

CLAIMS

1. A method for wireless communications ~~by-between~~ a user equipment (UE) and a base station comprising a first processor of the UE in electrical communication with a memory of the UE, the first processor configured to obtain data from the memory in preparation for wireless communications, the method comprising:
 - (a) receiving from the base station, by a first transceiver circuit using one or more first antenna elements in electrical communication with the first transceiver circuit, a data transmission including downlink control information (DCI) for transmission of a codeword;
 - (b) determining a transport block size (TBS) for the data transmission based on indicating a modulation and coding scheme (MCS) and a resource allocation (RA) for transmission of a-the codeword;
 - (c) ~~selecting~~determining, based on a code rate derived from the MCS-TBS and the RA, a base graph (BG), from which to derive a low density parity check (LDPC) code for use in decoding the codeword;
 - (d) receiving the codeword via resources of the RA; and
 - (e) decoding the codeword using the LDPC code derived from the selected BG.
2. The method of claim 1, wherein selecting the BG comprises selecting the BG from a set of two base graphs.
3. The method of claim 1, further comprising the steps of:
 - transmitting to the base station, by the first transceiver circuit of the UE, an indication that the UE did not receive the codeword;
 - receiving from the UE, by a second transceiver circuit of the base station using one or more second antenna elements in electrical communication with the second transceiver circuit, the indication;
 - selecting, by a second processor of the base station, a second code rate for a retransmission of the bits of the codeword, wherein the selection is from a restricted set of code rates designed to ensure the UE selects a same BG to decode the retransmission; and
 - retransmitting, by the second transceiver circuit of the base station using the one or more second antenna elements of the base station and the second processor, the data bits in another codeword according to the selected second code rate.
- ~~3. The method of claim 1, wherein selecting the BG comprises:~~
 - ~~determining a coding rate based on the MCS;~~
 - ~~calculating a code block size (CBS) based on the coding rate and the RA; and~~
 - ~~selecting the BG based on the CBS and the coding rate.~~
- ~~4. The method of claim 3, wherein selecting the BG further comprises:~~
 - ~~selecting a first BG from a set of two base graphs when:~~
 - ~~the CBS is less than or equal to 292 bits,~~
 - ~~the coding rate is less than or equal to 0.25, or~~
 - ~~the CBS is less than or equal to 3824 bits and the coding rate is less than or equal to 0.67; and~~
 - ~~selecting the second BG from the set of the two base graphs when the first BG is not selected.~~

54. A method for wireless communications by a base station (~~BS~~) comprising a processor in electrical communication with a memory, the processor configured to obtain data from the memory in preparation for wireless communications, the method comprising:
(a) selecting, based on a modulation and coding scheme (MCS) and a resource allocation (RA) of a transport block size (TBS) for transmitting a codeword, a base graph (BG) stored in said memory, from which to derive a low density parity check (LDPC) code for use in encoding data bits;
(b) encoding, by an encoder circuit, the data bits to generate the codeword using the LDPC code derived from the selected BG; and
(c) transmitting, by a transceiver circuit, the codeword using the MCS via resources of the RA using one or more antenna elements in electrical communication with the transceiver circuit.

65. The method of claim 54, wherein selecting the BG comprises selecting the BG from a set of two base graphs.

~~7. The method of claim 5, wherein selecting the BG comprises:~~

~~determining a coding rate based on the MCS;~~

~~calculating a code block size (CBS) based on the coding rate and the RA; and~~

~~selecting the BG based on the CBS and the coding rate.~~

~~8. The method of claim 7, wherein selecting the BG further comprises:~~

~~selecting a first BG from a set of two base graphs when:~~

~~the CBS is less than or equal to 292 bits;~~

~~the coding rate is less than or equal to 0.25, or~~

~~the CBS is less than or equal to 3824 bits and the coding rate is less than or equal to 0.67; and~~

~~selecting the second BG from the set of the two base graphs when the first BG is not selected.~~

96. The method of claim 54, further comprising:

obtaining, by the transceiver circuit, an indication that a user equipment (UE) did not receive the codeword;

selecting a second code rate for a retransmission of the bits of the codeword, wherein the selection is from a restricted set of code rates designed to ensure the UE selects a same BG to decode the retransmission; and

retransmitting the data bits in another codeword according to the selected second code rate.

~~107. The method of claim 96, wherein retransmitting the data bits comprises:~~

~~selecting a modulation and coding scheme (MCS) and a resource allocation (RA) for the retransmitting, based on the selected second code rate; and~~

~~transmitting, by the transceiver circuit, the second codeword using the selected MCS and via resources of the RA using the one or more antenna elements.~~

~~118. An apparatus for wireless communications, comprising:~~
a processor configured to:

~~(a) cause the apparatus to receive a data transmission including a downlink control information (DCI) from a base station for transmission of a codeword;~~

(b) determine a transport block size (TBS) for the data transmission based on indicating a modulation and coding scheme (MCS) and resource allocation (RA) for transmission of a the codeword;

(b) determining, based on a code rate derived from the TBS and the RA, select a base graph (BG), from which to derive a low density parity check (LDPC) code for use in decoding the codeword, based on the MCS and the RA;

(c) cause the apparatus to receive the codeword via resources of the RA; and

(d) decode the codeword using the LDPC code derived from the selected BG; and a memory coupled with the processor.

~~129.~~ The apparatus of claim ~~118~~, wherein the processor is configured to select the BG by selecting the BG from a set of two base graphs.

10. The apparatus of claim 8, the processor further configured to:

(a) transmit to the base station an indication that the UE did not receive the codeword; and

(b) receive a retransmission from the base station of the codeword, wherein the codeword is encoded by the base station employing a second code rate from a restricted set of code rates designed to ensure the UE selects the same BG to decode the retransmission.

~~13.~~ The apparatus of claim ~~11~~, wherein the processor is configured to select the BG by:
~~determining a coding rate based on the MCS;~~
~~calculating a code block size (CBS) based on the coding rate and the RA; and~~
~~selecting the BG based on the CBS and the coding rate.~~

~~14.~~ The apparatus of claim ~~13~~, wherein the processor is further configured to select the BG by:
~~selecting a first BG from a set of two base graphs when:~~
~~the CBS is less than or equal to 292 bits,~~
~~the coding rate is less than or equal to 0.25, or~~
~~the CBS is less than or equal to 3824 bits and the coding rate is less than or equal to 0.67; and~~
~~selecting the second BG from the set of the two base graphs when the processor does not select the first BG.~~

~~1511.~~ An apparatus for wireless communications, comprising: a processor configured to:

(a) select, based on a modulation and coding scheme (MCS) and a resource allocation (RA) of a transport block size for transmitting a codeword, a base graph (BG) from which to derive a low density parity check (LDPC) code for use in encoding data bits in the codeword;

(b) encode the data bits to generate the codeword using the LDPC code derived from the selected BG; and

(c) cause the apparatus to transmit the codeword using the MCS via resources of the RA; and a memory coupled with the processor.

~~1612.~~ The apparatus of claim ~~1511~~, wherein the processor is configured to select the BG by selecting the BG from a set of two base graphs.

~~17.~~ The apparatus of claim ~~15~~, wherein the processor is configured to select the BG by:
~~determining a coding rate based on the MCS;~~
~~calculating a code block size (CBS) based on the coding rate and the RA; and~~

~~selecting the BG based on the CBS and the coding rate.~~

18. ~~The apparatus of claim 17, wherein the processor is further configured to select the BG by:~~
~~selecting a first BG from a set of two base graphs when:~~
~~the CBS is less than or equal to 292 bits,~~
~~the coding rate is less than or equal to 0.25, or~~
~~the CBS is less than or equal to 3824 bits and the coding rate is less than or equal~~
~~to 0.67; and~~
~~selecting the second BG from the set of the two base graphs when the first BG is not~~
~~selected.~~

1913. The apparatus of claim 1511, wherein the processor is further configured to:
obtain an indication that a user equipment (UE) did not receive the codeword;
select a second code rate for a retransmission of the bits of the codeword, wherein the
selection is from a restricted set of code rates designed to ensure the UE selects a same BG to
decode the retransmission; and
cause the apparatus to retransmit the data bits in another codeword according to the
selected second code rate.

2014. The apparatus of claim 1913, wherein the processor is configured to cause the apparatus to
retransmit the data bits by:
selecting a modulation and coding scheme (MCS) and a resource allocation (RA) for the
retransmitting, based on the selected second code rate; and
causing the apparatus to transmit the second codeword using the selected MCS and via
resources of the RA.

21. ~~A method for wireless communications by a user equipment (UE) comprising a processor~~
~~in electrical communication with a memory, the processor configured to obtain data from the~~
~~memory in preparation for wireless communications, the method comprising:~~
~~—receiving, by a transceiver circuit using one or more antenna elements in electrical~~
~~communication with the transceiver circuit, control information indicating a modulation and~~
~~coding scheme (MCS), and a resource allocation (RA) for transmission of a codeword;~~
~~selecting a base graph (BG) from which to derive a low density parity check~~
~~(LDPC) code for use in decoding the codeword, wherein the selecting is based on~~
~~the MCS, and the RA;~~
~~—receiving the codeword via resources of the RA; and~~
~~—decoding the codeword using the LDPC code derived from the selected BG.~~

22. ~~The method of claim 21, wherein selecting the BG comprises selecting the BG from a set~~
~~of two base graphs.~~

23. ~~The method of claim 21, wherein selecting the BG comprises:~~
~~—determining a coding rate based on the MCS;~~
~~—calculating a code block size (CBS) based on the coding rate and the RA; and~~
~~—selecting the BG based on the CBS and the coding rate.~~

24. ~~The method of claim 23, wherein selecting the BG further comprises:~~
~~—selecting a first BG from a set of two base graphs when:~~

——the CBS is less than or equal to a first threshold number of bits;
——the coding rate is less than or equal to a first threshold coding rate, or
——the CBS is less than or equal to a second threshold number of bits and the coding rate is less than or equal to a second threshold coding rate; and
——selecting the second BG from the set of the two base graphs when the first BG is not selected.

25. The method of claim 24, wherein:

——the first threshold number is 292;
——the first threshold coding rate is 0.25;
——the second threshold number is 3824, and
——the second threshold coding rate is 0.67.

26. A method for wireless communications by a base station (BS) comprising a processor in electrical communication with a memory, the processor configured to obtain data from the memory in preparation for wireless communications, the method comprising:

selecting a base graph (BG) stored in said memory from which to derive a low density parity check (LDPC) code for use in encoding data bits, wherein the selecting is based on a modulation and coding scheme (MCS), and a resource allocation for transmitting a codeword;
——encoding, by an encoder circuit, the data bits to generate the codeword using the LDPC code derived from the selected BG; and
——transmitting, by a transceiver circuit, the codeword using the MCS via resources of the RA using one or more antenna elements in electrical communication with the transceiver circuit.

27. The method of claim 26, wherein selecting the BG comprises selecting the BG from a set of two base graphs.

28. The method of claim 26, wherein selecting the BG comprises:

——determining a first coding rate based on the MCS;
——calculating a code block size (CBS) based on the first coding rate and the RA; and
——selecting the BG based on the CBS and the first coding rate.

29. The method of claim 28, wherein selecting the BG further comprises:

——selecting a first BG from a set of two base graphs when:
——the CBS is less than or equal to a first threshold number of bits;
——the first coding rate is less than or equal to a first threshold coding rate, or
——the CBS is less than or equal to a second threshold number of bits and the first coding rate is less than or equal to a second threshold coding rate; and
——selecting the second BG from the set of the two base graphs when the first BG is not selected.

30. The method of claim 29, wherein:

——the first threshold number is 292;
——the first threshold coding rate is 0.25;
——the second threshold number is 3824, and
——the second threshold coding rate is 0.67.

31. The method of claim 26, further comprising:
— obtaining, by the transceiver circuit, an indication that a user equipment (UE) did not receive the codeword;
— selecting a second coding rate for a retransmission of the bits of the codeword, wherein the selection is from a restricted set of coding rates designed to ensure the UE selects a same BG to decode the retransmission; and
— retransmitting the data bits in another codeword according to the selected second coding rate.
32. The method of claim 31, wherein retransmitting the data bits comprises:
— selecting another MCS and another resource allocation (RA) for the retransmitting, based on the selected second coding rate; and
— transmitting, by the transceiver circuit, the other codeword using the selected other MCS and via resources of the other RA using the one or more antenna elements.
33. The apparatus of claim 13, wherein the processor is further configured to select the BG by:
— selecting a first BG from a set of two base graphs when:
 — the CBS is less than or equal to a first threshold number of bits,
 — the coding rate is less than or equal to a first threshold coding rate, or
 — the CBS is less than or equal to a second threshold number of bits and the coding rate is less than or equal to a second threshold coding rate; and
— selecting the second BG from the set of the two base graphs when the processor does not select the first BG.
34. The apparatus of claim 33, wherein:
— the first threshold number is 292;
— the first threshold coding rate is 0.25;
— the second threshold number is 3824, and
— the second threshold coding rate is 0.67.
35. An apparatus for wireless communications, comprising:
— a processor configured to:
 — select a base graph (BG) from which to derive a low density parity check (LDPC) code for use in encoding data bits in the codeword, wherein the selection is based on a modulation and coding scheme (MCS), and a resource allocation (RA) for transmitting a codeword;
 — encode the data bits to generate the codeword using the LDPC code derived from the selected BG; and
 — cause the apparatus to transmit the codeword using the MCS via resources of the RA; and
— a memory coupled with the processor.
36. The apparatus of claim 35, wherein the processor is configured to select the BG by selecting the BG from a set of two base graphs.
37. The apparatus of claim 35, wherein the processor is configured to select the BG by:
— determining the first coding rate based on the MCS;
— calculating a code block size (CBS) based on the first coding rate and the RA; and

—selecting the BG based on the CBS and the first coding rate.

38. The apparatus of claim 37, wherein the processor is further configured to select the BG by:

—selecting a first BG from a set of two base graphs when:

—the CBS is less than or equal to a first threshold number of bits,

—the first coding rate is less than or equal to a first threshold coding rate, or

—the CBS is less than or equal to a second threshold number of bits and the first coding rate is less than or equal to a second threshold coding rate; and

—selecting the second BG from the set of the two base graphs when the first BG is not selected.

39. The apparatus of claim 38, wherein:

—the first threshold number is 292;

—the first threshold coding rate is 0.25;

—the second threshold number is 3824, and

—the second threshold coding rate is 0.67.

40. The apparatus of claim 35, wherein the processor is further configured to:

—obtain an indication that a user equipment (UE) did not receive the codeword;

—select a second coding rate for a retransmission of the bits of the codeword, wherein the selection is from a restricted set of coding rates designed to ensure the UE selects a same BG to decode the retransmission; and

—cause the apparatus to retransmit the data bits in another codeword according to the selected second coding rate.

41. The apparatus of claim 40, wherein the processor is configured to cause the apparatus to retransmit the data bits by:

—selecting another MCS and another resource allocation (RA) for the retransmitting, based on the selected second coding rate; and

—causing the apparatus to transmit the other codeword using the selected other MCS and via resources of the other RA.