CLAIMS

1. A responsive load system for delivering a responsive load service to an electricity power supply network (8) having a nominal operating value ($f_{nominal}$) for a variable physical parameter (f) of the electricity supply network, the responsive load system comprising:

a remote controller (14) and at least one load controller (10) adapted to control electricity consumption of one or more associated electrical loads (6) in the vicinity of the load controller (10), each load controller (10) including:

a parameter measuring device (17) for regular measurement of the variable physical parameter (f) of the electricity supply network,

a power consumption controller for determining and for causing adjustment of the power consumption of at least one of the one or more associated electrical loads (6) to deliver a responsive load service in response to a detected difference between a recent measurement of the transitory variable physical parameter (f) of the electricity supply network and the nominal operating value ($f_{nominal}$) of the physical parameter, and

a first communication device (13) adapted for receiving command signals (140) from the remote controller (14), each command signal (140) being representative of an adjustment to the amount of responsive load service being delivered by the one or more associated electrical loads (6),

the remote controller (14) including:

a parameter measuring device (17) for regular measurement of the variable physical parameter (f) of the electricity power supply network,

an analyser (18) adapted to determine adjustments to the responsive load service delivered by the one or more electrical loads (6) of the at least one load controller (6); and

a second communication device (13) for transmitting to the at least one load controller (10) a command signal (140) representative of a determined responsive load service correction,

wherein each load controller (10) is adapted to receive the command signal (140) and apply the responsive load service correction as an offset to power consumption adjustments determined by the power consumption controller.

2. The responsive load system as claimed in claim 1 wherein the offset is applied by the load controller (10) to:

   i) measurements of the variable physical parameter (*f*) of the electricity supply network,

   ii) a threshold of the measured physical parameter ($f_{threshold}$) which triggers adjustment of the power consumption of at least one of the one or more associated electrical loads (6) to deliver a responsive load service, or

   iii) a magnitude of the adjustment of the power consumption ($\%_{Response}$) of at least one of the one or more associated electrical loads (6).

3. The responsive load system as claimed in either of claims 1 or 2, wherein each load controller (10) is adapted to apply a responsive load service correction as an offset to all power consumption adjustments until a new responsive load service correction is transmitted by the remote controller.

4. The responsive load system as claimed in claim 3, wherein the remote controller is adapted to transmit a responsive load service correction with a zero value where no correction is required.

5. The responsive load system as claimed in either of claims 1 or 2,

wherein each load controller (10) is adapted to apply a responsive load service correction as an offset to all power consumption adjustments for a predetermined period of time.

6. The responsive load system as claimed in claim 5, wherein the predetermined period of time is at least 5 minutes, more preferably 30 minutes.

7. The responsive load system as claimed in any one of the preceding claims, wherein the variable physical parameter (*f*) of the electricity supply network is the operating frequency and the parameter measuring devices (17) are frequency monitors.

8. The responsive load system as claimed in any one of the preceding claims, wherein the load controller (10) includes wired connections to the one or more associated electrical loads (6).

9. The responsive load system as claimed in any one of the preceding claims, wherein the first and second communications systems (13) are in wireless communication.

10. The responsive load system as claimed in any one of the preceding claims, wherein the load controller (10) is a semi-autonomous load controller.

11. A load controller (10) for delivering a responsive load service to an electricity power supply network (8) having a nominal operating value ($f_{nominal}$) for a physical parameter (*f*) of the electricity supply network, the load controller (10) comprising:

a parameter measuring device (17) for regular measurement of the variable physical parameter (*f*) of the electricity supply network,

a power consumption controller for determining and for causing adjustment of the power consumption of at least one of one or more associated electrical loads (6) to deliver a responsive load service in response to a detected difference between a recent measurement of the transitory variable physical parameter (f) of the electricity supply network and the nominal operating value ($f_{nominal}$) of the physical parameter, and

a communication device (13) adapted for receiving command signals (140) from a remote controller (14), each command signal (140) being representative of a responsive load service correction,

wherein the load controller (10) is adapted to receive a command signal (140) and apply the responsive load service correction as an offset to power consumption adjustments determined by the power consumption controller.

12. The load controller (10) as claimed in claim 11, wherein the offset is applied by the load controller to:

i) measurements of the variable physical parameter (*f*) of the electricity supply network,

ii) a threshold of the measured physical parameter ($f_{nominal}$) which triggers adjustment of the power consumption of at least one of the one or more associated electrical loads (6) to deliver a responsive load service, or

iii) a magnitude of the adjustment of the power consumption ($\%_{Response}$) of at least one of the one or more associated electrical loads (6).

13. The load controller (10) as claimed in either of claims 11 or 12, wherein each load controller (10) is adapted to apply a responsive load service correction as an offset to all power consumption adjustments until a new responsive load service correction is transmitted by the remote

controller (14).

14. The load controller (10) claimed in either of claims 11 or 12, wherein the load controller (10) is adapted to apply a responsive load service correction as an offset to all power consumption adjustments for a predetermined period of time.

15. The load controller as claimed in claim 14, wherein the predetermined period of time is at least 5 minutes, more preferably 30 minutes.

16. The load controller (10) as claimed in any one of claims 11 to 15, wherein the load controller (10) is a semi-autonomous load controller.

17. A remote controller (14) for adjusting a responsive load service delivered by one or more electrical loads (6) under the control of at least one load controller (10) to an electricity power supply network (8) having a nominal operating value ($f_{nominal}$) for a variable physical parameter (f) of the electricity supply network, the remote controller (14) comprising:

a parameter measuring device (17) for regular measurement of the variable physical parameter (f) of the electricity power supply network,

an analyser (18) adapted to determine adjustments to a responsive load service being delivered by one or more electrical loads (6) under the control of the at least one load controller (6); and

a communication device (13) for transmitting command signals (140) each representative of a determined responsive load service correction to the at least one load controller (10),

wherein the determined responsive load service correction is adapted to be applied as an offset by the at least one load controller (10) to power consumption adjustments determined by the at least one load controller (10).

18. The remote controller as claimed in claim 17 further adapted to transmit a responsive load service correction with a zero value where no correction is required.

19. A method of controlling one or more electrical loads (6) coupled to an electricity power supply network (8) having a nominal operating value ($f_{nominal}$) for a variable physical parameter (f) of the electricity power supply network to deliver a responsive load service by varying the power consumption of the one or more electrical loads (6) in response to a difference between an instantaneous measurement of the variable physical parameter (f) of the electricity power supply network and its nominal operating value ($f_{nominal}$), said method comprising the steps of:

(i) regularly measuring the variable physical parameter (f) of the electricity power supply network by a load controller (10) in the vicinity of and in communication with the one or more electrical loads (6) and separately by a remote controller (14);

(ii) in response to a difference detected by the load controller (10) between a measured instantaneous value of the variable physical parameter (f) and the nominal operating value ($f_{nominal}$), determining a power consumption adjustment and adjusting the power consumption of at least one of the one or more electrical loads (6) in accordance with the determined power consumption adjustment to deliver a responsive load service independently of the remote controller (14);

(iii) the remote controller (14) determining a responsive load service correction to the responsive load service being delivered;

(iv) transmitting a command signal (140) representative of the determined responsive load service correction from the remote controller (14) to the load controller (10); and

the load controller (10) altering the responsive load service delivered to the electricity power supply network in accordance with the determined

responsive load service correction transmitted to the load controller (10) wherein the determined adjustment is an offset to be applied by the load controller to power consumption adjustments determined by the load controller (10).

20. A method as claimed in claim 19 further comprising the steps of:

(v) the load controller (10) transmitting to the remote controller (14) service data (120) on the magnitude of the responsive load service provided by the one or more electrical loads (6);

(vi) analysis of the service data (120) transmitted by the load controller (10) to identify tracking errors in the magnitude of the responsive load service provided; and

(vii) determining and transmitting a responsive load service correction (140) based upon an identified tracking error.