CLAIMS

1. A method for wirelessly transmitting data in accordance with a radio technology, comprising: determining a tower of lifting size values including a set of a plurality of powers of an integer multiplied by a set of a plurality of lifting size values, the tower of lifting size values comprising a plurality of families of lifting size values; determining a first lifting size value from a first family of the plurality of families of lifting size values and a first set of cyclic lifting values for generating a first lifted low density parity check (LDPC) code; determining the first lifted LDPC code by applying the first set of cyclic lifting values to interconnect edges in a number of copies of a base parity check matrix (PCM) having a first number of columns corresponding to base variable nodes in a base graph and a second number of rows corresponding to base check nodes in the base graph to obtain a first lifted PCM corresponding to the first lifted LDPC code, the number of copies corresponding to the first lifting size value; storing the first lifted LDPC code; determining a second set of cyclic lifting values for generating a second lifted PCM corresponding to a second lifted LDPC code for a second lifting size value in the first family by computing a modulo of each of the first set of cyclic lifting values with respect to the second lifting size value; encoding a set of information bits based on at least one of: the first lifted LDPC code or the second lifted LDPC code to produce one or more code words; and transmitting the one or more code words in accordance with the radio technology across a wireless channel, wherein the set of lifting size values comprises lifting size values within a defined range of each other.

2. The method of claim 1, wherein each family of lifting size values in the tower of lifting size values comprises the lifting size values corresponding to the set of powers of the integer multiplied by one lifting size value of the set of lifting size values.

3. The method of claim 1, wherein the first lifting size value Z comprises a largest lifting size value in the first family of lifting size values.

4. The method of claim 1, further comprising storing only lifted PCMs corresponding to the largest lifting size value in each of the plurality of families of lifting size values.

5. The method of claim 1, wherein computing the modulo of the second set of cyclic lifting values with respect to the second lifting size value comprises, for each cyclic lifting value in the second set of cyclic lifting values, performing a modulo operation, wherein the second lifting size value is a divisor in the modulo operation and a corresponding cyclic lifting value in the first set of cyclic lifting values is a dividend in the modulo operation.

6. The method of claim 1, wherein the second lifting size value is selected based on a target range of blocklengths of the code word.

7. The method of claim 1, wherein: the first lifted PCM and the second lifted PCM are associated with a first code rate; and the method further comprises generating different lifted PCMs based on second base PCM associated with a second code rate.

8. The method of claim 1, wherein the defined range of lifting size values comprises a smallest lifting size value in the set of lifting size values that is within a factor of 2 or 3 of the largest lifting size value in the set of lifting size values.

9. The method of claim 1, wherein each family of lifting size values in the tower of lifting size values corresponds to a power of the set of powers of the integer multiplied by each of the set of lifting size values.

10. The method of claim 9, wherein the first lifting size value comprises a smallest lifting size value in the first family of lifting size values.

11. The method of claim 9, further comprising: determining a second base PCM and a third set of lifting size values for another family of lifting size values in the tower of lifting size values; and using the second base PCM and the third set of lifting values for other lifting size values in that family of lifting size values.

12. The method of claim 1, further comprising determining a third set of cyclic lifting values

for another lifting size value in another family of lifting size values in the tower of lifting size values corresponding to the power used for a first cluster plus 1.

13. The method of claim 12, wherein determining the third set of cyclic lifting values for an edge in the lifted PCMs for the different set of lifting size values comprises: multiplying the first set of cyclic lifting values by the integer to obtain a scaled set of cyclic lifting values; and for each scaled cyclic lifting value: copying a portion of bits of the scaled cyclic lifting value in the first set of lifting values associated with that edge; and adding a number of unique bits to the portion of copied bits.

14. The method of claim 13, wherein the first portion of copied bits is equal to the number of the set of powers in the tower and the number of unique bits for each set is equal to the integer.

15. An apparatus for wirelessly transmitting data in accordance with a radio technology, comprising: means for determining a tower of lifting size values including a set of a plurality of powers of an integer multiplied by a set of a plurality of lifting size values, the tower of lifting size values comprising a plurality of families of lifting size values; means for determining a first lifting size value from a first family of the plurality of families of lifting size values and a first set of cyclic lifting values for generating a first lifted low density parity check (LDPC) code; means for determining the first lifted LDPC code by applying the first set of cyclic lifting values to interconnect edges in a number of copies of a base parity check matrix (PCM) having a first number of columns corresponding to base variable nodes in a base graph and a second number of rows corresponding to base check nodes in the base graph to obtain a first lifted PCM corresponding to the first lifted LDPC code, the number of copies corresponding to the first lifting size value; means for storing the first lifted LDPC code; means for determining a second set of cyclic lifting values for generating a second lifted PCM corresponding to a second lifted LDPC code for a second lifting size value in the first family by computing a modulo of each of the first set of cyclic lifting values with respect to the second lifting size value; means for encoding a set of information bits based on at least one of: the first lifted LDPC code or the second lifted LDPC code to produce one or more code words; and means for transmitting the one or more code words in accordance with the radio technology across a wireless channel, wherein

the set of lifting size values comprises lifting size values within a defined range of each other.

16. The apparatus of claim 15, further comprising means for determining a third set of cyclic lifting values for another lifting size value in another family of lifting size values in the tower of lifting size values corresponding to the power used for a first cluster plus 1.

17. The apparatus of claim 15, wherein means for determining the third set of cyclic lifting values comprises: means for multiplying the first set of cyclic lifting values by the integer to obtain a scaled set of cyclic lifting values; and for each scaled cyclic lifting value: means for copying a portion of bits of the scaled cyclic lifting value in the first set of lifting values associated with that edge; and means for adding a number of unique bits to the portion of copied bits.

18. An apparatus for wirelessly transmitting data in accordance with a radio technology, comprising: at least one processor coupled with a memory and configured to: determine a tower of lifting size values including a set of a plurality of powers of an integer multiplied by a set of a plurality of lifting size values, the tower of lifting size values comprising a plurality of families of lifting size values; determine a first lifting size value from a first family of the plurality of families of lifting size values and a first set of cyclic lifting values for generating a first lifted low density parity check (LDPC) code; determine the first lifted LDPC code by applying the first set of cyclic lifting values to interconnect edges in a number copies of a base parity check matrix (PCM) having a first number of columns corresponding to base variable nodes in a base graph and a second number of rows corresponding to base check nodes in the base graph to obtain a first lifted PCM corresponding to the first lifted LDPC code, the number of copies corresponding to the first lifting size value; store the first lifted LDPC code; determine a second set of cyclic lifting values for generating a second lifted PCM corresponding to a second lifted LDPC code for a second lifting size value in the first family by computing a modulo of each of the first set of cyclic lifting values with respect to the second lifting size value; and encode a set of information bits based on at least one of: the first lifted LDPC code or the second lifted LDPC code to produce one or more code words; and a transmitter configured to transmit the one or more code words in accordance with the radio technology across a wireless channel, wherein the set of

lifting size values comprises lifting size values within a defined range of each other.

19. A non-transitory computer readable medium having computer executable code stored thereon for wirelessly transmitting data in accordance with a radio technology, comprising: code for determining a tower of lifting size values including a set of a plurality of powers of an integer multiplied by a set of a plurality of lifting size values, the tower of lifting size values comprising a plurality of families of lifting size values; code for determining a first lifting size value from a first family of the plurality of families of lifting size values and a first set of cyclic lifting values for generating a first lifted low density parity check (LDPC) code; code for determining the first lifted LDPC code by applying the first set of cyclic lifting values to interconnect edges in a number of copies of a base parity check matrix (PCM) having a first number of columns corresponding to base variable nodes in a base graph and a second number of rows corresponding to base check nodes in the base graph to obtain a first lifted PCM corresponding to the first lifted LDPC code, the number of copies corresponding to the first lifting size value; code for storing the first lifted LDPC code; code for determining a second set of cyclic lifting values for generating a second lifted PCM corresponding to a second lifted LDPC code for a second lifting size value in the first family by computing a modulo of each of the first set of cyclic lifting values with respect to the second lifting size value; code for encoding a set of information bits based on at least one of: the first lifted LDPC code or the second lifted LDPC code to produce one or more code words; and code for transmitting the one or more code words in accordance with the radio technology across a wireless channel, wherein the set of lifting size values comprises lifting size values within a defined range of each other.

20. The method of claim 19, wherein selecting the first set of cyclic lifting values for generating the first lifted LDPC code comprises: selecting a third set of cyclic lifting values for a smallest lifting size value in the first family of lifting values to obtain a third lifted PCM; lifting the third lifted PCM by lifting size values of 2 until the third lifted PCM is lifted by the first lifting size value.

21. A method for wireless communications, comprising:
determining a first set of cyclic lifting values associated with a set of lifting size values

and a base parity check matrix (PCM) associated with a base graph;

selecting a lifting size value from the set of lifting size values;

determining a second set of cyclic lifting values by computing a modulo of each of the first set of cyclic lifting values with respect to the selected lifting size value;

determining a lifted PCM for generating a lifting low density parity code (LDPC) code by applying the second set of cyclic lifting values to interconnect edges in copies of the base graph;

the set of lifting size values includes values corresponding to a plurality of powers of a first integer, each value multiplied by a second integer;

the set of lifting size values is from a plurality of sets of lifting size values, each set including values corresponding the plurality of powers of the first integer, each value multiplied by a different integer for the different sets.

and

at least one of: encoding a set of information bits to produce one or more codewords for transmission or decoding one or more codewords to obtain a set of information bits,

wherein the one or more codewords are based on the lifting LDPC code,

wherein the set of lifting size values comprises lifting size values within a defined range of each other.

22. The method of claim 21, wherein:

computing the modulo of the second set of cyclic lifting values with respect to the selected lifting size value comprises, for each cyclic lifting value in the second set of cyclic lifting values, performing a modulo operation;

the selected lifting size value is a divisor in the modulo operation; and

a corresponding cyclic lifting value in the first set of cyclic lifting values is a dividend in the modulo operation.

23. The method of claim 21, wherein the different integers for the different sets are clustered, the clustered integers including a smallest of the integers that is within a factor of 2 or 3 of a largest of the integers.

24. The method of claim 21, further comprising determining a third set of cyclic lifting

values for a second selected lifting size value in the set of lifting size values corresponding to the power used for the first associated with the first selected lifting size plus 1.

25. The method of claim 24, wherein determining the third set of cyclic lifting values comprises:

multiplying the first set of cyclic lifting values by the integer to obtain a scaled set of cyclic lifting values; and

for each scaled cyclic lifting value:

copying a portion of bits of the scaled cyclic lifting value in the first set of lifting values; and

adding a number of unique bits to the portion of copied bits.

26. The method of claim 25, wherein the first portion of copied bits is equal to the number of the powers and the number of unique bits is equal to the integer.

27. The method of claim 21, wherein the first set of cyclic lifting values are based on a smallest or a largest lifting size value in the set of lifting size values.

28. The method of claim 21, wherein:

the first set of cyclic lifting values and base PCM associated with the base graph are stored; and

different sets of cyclic lifting values associated with lifted PCMs for lifted base graphs are generated using the stored first set of cyclic lifting values and base PCM.

29. The method of claim 21, wherein the lifting size value is selected based on a target range of blocklengths of the codeword.

30. The method of claim 21, wherein:

the base PCM and the base graph are associated with a first code rate; and

the method further comprises generating different lifted PCMs based on a second base PCM associated with a second base graph and a second code rate.

31. An apparatus wireless communications, comprising:

a memory; and

at least one processor coupled with the memory and configured to:

determine a first set of cyclic lifting values associated with a set of lifting size values and a base parity check matrix (PCM) associated with a base graph;

select a lifting size value from the set of lifting size values;

determine a second set of cyclic lifting values by computing a modulo of each of the first set of cyclic lifting values with respect to the selected lifting size value;

determine a lifted PCM for generating a lifting low density parity code (LDPC) code by applying the second set of cyclic lifting values to interconnect edges in copies of the base graph; the set of lifting size values includes values corresponding to a plurality of powers of a first integer, each value multiplied by a second integer;

the set of lifting size values is from a plurality of sets of lifting size values, each set including values corresponding the plurality of powers of the first integer, each value multiplied by a different integer for the different sets and

at least one of: encode a set of information bits to produce one or more codewords for transmission or decode one or more codewords to obtain a set of information bits, wherein the one or more codewords are based on the lifting LDPC code,

wherein the set of lifting size values comprises lifting size values within a defined range of each other.

32. The apparatus of claim 31, wherein:

the at least one processor is configured to compute the modulo of the second set of cyclic lifting values with respect to the selected lifting size value by, for each cyclic lifting value in the second set of cyclic lifting values, performing a modulo operation;

the selected lifting size value is a divisor in the modulo operation; and

a corresponding cyclic lifting value in the first set of cyclic lifting values is a dividend in the modulo operation.

33. The apparatus of claim 31, wherein the different integers for the different sets are

clustered, the clustered integers including a smallest of the integers that is within a factor of 2 or 3 of a largest of the integers.

34. The apparatus of claim 31, wherein the at least one processor is further configured to determine a third set of cyclic lifting values for a second selected lifting size value in the set of lifting size values corresponding to the power used for the first associated with the first selected lifting size plus 1.

35. The apparatus of claim 34, wherein the at least one processor is configured to determine the third set of cyclic lifting values by:

multiplying the first set of cyclic lifting values by the integer to obtain a scaled set of cyclic lifting values; and

for each scaled cyclic lifting value:

copying a portion of bits of the scaled cyclic lifting value in the first set of lifting values; and

adding a number of unique bits to the portion of copied bits.

36. The apparatus of claim 35, wherein the first portion of copied bits is equal to the number of the powers and the number of unique bits is equal to the integer.

37. The apparatus of claim 31, wherein the first set of cyclic lifting values are based on a smallest or a largest lifting size value in the set of lifting size values.

38. The apparatus of claim 31, wherein:

the first set of cyclic lifting values and base PCM associated with the base graph are stored; and

different sets of cyclic lifting values associated with lifted PCMs for lifted base graphs are generated using the stored first set of cyclic lifting values and base PCM.

39. The apparatus of claim 31, wherein the lifting size value is selected based on a target range of blocklengths of the codeword.

40. The apparatus of claim 31, wherein:

the base PCM and the base graph are associated with a first code rate; and

the at least one processor is configured to generate different lifted PCMs based on a second base PCM associated with a second base graph and a second code rate.

41. An apparatus wireless communications, comprising:

means for determining a first set of cyclic lifting values associated with a set of lifting size values and a base parity check matrix (PCM) associated with a base graph;

means for selecting a lifting size value from the set of lifting size values;

means for determining a second set of cyclic lifting values by computing a modulo of each of the first set of cyclic lifting values with respect to the selected lifting size value;

means for determining a lifted PCM for generating a lifting low density parity code (LDPC) code by applying the second set of cyclic lifting values to interconnect edges in copies of the base graph; and

means for at least one of: encoding a set of information bits to produce one or more codewords for transmission or decoding one or more codewords to obtain a set of information bits

wherein:

the one or more codewords are based on the lifting LDPC code;

the set of lifting size values includes values corresponding to a plurality of powers of a first integer, each value multiplied by a second integer; and

the set of lifting size values is from a plurality of sets of lifting size values, each set including values corresponding the plurality of powers of the first integer, each value multiplied by a different integer for the different sets,

wherein the set of lifting size values comprises lifting size values within a defined range of each other.

42. The apparatus of claim 41, wherein:

means for computing the modulo of the second set of cyclic lifting values with respect to the selected lifting size value comprises means for, for each cyclic lifting value in the second set

of cyclic lifting values, performing a modulo operation;

the selected lifting size value is a divisor in the modulo operation; and

a corresponding cyclic lifting value in the first set of cyclic lifting values is a dividend in the modulo operation.

43. The apparatus of claim 41, wherein the different integers for the different sets are clustered, the clustered integers including a smallest of the integers that is within a factor of 2 or 3 of a largest of the integers.

44. A computer readable medium storing computer executable code thereon for wireless communications, comprising:

code for determining a first set of cyclic lifting values associated with a set of lifting size values and a base parity check matrix (PCM) associated with a base graph;

code for selecting a lifting size value from the set of lifting size values;

code for determining a second set of cyclic lifting values by computing a modulo of each of the first set of cyclic lifting values with respect to the selected lifting size value;

code for determining a lifted PCM for generating a lifting low density parity code (LDPC) code by applying the second set of cyclic lifting values to interconnect edges in copies of the base graph; and

code for at least one of: encoding a set of information bits to produce one or more codewords for transmission or decoding one or more codewords to obtain a set of information bits

wherein:

the one or more codewords are based on the lifting LDPC code

the set of lifting size values includes values corresponding to a plurality of powers of a first integer, each value multiplied by a second integer; and

the set of lifting size values is from a plurality of sets of lifting size values, each set including values corresponding the plurality of powers of the first integer, each value multiplied by a different integer for the different sets,

wherein the set of lifting size values comprises lifting size values within a defined range of each other.

45. The computer readable medium of claim 44, wherein:

code for computing the modulo of the second set of cyclic lifting values with respect to the selected lifting size value comprises code for, for each cyclic lifting value in the second set of cyclic lifting values, performing a modulo operation;

the selected lifting size value is a divisor in the modulo operation; and

a corresponding cyclic lifting value in the first set of cyclic lifting values is a dividend in the modulo operation.

46. The computer readable medium of claim 44, wherein the different integers for the different sets are clustered, the clustered integers including a smallest of the integers that is within a factor of 2 or 3 of a largest of the integers.