CLAIMS

What is Claimed is:

1. A method for contactless power transfer, the method comprising:

operating ~~(252)~~ a first power exchanger coil ~~(20;120;160)~~ at a system frequency, the first power exchanger coil capable of transferring alternating current power to a second power exchanger coil of a wireless power receiving device via a magnetic field using a resonance based coupling at the system frequency;

determining a power requirement associated with a load of the wireless power receiving device;

~~detecting (254) a second power exchanger coil (24; 124; 164);~~

~~generating (256) an alternating current power at the system frequency using a first power converter (12; 112; 152);~~

controlling a duration of intermittent time periods of an activated state to generate pulses of alternating current power at the system frequency based on the load and the power requirement associated with the load, wherein the activated state is different from a deactivated state in which the first power exchanger coil does not transfer the alternating current power; and

transferring ~~(258)~~, during each of the intermittent time periods, the alternating current power from the first power exchanger coil ~~(20; 120; 160)~~ to the second power exchanger coil ~~(24; 124; 164) at the system frequency~~ via ~~a~~the magnetic field using the resonance based coupling at the system frequency.~~; and~~

~~controlling (260) a time period of an operating state of the first power converter (12; 112; 152) operating at the system frequency for varying the alternating current power generated by the first power converter (12; 112; 152), wherein controlling the operating state of the first power converter (12; 112; 152) comprises altering a first time period of an activated state of the first power converter (12; 112; 152) and altering a second time period of a deactivated state of the first power converter (12; 112; 152) to vary the alternating current power generated by the first power converter (12; 112; 152).~~

~~2. The method of claim 1, wherein controlling (260) the time period of the operating state of the first power converter (12; 112; 152) for varying the alternating current power generated by the first power converter (12; 112; 152) comprises controlling the time period of the operating state of the first power converter (12; 112; 152) based on a required load power.~~

~~3~~2. The method of claim ~~2~~1, ~~further comprising measuring~~ wherein determining power requirement associated with the load of the wireless power receiving device includes receiving at least a voltage measured at a first node ~~(34; 134; 174)~~ located between the second power exchanger coil ~~(24; 124; 164)~~ and ~~a~~the load ~~(30; 130; 170)~~, and varying the ~~alternating current power~~ duration of intermittent time periods based, at least in part, ~~on at least a sensed~~ the voltage.

~~4~~3. The method of claim 1, wherein detecting the second power exchanger coil ~~(24; 124; 164)~~ comprises generating a bias power using the first power converter ~~(12; 112; 152)~~ and transmitting the bias power from the first power exchanger coil ~~(20; 120; 160)~~ to the second power exchanger coil ~~(24; 124; 164)~~.

~~5~~4. The method of claim ~~4~~3, further comprising receiving the bias power from the first power exchanger coil ~~(120; 160)~~ using a second bias processing unit ~~(144; 184)~~ and transmitting a signal representative of a presence of the second power exchanger coil ~~(124; 164)~~ to a controller ~~(138; 178)~~.

~~6~~5. A contactless power transfer system comprising:

~~a first power converter (12; 112; 152) configured to convert a direct current power received from a power source (14; 114; 154) to an alternating current power at a system frequency;~~

a power converter configured to generate, during an activated state, an alternating current power at a system frequency based, at least in part, on a direct current power received from a power source;

a first power exchanger coil ~~(20; 120; 160)~~ operatively coupled ~~to~~with the ~~first~~ power converter ~~(12; 112; 152)~~ and configured to receive the alternating current power from the ~~first~~ power converter ~~(12; 112; 152)~~, the first power exchanger coil configured to transfer the alternating current power to a second power exchanger coil of a wireless power receiving device using resonance based coupling via a magnetic field at the system frequency; and~~;~~

~~a second power exchanger coil (24; 124; 164) configured to receive the alternating current power from the first power exchanger coil (20; 120; 160) via a magnetic field at the system frequency;~~

~~a second power converter (26; 126; 166) operatively coupled to the second power exchanger coil (24; 124; 164) and configured to convert the alternating current power to an output direct current power transmitted to a load (30; 130; 170);~~

~~a sensor (32; 132; 172) operatively coupled to the second power converter (26; 126; 166) and configured to measure at least a voltage at a first node (34; 134; 174) located between the second power converter (26; 126; 166) and the load (30; 130; 170); and~~

a controller ~~(38; 138; 178)~~ operatively coupled to the first power converter ~~(12; 112; 152)~~ and configured to:

determine a power requirement associated with a load of the wireless power receiving device; and

control ~~an operating state of the first power converter (12; 112; 152) for varying the alternating current power generated by the first power converter (12; 112; 152) based on at least a sensed voltage received from the sensor (32; 132; 172).~~ a duration of intermittent time periods of an activated state to generate pulses of alternating current power at the system frequency based on the load and the power requirement associated with the load, wherein the activated state is different from a deactivated state in which the first power exchanger coil does not transfer the alternating current power.

~~7. The contactless power transfer system of claim 6, wherein the operating state comprises an activated state and a deactivated state of the first power converter (12; 112; 152) and the controller (38; 138; 178) is configured to control a first time period of the activated state of the first power converter (12; 112; 152) and a second time period of the deactivated state of the first power converter (12; 112; 152).~~

~~8~~6. The contactless power transfer system of claim ~~6~~5, further comprising a first bias processing unit ~~(140; 180)~~ operatively coupled to the controller ~~(138; 178)~~, wherein the first bias processing unit ~~(140; 180)~~ is configured to provide an operating power to the controller ~~(138; 178)~~ from the power source ~~(114; 154)~~.

~~9~~7. The contactless power transfer system of claim ~~6~~5, further comprising a second bias processing unit ~~(144; 184)~~ operatively coupled to the second power exchanger coil ~~(124; 164)~~ and configured to receive a bias power transmitted by the first power exchanger coil ~~(120; 160)~~ and transmitting a signal representative of a detected second power exchanger coil ~~(124; 164)~~ to the controller ~~(138; 178)~~.

~~10~~8. The contactless power transfer system of claim ~~9~~7, further comprising a bias coil ~~(186)~~ operatively coupled to the second power exchanger coil ~~(164)~~ and the second bias processing unit ~~(184)~~, and wherein the bias coil ~~(186)~~ is configured to receive the bias power from the first power exchanger coil ~~(160)~~ and transmit the bias power to the second bias processing unit ~~(184)~~ for detecting the second power exchanger coil ~~(164)~~.

~~11~~9. The contactless power transfer system of claim ~~9~~7, further comprising a bias transformer ~~(236)~~ configured to receive the bias power from the first power exchanger coil ~~(210)~~ and transmit the bias power to the second bias processing unit ~~(234)~~ for detecting the second power exchanger coil ~~(214)~~, wherein a primary winding ~~(238)~~ of the bias transformer ~~(236)~~ is operatively coupled to the second power exchanger coil ~~(214)~~ and a secondary winding

~~(240)~~ of the bias transformer ~~(236)~~ is operatively coupled to the second bias processing unit ~~(234)~~.

~~12~~10. The contactless power transfer system of claim ~~9~~7, wherein the second bias processing unit ~~(234)~~ is a switched-mode power supply.

11. The contactless power transfer system of claim 5, wherein the controller is further configured to determine the power requirement associated with the load of the wireless power receiving device by receiving a voltage measured between a node located between the second power exchanger coil and the load, and to vary the duration of the intermittent time periods based, at least in part, on the voltage.

12. The contactless power transfer system of claim 5, wherein each intermittent time period of the activated state is followed by a time period of the deactivated state, and wherein the time period of the activated state is different than the time period of the deactivated state.

13. The method of claim 1, wherein each intermittent time period of the activated state is followed by a time period of the deactivated state, and wherein the time period of the activated state is different than the time period of the deactivated state.

14. The method of claim 1 further comprising:

modifying the duration of the intermittent time periods in response to a change in a power requirement associated with the second power exchanger coil.

15. The method of claim 13, wherein controlling the duration of the of intermittent time periods is different from a duty cycle associated with duty cycle modulation.

16. The method of claim 1, wherein the operating state comprises an activated state and a deactivated state of the first power converter and the controller is configured to control a first time period of the activated state of the first power converter and a second time period of the deactivated state of the first power converter.

17. The method of claim 1, wherein controlling the duration of the intermittent time periods of the activated state results in an average of the pulses of the alternating current power generated by the first power converter.

18. The contactless power transfer system of claim 5, wherein controlling the duration of the intermittent time periods of the activated state results in an average of the pulses of the alternating current power generated by the first power converter.