

WHAT IS CLAIMED IS:

1. An antenna system operative with a communications device for receiving a radio frequency signal, wherein the communications device produces a first control signal representing a frequency of a received signal, the antenna system comprising:

an antenna structure for receiving the radio frequency signal, the antenna structure comprising tunable elements for controlling a resonant frequency of the antenna structure;

a decoder responsive to the first control signal for producing a second control signal;  
and

a switch matrix responsive to the second control signal for configuring one or more of the tunable elements to control the resonant frequency responsive to the frequency of the received signal.

2. The antenna system of claim 1 further comprising a serial-to-parallel converter responsive to a serial bit stream for converting the serial bit stream to parallel bits comprising the first control signal input to the decoder.

3. The antenna system of claim 2 wherein the converter is further responsive to a synchronization signal for use in converting the serial bit stream to the parallel bits.

4. The antenna system of claim 2 wherein the decoder is further responsive to a synchronization signal for use in decoding the parallel bits to produce the second control signal.

5. The antenna system of claim 1 wherein the tunable elements comprise reactive elements.

6. The antenna system of claim 5 wherein the tunable elements comprise variable capacitors, one or more of the variable capacitors responsive to the analog signal for determining a capacitance thereof.

7. The antenna system of claim 6 wherein the variable capacitors each comprise a reverse-biased semiconductor diode.

8. The antenna system of claim 1 wherein the antenna structure comprises a conductive structure and the switch matrix comprises spaced-apart switchable control elements each connected at a different location on the conductive structure, wherein the switchable control elements are controllable to a closed or an opened condition responsive to the second control signal to respectively short an associated location to ground or open an associated location from ground and thereby affect the resonant frequency of the antenna structure.

9. The antenna system of claim 8 wherein the conductive structure comprises a meanderline conductive structure.

10. The antenna system of claim 1 wherein the antenna structure comprises a meanderline conductive structure further comprising a plurality of recurrent serpentine segments and the switch matrix comprises controllable elements configurable to an opened or a closed state, the controllable elements for selectably shorting a segment and thereby affecting the resonant frequency of the antenna structure.

11. The antenna system of claim 1 wherein the tunable elements comprise reactive elements each in a serial configuration with a switch of the switch matrix, and wherein each of the tunable elements is configured according to an opened or closed condition of an associated switch.

12. An antenna system operative with a communications device for receiving a radio frequency signal, wherein the communications device produces a first control signal representing a frequency of a received signal, the antenna system comprising:

an antenna structure for receiving the radio frequency signal;

a decoder responsive to the first control signal for producing a second control signal;

and

a switch matrix comprising a plurality of switches, the switch matrix responsive to the second control signal for configuring one or more of the plurality of switches to determine a resonant frequency of the antenna.

13. An antenna system operative with a communications device for receiving a radio frequency signal, wherein the communications device produces a first control signal representing a frequency of a received signal, the antenna system comprising:

an antenna structure for receiving the radio frequency signals, the antenna structure comprising tunable elements for controlling a resonant frequency of the antenna structure, the antenna structure further comprising an antenna radio frequency output conductor for carrying the received signal;

a signal separator having a first port connected to the antenna output conductor, a second port connected to for supplying the received radio frequency signal to the communications device and for receiving the first control signal, and a third port;

a decoder responsive to the first control signal supplied from the third port of the signal separator, the decoder for producing a second control signal; and

a switch matrix responsive to the second control signal for controlling one or more of the tunable elements to control the resonant frequency responsive to the frequency of the received signal.

14. The antenna system of claim 13 wherein the first control signal comprises a serial bit stream, the antenna system further comprising a serial-to-parallel converter for receiving the serial bit stream from the third port of the signal separator and for converting the serial bit stream to parallel bits input to the decoder.

15. The antenna system of claim 14 wherein the converter is further responsive to a synchronization signal for use in converting the serial bit stream to the parallel bits and the decoder is further responsive to the synchronization signal for use in decoding the parallel bits to produce the second control signal.

16. The antenna structure of claim 13 wherein the tunable elements comprise reactive elements and controllable current paths configurable by the switch matrix.

17. An antenna system operative with a communications device for receiving a radio frequency signal, wherein the communications device produces a control signal representing a frequency of a received signal, the antenna system comprising:

an antenna structure for receiving the radio frequency signal, the antenna structure comprising tunable elements for controlling a resonant frequency of the antenna structure;

a conductive element connected to the antenna structure;

a resonant frequency controller; and

a signal separator connected to the conductive element, the signal separator responsive to the radio frequency signal through the conductive element, the signal separator responsive to the control signal, the signal separator supplying the radio frequency signal to a receiving element of the communications device and supplying the control signal to the resonant frequency controller for controlling the tunable elements.

18. The antenna system of claim 17 wherein the control signal comprises a pulse width modulated control signal, and wherein the resonant frequency controller further comprises an integrating element for producing a DC signal representative of the pulse width modulated control signal, the DC signal for controlling the tunable elements.

19. The antenna system of claim 18 wherein the integrating element comprises a low pass filter or an integrator.

20. The antenna of claim 18 wherein the resonant frequency controller further comprises a filter responsive to the DC signal for producing a filtered DC signal for controlling the tunable elements.

21. The antenna system of claim 17 wherein the signal separator comprises a parallel configuration of a high pass filter and a low pass filter, the high pass filter receiving the radio frequency signals and supplying same to the receiving circuits, the low pass filter receiving the control signal and supplying same to the resonant frequency controller for controlling the tunable elements.

22. The antenna system of claim 17 wherein the signal separator supplies the radio frequency signal to the receiving element of the communications device through a coaxial cable and the control signal is supplied to the signal separator through the coaxial cable.

23. An antenna system operative with a communications device for receiving a radio frequency signal, wherein the communications device produces a control signal representing a frequency of a received signal, the antenna system comprising:

an antenna structure for receiving the radio frequency signal, the antenna structure comprising tunable elements for controlling a resonant frequency of the antenna structure;

a first conductive element connected to the antenna structure;

a resonant frequency controller;

a second conductive element; and

a signal separator receiving the radio frequency signal through the first conductive element, the signal separator receiving the control signal through the second conductive element and supplying the radio frequency signal to a receiving element of the communications device through the second conductive element, the signal separator supplying the control signal to the resonant frequency controller for controlling the tunable elements.

24. The antenna system of claim 23 wherein the antenna structure comprises an inverted F antenna, a dipole antenna, a monopole antenna or a meanderline antenna.

25. The antenna system of claim 23 wherein the control signal comprises a pulse width modulated control signal.

26. The antenna system of claim 25 wherein the signal separator converts the pulse width modulated control signal to a DC control signal supplied to the resonant frequency controller for controlling the tunable elements.

27. An antenna system operative with a communications device for receiving a radio frequency signal, wherein the communications device produces a first control signal representing a frequency of a received signal, the antenna system comprising:

an antenna structure for receiving the radio frequency signal, the antenna structure comprising tunable elements for controlling a resonant frequency of the antenna structure; and

a digital-to-analog converter responsive to the control signal for producing one or more analog signals for controlling one or more of the tunable elements to control the resonant frequency responsive to the frequency of the received signal.

28. The antenna system of claim 27 wherein the tunable elements comprise reactive elements the reactance of which is responsive to the analog signal.

29. The antenna system of claim 28 wherein the reactive elements comprise variable capacitors responsive to the analog signal for determining a capacitance thereof.

30. The antenna system of claim 29 wherein the variable capacitors each comprise a reverse-biased semiconductor diode, the reverse bias responsive to the analog signal.

31. The antenna system of claim 27 wherein the control signal comprises a pulse width modulated control signal converted by the digital-to-analog converter to a representative DC signal for controlling one or more of the tunable elements.

32. A communications device comprising:

a receiving element for providing a control signal representative of a frequency of a desired radio frequency signal and for processing radio frequency signals;

an antenna structure for receiving radio frequency signals, the antenna structure comprising tunable elements for controlling a resonant frequency of the antenna structure;

a first conductive element connected to the antenna structure;

a resonant frequency controller;

a second conductive element; and

a signal separator receiving the radio frequency signals through the first conductive element, the signal separator receiving the control signal through the second conductive element and supplying the radio frequency signals to the receiving element through the second conductive element, the signal separator supplying the control signal to the resonant frequency controller for controlling the tunable elements to receive the desired radio frequency signal.

33. The communications device of claim 32 wherein the antenna structure comprises an inverted F antenna, a dipole antenna, a monopole antenna or a meanderline antenna.

34. The communications device of claim 32 wherein the control signal comprises a pulse width modulated control signal, and wherein the signal separator converts the pulse width modulated control signal to a DC control signal supplied to the resonant frequency controller for controlling the tunable elements to receive the desired radio frequency signal.