device receives the response ~~form~~ from the slave device, and RTD is the first packet trip delay.

27~~28~~. A computer readable medium comprising executable instructions, the instructions being executable by a processor to perform a method of synchronizing a master clock and a slave clock, the method comprising:

transmitting a plurality of packets between a master device with the master clock and a slave device with the slave clock;

calculating a first skew between a first pair of the plurality of packets at the slave device and a second skew between the first pair at the master device;

calculating a ratio between the first skew and the second skew;

providing a slave clock frequency correction of the slave clock to the slave device to allow the slave device to correct a slave clock frequency;

calculating a first packet trip delay by using a time that the master device initiates sending a packet of the plurality of packets to the slave device, a time the master device receives a response from the slave device, a corrected time the slave device receives the packet, and a corrected time the slave device initiates sending the response;