CLAIMS

1. A method for a channel encoding in a communication system using a Low-Density Parity-Check (LDPC) code for which a parity check matrix has N_1 columns, where N_1 is 16200, the parity check matrix having an information part and a parity part, wherein the information part has K_1 columns, where K_1 is 3240, wherein the parity part has (N_1-K_1) columns, where (N_1-K_1) is 12960, where the information part comprises a plurality of column groups, each column group having M_1 columns, where M_1 is 360, and the number of column groups is K_1/M_1, where K_1/M_1 is 9,

wherein the sequences of positions of '1's in the 0th column in the ith column group, i=0, …, 8, denoted by $R_{i,0}^{(1)}, R_{i,0}^{(2)}, \ldots, R_{i,0}^{(D_i)}$, are

6295 9626 304 7695 4839 4936 1660 144 11203 5567 6347 12557
10691 4988 3859 3734 3071 3494 7687 10313 5964 8069 8296 11090
10774 3613 5208 11177 7676 3549 8746 6583 7239 12265 2674 4292
11869 3708 5981 8718 4908 10650 6805 3334 2627 10461 9285 11120
7844 3079 10773
3385 10854 5747
1360 12010 12202
6189 4241 2343
9840 12726 4977,

where a degree of the 0th column in each ith column group is denoted by D_i;

wherein the structure of the information part is made using the following rule:

determining position of rows with '1's, denoted by $R_{i,j}^{(k)}$, by

$$R_{i,j}^{(k)} = \{R_{i,(j-1)}^{(k)} + q\} \bmod (N_1 - K_1),$$
$$k = 1,2,\ldots,D_i, \quad i = 1,\ldots,8, \quad j = 1,\ldots,359;$$

where q is an integer satisfying $q = (N_1 - K_1)/M_1 = 36$;

the method comprising:

(a) reading parity check matrix information;

(b) determining a length K_2, where K_2 denotes a length of information bits to be

obtained by shortening, wherein the information bits include 168 BCH parity bits;

(c) based on the length K_2, performing shortening on information bits in an order according to a predetermined shortening pattern defined in the following table

Scope of K_2	Shortening Method
1) $528 \le K_2 < 3240$	For an integer $m = \left\lfloor \frac{3240 - K_2}{360} \right\rfloor$, shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(m\text{-}1)^{th}$ column groups, and additionally shortens $3240\text{-}K_2\text{-}360m$ information bits from the $\pi(m)^{th}$ column group. Herein, π denotes a permutation function shown at the bottom of the table. However, when a part of information bits corresponding to the $\pi(7)=8^{th}$ column group is shortened, the 168 BCH parity bits are not subjected to shortening.
2) $168 \le K_2 < 528$	Shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(6)^{th}$ column groups, and shortens all information bits except for the 168 BCH parity bits from the information bits corresponding to the $\pi(7)=8^{th}$ column group. Further, additionally shortens $528\text{-}K_2$ information bits corresponding to the $\pi(8)=0^{th}$ column group.

$\pi(0)$	$\pi(1)$	$\pi(2)$	$\pi(3)$	$\pi(4)$	$\pi(5)$	$\pi(6)$	$\pi(7)$	$\pi(8)$
7	3	6	5	2	4	1	8	0

and

(d) LDPC encoding the shortened information bits using the parity check matrix.

2. An apparatus for a channel encoding in a communication system using a Low-Density Parity-Check (LDPC) code for which a parity check matrix has N_1 columns, where N_1 is 16200, the parity check matrix having an information part and a parity part, wherein the information part has K_1 columns, where K_1 is 3240, wherein the parity part has $(N_1\text{-}K_1)$ columns, where $(N_1\text{-}K_1)$ is 12960, wherein the information part comprises a plurality of column groups, each column group having M_1 columns, where

M_1 is 360, and the number of column groups is K_1/M_1, where K_1/M_1 is 9,

wherein the sequences of positions of '1's in the 0th column in the ith column group, i=0, ..., 8, denoted by $R_{i,0}^{(1)}, R_{i,0}^{(2)}, \ldots, R_{i,0}^{(D_i)}$, are

6295 9626 304 7695 4839 4936 1660 144 11203 5567 6347 12557
10691 4988 3859 3734 3071 3494 7687 10313 5964 8069 8296 11090
10774 3613 5208 11177 7676 3549 8746 6583 7239 12265 2674 4292
11869 3708 5981 8718 4908 10650 6805 3334 2627 10461 9285 11120
7844 3079 10773
3385 10854 5747
1360 12010 12202
6189 4241 2343
9840 12726 4977,

where a degree of the 0th column in each ith column group is denoted by D_i;

wherein the structure of the information part is made using the following rule:

determining position of rows with '1's, denoted by $R_{i,j}^{(k)}$, by

$$R_{i,j}^{(k)} = \{R_{i,(j-1)}^{(k)} + q\} \bmod (N_1 - K_1),$$
$$k = 1,2,\ldots,D_i, \quad i = 1,\ldots,8, \quad j = 1,\ldots,359;$$

where q is an integer satisfying $q = (N_1 - K_1)/M_1 = 36$;

the apparatus comprising:

a parity-check matrix extractor (740) for reading the parity check matrix information;

a shortening pattern applier (720) for determining a length K_2, where K_2 denotes a length of information bits to be obtained by shortening, wherein the information bits include 168 BCH parity bits, and based on the length K_2, for performing shortening on information bits in an order according to a predetermined shortening pattern defined in the following table;

Scope of K_2	Shortening Method
1) $528 \le K_2 < 3240$	For an integer $m = \left\lfloor \frac{3240 - K_2}{360} \right\rfloor$, shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(m\text{-}1)^{th}$ column groups, and additionally shortens $3240\text{-}K_2\text{-}360m$ information bits from a $\pi(m)^{th}$ column group. Herein, π denotes a permutation function shown at the bottom of the table. However, when a part of information bits corresponding to the $\pi(7)=8^{th}$ column group are shortened, the 168 BCH parity bits are not subjected to shortening.
2) $168 \le K_2 < 528$	Shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(6)^{th}$ column groups, and shortens all information bits except for the 168 BCH parity bits from the information bits corresponding to the $\pi(7)=8^{th}$ column group. Further, additionally shortens $528\text{-}K_2$ information bits corresponding to the $\pi(8)=0^{th}$ column group.

$\pi(0)$	$\pi(1)$	$\pi(2)$	$\pi(3)$	$\pi(4)$	$\pi(5)$	$\pi(6)$	$\pi(7)$	$\pi(8)$
7	3	6	5	2	4	1	8	0

and an encoder (760) for LDPC encoding the shortened information bits using the parity check matrix.

3. A method for channel encoding in a communication system using a Low-Density Parity-Check (LDPC) code for which a parity check matrix has N_1 columns, where N_1 is 16200, the parity check matrix having an information part and a parity part, wherein the information part has K_1 columns, where K_1 is 7200, wherein the parity part has $(N_1\text{-}K_1)$ columns, wherein $(N_1\text{-}K_1)$ is 9000; wherein the information part comprises a plurality of column groups, each column group

having M_1 columns, where M_1 is 360, and the number of column groups is K_1/M_1, where K_1/M_1 is 20,

wherein the sequences of positions of '1's in the 0th column in the ith column group, i=0, ..., 19, denoted by $R_{i,0}^{(1)}, R_{i,0}^{(2)}, \ldots, R_{i,0}^{(D_i)}$, are

20 712 2386 6354 4061 1062 5045 5158

21 2543 5748 4822 2348 3089 6328 5876

22 926 5701 269 3693 2438 3190 3507

23 2802 4520 3577 5324 1091 4667 4449

24 5140 2003 1263 4742 6497 1185 6202

0 4046 6934

1 2855 66

2 6694 212

3 3439 1158

4 3850 4422

5 5924 290

6 1467 4049

7 7820 2242

8 4606 3080

9 4633 7877

10 3884 6868

11 8935 4996

12 3028 764

13 5988 1057

14 7411 3450,

where a degree of the 0^{th} column in each i^{th} column group is denoted by D_i;

wherein the structure of the information part is made using the following rule:

determining position of rows with '1's, denoted by $R_{i,j}^{(k)}$, by

$$R_{i,j}^{(k)} = \{R_{i,(j-1)}^{(k)} + q\} \bmod (N_1 - K_1),$$
$$k = 1,2,\ldots,D_i, \quad i = 0,\ldots,19, \quad j = 1,\ldots,359;$$

where q is an integer satisfying $q = (N_1 - K_1)/M_1 = 25$;

the method comprising:

(a) reading parity check matrix information;

(b) determining a length K_2, where K_2 denotes a length of information bits to be obtained by shortening, wherein the information bits include 168 BCH parity bits;

(c) based on the length K_2, performing shortening on information bits in an order according to a predetermined shortening pattern defined in the following table

Scope of K_2	Shortening Method
1) $528 \le K_2 < 7200$	For an integer $m = \left\lfloor \frac{7200 - K_2}{360} \right\rfloor$, shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(m-1)^{th}$ column groups, and additionally shortens

	7200-K_2-360m information bits from the $\pi(m)^{th}$ column group. Herein, π denotes a permutation function shown at the bottom of the table. However, when a part of information bits corresponding to the $\pi(18)^{th}$ =19^{th} column group is shortened, the 168 BCH parity bits are not subjected to shortening.
2) $168 \leq K_2 < 528$	Shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(17)^{th}$ column groups, and shortens all information bits except for the 168 BCH parity bits from the information bits corresponding to the $\pi(18)$=19^{th} column group. Further, additionally shortens 528-K_2 information bits corresponding to the $\pi(19)$=0^{th} column group.

$\pi(0)$	$\pi(1)$	$\pi(2)$	$\pi(3)$	$\pi(4)$	$\pi(5)$	$\pi(6)$	$\pi(7)$	$\pi(8)$	$\pi(9)$
18	17	16	15	14	13	12	11	4	10
$\pi(10)$	$\pi(11)$	$\pi(12)$	$\pi(13)$	$\pi(14)$	$\pi(15)$	$\pi(16)$	$\pi(17)$	$\pi(18)$	$\pi(19)$
9	8	3	2	7	6	5	1	19	0

;and

(d) LDPC encoding the shortened information bits using the parity check matrix.

4. An apparatus for channel encoding in a communication system using a Low-Density Parity-Check (LDPC) code for which a parity check matrix has N_1 columns, where N_1 is 16200, the parity check matrix having an information part

and a parity part, wherein the information part has K_1 columns, where K_1 is 7200, wherein the parity part has (N_1-K_1) columns, wherein (N_1-K_1) is 9000; wherein the information part comprises a plurality of column groups, each column group having M_1 columns, where M_1 is 360, and the number of column groups is K_1/M_1, where K_1/M_1 is 20,

wherein the sequences of positions of '1's in the 0^{th} column in the i^{th} column group, i=0, …, 19, denoted by $R_{i,0}^{(1)}, R_{i,0}^{(2)}, \ldots, R_{i,0}^{(D_i)}$, are

20 712 2386 6354 4061 1062 5045 5158

21 2543 5748 4822 2348 3089 6328 5876

22 926 5701 269 3693 2438 3190 3507

23 2802 4520 3577 5324 1091 4667 4449

24 5140 2003 1263 4742 6497 1185 6202

0 4046 6934

1 2855 66

2 6694 212

3 3439 1158

4 3850 4422

5 5924 290

6 1467 4049

7 7820 2242

8 4606 3080

9 4633 7877

10 3884 6868

11 8935 4996

12 3028 764

13 5988 1057

14 7411 3450,

where a degree of the 0^{th} column in each i^{th} column group is denoted by D_i;

wherein the structure of the information part is made using the following rule:

determining position of rows with '1's, denoted by $R_{i,j}^{(k)}$, by

$$R_{i,j}^{(k)} = \{R_{i,(j-1)}^{(k)} + q\} \bmod (N_1 - K_1),$$
$$k = 1,2,...,D_i, \quad i = 0,...,19, \quad j = 1,...,359;$$

where q is an integer satisfying $q = (N_1 - K_1)/M_1 = 25$;

the apparatus comprising:

a parity-check matrix extractor (740) for reading parity check matrix information;

a shortening pattern applier (720) for determining a length K_2, where K_2 denotes a length of information bits to be obtained by shortening, wherein the information bits include 168 BCH parity bits, and based on the length K_2, performing shortening on information bits in an order according to a predetermined shortening pattern defined in the following table

Scope of K_2	Shortening Method
1) $528 \le K_2 < 7200$	For an integer $m = \left\lfloor \frac{7200 - K_2}{360} \right\rfloor$, shortens all

	information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(m-1)^{th}$ column groups, and additionally shortens $7200-K_2-360m$ information bits from the $\pi(m)^{th}$ column group. Herein, π denotes a permutation function shown at the bottom of the table. However, when a part of information bits corresponding to the $\pi(18)^{th}$ $=19^{th}$ column group is shortened, the 168 BCH parity bits are not subjected to shortening.
2) $168 \leq K_2 < 528$	Shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(17)^{th}$ column groups, and shortens all information bits except for the 168 BCH parity bits from the information bits corresponding to the $\pi(18)=19^{th}$ column group. Further, additionally shortens $528-K_2$ information bits corresponding to the $\pi(19)=0^{th}$ column group.

$\pi(0)$	$\pi(1)$	$\pi(2)$	$\pi(3)$	$\pi(4)$	$\pi(5)$	$\pi(6)$	$\pi(7)$	$\pi(8)$	$\pi(9)$
18	17	16	15	14	13	12	11	4	10
$\pi(10)$	$\pi(11)$	$\pi(12)$	$\pi(13)$	$\pi(14)$	$\pi(15)$	$\pi(16)$	$\pi(17)$	$\pi(18)$	$\pi(19)$
9	8	3	2	7	6	5	1	19	0

; and

an encoder (760) for LDPC encoding the shortened information bits using the parity check matrix.

5. A method for channel decoding in a communication system using a Low-Density Parity-Check (LDPC) code for which a parity check matrix has N_1 columns, where N_1 is 16200, the parity check matrix having an information part and a parity part, wherein the information part has K_1 columns, where K_1 is 7200, wherein the parity part has (N_1-K_1) columns, wherein (N_1-K_1) is 9000; wherein the information part comprises a plurality of column groups, each column group having M_1 columns, where M_1 is 360, and the number of column groups is K_1/M_1, where K_1/M_1 is 20,

wherein the sequences of positions of '1's in the 0^{th} column in the i^{th} column group, i=0, …, 19, denoted by $R_{i,0}^{(1)}, R_{i,0}^{(2)}, \ldots, R_{i,0}^{(D_i)}$, are

20 712 2386 6354 4061 1062 5045 5158
21 2543 5748 4822 2348 3089 6328 5876
22 926 5701 269 3693 2438 3190 3507
23 2802 4520 3577 5324 1091 4667 4449
24 5140 2003 1263 4742 6497 1185 6202
0 4046 6934
1 2855 66
2 6694 212
3 3439 1158
4 3850 4422
5 5924 290
6 1467 4049
7 7820 2242
8 4606 3080
9 4633 7877
10 3884 6868
11 8935 4996
12 3028 764
13 5988 1057
14 7411 3450,

where a degree of the 0^{th} column in each i^{th} column group is denoted by D_i;
wherein the structure of the information part is made using the following rule:

determining position of rows with '1's, denoted by $R_{i,j}^{(k)}$, by

$$R_{i,j}^{(k)} = \{R_{i,(j-1)}^{(k)} + q\} \bmod (N_1 - K_1),$$
$$k = 1,2,...,D_i, \quad i = 0,...,19, \; j = 1,...,359;$$

where q is an integer satisfying $q = (N_1 - K_1)/M_1 = 25$;

the method comprising:
(a) demodulating (1101) a received signal, the signal having been transmitted from a transmitter;
(b) determining (1103-1109) position information of shortened information bits using a predetermined shortening pattern defined in the following table; and
(c) decoding (1111) the demodulated signal based on the determined position information of the shortened information bits,
where K_2 denotes a length of information bits to be obtained by shortening, wherein the information bits include 168 BCH parity bits;

Scope of K_2	Shortening Method
1) $528 \le K_2 < 7200$	For an integer $m = \left\lfloor \frac{7200 - K_2}{360} \right\rfloor$, shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(m-1)^{th}$ column groups, and additionally shortens $7200-K_2-360m$ information bits from the $\pi(m)^{th}$ column group. Herein, π denotes a permutation function shown at the bottom of the table. However, when a part of information bits corresponding to the $\pi(18)^{th} = 19^{th}$ column group is shortened, the 168 BCH parity bits are not subjected to shortening.
2) $168 \le K_2 < 528$	Shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(17)^{th}$ column groups, and

			shortens all information bits except for the 168 BCH parity bits from the information bits corresponding to the $\pi(18)=19^{th}$ column group. Further, additionally shortens $528-K_2$ information bits corresponding to the $\pi(19)=0^{th}$ column group.						
$\pi(0)$	$\pi(1)$	$\pi(2)$	$\pi(3)$	$\pi(4)$	$\pi(5)$	$\pi(6)$	$\pi(7)$	$\pi(8)$	$\pi(9)$
18	17	16	15	14	13	12	11	4	10
$\pi(10)$	$\pi(11)$	$\pi(12)$	$\pi(13)$	$\pi(14)$	$\pi(15)$	$\pi(16)$	$\pi(17)$	$\pi(18)$	$\pi(19)$
9	8	3	2	7	6	5	1	19	0

6. An apparatus for channel decoding in a communication system using a Low-Density Parity-Check (LDPC) code for which a parity check matrix has N_1 columns, where N_1 is 16200, the parity check matrix having an information part and a parity part, wherein the information part has K_1 columns, where K_1 is 7200, wherein the parity part has (N_1-K_1) columns, wherein (N_1-K_1) is 9000; wherein the information part comprises a plurality of column groups, each column group having M_1 columns, where M_1 is 360, and the number of column groups is K_1/M_1, where K_1/M_1 is 20,

wherein the sequences of positions of '1's in the 0^{th} column in the i^{th} column group, i=0, …, 19, denoted by $R_{i,0}^{(1)}, R_{i,0}^{(2)}, \ldots, R_{i,0}^{(D_i)}$, are

20 712 2386 6354 4061 1062 5045 5158
21 2543 5748 4822 2348 3089 6328 5876
22 926 5701 269 3693 2438 3190 3507
23 2802 4520 3577 5324 1091 4667 4449
24 5140 2003 1263 4742 6497 1185 6202
0 4046 6934
1 2855 66
2 6694 212
3 3439 1158
4 3850 4422

5 5924 290
6 1467 4049
7 7820 2242
8 4606 3080
9 4633 7877
10 3884 6868
11 8935 4996
12 3028 764
13 5988 1057
14 7411 3450,

where a degree of the 0^{th} column in each i^{th} column group is denoted by D_i;
wherein the structure of the information part is made using the following rule:

determining position of rows with '1's, denoted by $R_{i,j}^{(k)}$, by

$$R_{i,j}^{(k)} = \{R_{i,(j-1)}^{(k)} + q\} \bmod (N_1 - K_1),$$
$$k = 1,2,\ldots,D_i, \quad i = 0,\ldots,19, \quad j = 1,\ldots,359;$$

where q is an integer satisfying $q = (N_1 - K_1)/M_1 = 25$;

the apparatus comprising:
a demodulator (930) for demodulating a signal transmitted from a transmitter and received by the apparatus;
a shortening pattern determiner (920, 1020) for determining position information of shortened information bits using a predetermined shortening pattern defined in the following table; and
a decoder (940) for decoding the demodulated signal based on the determined position information of the shortened information bits,
where K_2 denotes a length of information bits to be obtained by shortening, wherein the information bits include 168 BCH parity bits;

Scope of K_2	Shortening Method
1) $528 \le K_2 < 7200$	For an integer $m = \left\lfloor \frac{7200 - K_2}{360} \right\rfloor$, shortens all

	information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(m-1)^{th}$ column groups, and additionally shortens $7200-K_2-360m$ information bits from the $\pi(m)^{th}$ column group. Herein, π denotes a permutation function shown at the bottom of the table. However, when a part of information bits corresponding to the $\pi(18)^{th}$ $=19^{th}$ column group is shortened, the 168 BCH parity bits are not subjected to shortening.
2) $168 \leq K_2 < 528$	Shortens all information bits corresponding to the $\pi(0)^{th}$, $\pi(1)^{th}$, ..., and $\pi(17)^{th}$ column groups, and shortens all information bits except for the 168 BCH parity bits from the information bits corresponding to the $\pi(18)=19^{th}$ column group. Further, additionally shortens $528-K_2$ information bits corresponding to the $\pi(19)=0^{th}$ column group.

$\pi(0)$	$\pi(1)$	$\pi(2)$	$\pi(3)$	$\pi(4)$	$\pi(5)$	$\pi(6)$	$\pi(7)$	$\pi(8)$	$\pi(9)$
18	17	16	15	14	13	12	11	4	10
$\pi(10)$	$\pi(11)$	$\pi(12)$	$\pi(13)$	$\pi(14)$	$\pi(15)$	$\pi(16)$	$\pi(17)$	$\pi(18)$	$\pi(19)$
9	8	3	2	7	6	5	1	19	0

CLAIMS:

1. A method for a channel encoding in a system using a Low-Density Parity-Check (LDPC) code, the method comprising:

dividing information bits into a plurality of bit groups;

determining a number of information bits to be shortened;

determining a number of bit groups to be shortened based on the determined number of information bits to be shortened;

shortening information bits in the determined number of bit groups according to a predetermined order; and

LDPC encoding shortened information bits.

2. The method of claim 1, further comprising:

determining a number of information bits to be obtained by shortening for determining the number of information bits to be shortened.

3. The method of claim 1, wherein the predetermined order is 7^{th} bit group, 3^{rd} bit group, 6^{th} bit group, 5^{th} bit group, 2^{nd} bit group, 4^{th} bit group, 1^{st} bit group, 8^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 3240.

4. The method of claim 1, wherein the predetermined order is 18^{th} bit group, 17^{th} bit group, 16^{th} bit group, 15^{th} bit group, 14^{th} bit group, 13^{th} bit group, 12^{th} bit group, 11^{th} bit group, 4^{th} bit group, 10^{th} bit group, 9^{th} bit group, 8^{th} bit group, 3^{rd} bit group, 2^{nd} bit group, 7^{th} bit group, 6^{th} bit group, 5^{th} bit group, 1^{st} bit group, 19^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 7200.

5. The method of claim 1, comprising:

wherein when a number of bits of each bit group is 360 and the information bits is 3240,

shortening all information bits in bit groups from 0^{th} bit group to $(m\text{-}1)^{th}$ bit group in the predetermined order; and

shortening ($3240\text{-}K_2\text{-}360m$) information bits in m^{th} bit group in the predetermined order,

wherein, K_2 is a number of information bits to be obtained by shortening, ($3240\text{-}K_2$) is the number of information bits to be shortened, and $m = \left\lfloor \frac{3240 - K_2}{360} \right\rfloor$.

6. The method of claim 1, comprising:

wherein when a number of bits of each bit group is 360 and the information bits is 7200,

shortening all information bits in bit groups from 0^{th} bit group to $(m-1)^{th}$ bit group in the predetermined order; and

shortening ($7200-K_2-360m$) information bits in m^{th} bit group in the predetermined order,

wherein, K_2 is a number of information bits to be obtained by shortening, ($7200-K_2$) is the number of information bits to be shortened, and $m = \left\lfloor \frac{7200-K_2}{360} \right\rfloor$.

7. An apparatus for a channel encoding in a system using a Low-Density Parity-Check (LDPC) code, the apparatus comprising:

a shortening pattern applier for dividing information bits into a plurality of bit groups, for determining a number of information bits to be shortened, for determining a number of bit groups to be shortened based on the determined number of information bits to be shortened, and for shortening information bits in the determined number of bit groups according to a predetermined order; and

an encoder for LDPC encoding shortened information bits.

8. The apparatus of claim 7, wherein the shortening pattern applier is configured to determine a number of information bits to be obtained by shortening for determining the number of information bits to be shortened.

9. The apparatus of claim 7, wherein the predetermined order is 7^{th} bit group, 3^{rd} bit group, 6^{th} bit group, 5^{th} bit group, 2^{nd} bit group, 4^{th} bit group, 1^{st} bit group, 8^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 3240.

10. The apparatus of claim 7, wherein the predetermined order is 18^{th} bit group, 17^{th} bit group, 16^{th} bit group, 15^{th} bit group, 14^{th} bit group, 13^{th} bit group, 12^{th} bit group, 11^{th} bit group, 4^{th} bit group, 10^{th} bit group, 9^{th} bit group, 8^{th} bit group, 3^{rd} bit group, 2^{nd} bit group, 7^{th} bit group, 6^{th} bit group, 5^{th} bit group, 1^{st} bit group, 19^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 7200.

11. The apparatus of claim 7, wherein when a number of bits of each bit group is 360 and

the information bits is 3240, the shortening pattern applier shortens all information bits in bit groups from 0^{th} bit group to $(m-1)^{th}$ bit group in the predetermined order, and shortens ($3240-K_2-360m$) information bits in m^{th} bit group in the predetermined order,

wherein, K_2 is a number of information bits to be obtained by shortening, ($3240-K_2$) is the number of information bits to be shortened, and $m = \left\lfloor \frac{3240-K_2}{360} \right\rfloor$.

12. The apparatus of claim 7, wherein when a number of bits of each bit group is 360 and the information bits is 7200, the shortening pattern applier shortens all information bits in bit groups from 0^{th} bit group to $(m-1)^{th}$ bit group in the predetermined order, and shortens ($7200-K_2-360m$) information bits in m^{th} bit group in the predetermined order,

wherein, K_2 is a number of information bits to be obtained by shortening, ($7200-K_2$) is the number of information bits to be shortened, and $m = \left\lfloor \frac{7200-K_2}{360} \right\rfloor$.

13. A method for a channel decoding in a system using a Low-Density Parity-Check (LDPC) code, the method comprising:

demodulating a received signal;

determining position of shortened information bits; and

decoding the demodulated signal in consideration of the determined position of shortened information bits,

wherein determining position of shortened information bits comprises,

dividing information bits into a plurality of bit groups;

determining a number of shortened information bits;

determining a number of shortened bit groups based on the determined number of information bits to be shortened; and

determining the shortened bit groups based on a predetermined order.

14. The method of claim 13, wherein determining position of shortened information bits further comprising:

determining a number of information bits to be obtained by shortening for determining the number of information bits to be shortened.

15. The method of claim 13, wherein the predetermined order is 7^{th} bit group, 3^{rd} bit group, 6^{th} bit group, 5^{th} bit group, 2^{nd} bit group, 4^{th} bit group, 1^{st} bit group, 8^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 3240.

16. The method of claim 13, wherein the predetermined order is 18^{th} bit group, 17^{th} bit group, 16^{th} bit group, 15^{th} bit group, 14^{th} bit group, 13^{th} bit group, 12^{th} bit group, 11^{th} bit group, 4^{th} bit group, 10^{th} bit group, 9^{th} bit group, 8^{th} bit group, 3^{rd} bit group, 2^{nd} bit group, 7^{th} bit group, 6^{th} bit group, 5^{th} bit group, 1^{st} bit group, 19^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 7200.

17. The method of claim 13, comprising:

wherein when a number of bits of each bit group is 360 and the information bits is 3240,

determining that all information bits in bit groups from 0^{th} bit group to $(m\text{-}1)^{th}$ bit group in the predetermined order are shortened; and

determining that $(3240\text{-}K_2\text{-}360m)$ information bits in m^{th} bit group in the predetermined order are shortened,

wherein, K_2 is a number of information bits to be obtained by shortening, $(3240\text{-}K_2)$ is the number of information bits to be shortened, and $m = \left\lfloor \frac{3240 - K_2}{360} \right\rfloor$.

18. The method of claim 13, comprising:

wherein when a number of bits of each bit group is 360 and the information bits is 7200,

determining that all information bits in bit groups from 0^{th} bit group to $(m\text{-}1)^{th}$ bit group in the predetermined order are shortened; and

determining that $(7200\text{-}K_2\text{-}360m)$ information bits in m^{th} bit group in the predetermined order are shortened,

wherein, K_2 is a number of information bits to be obtained by shortening, $(7200\text{-}K_2)$ is the number of information bits to be shortened, and $m = \left\lfloor \frac{7200 - K_2}{360} \right\rfloor$.

19. An apparatus for a channel decoding in a system using a Low-Density Parity-Check (LDPC) code, the apparatus comprising:

a demodulator for demodulating a received signal;

a shortening pattern determiner for determining position of shortened information bits; and

a decoder for decoding the demodulated signal in consideration of the determined position of shortened information bits,

wherein determining position of shortened information bits comprises,

dividing information bits into a plurality of bit groups;

determining a number of shortened information bits;

determining a number of shortened bit groups based on the determined number of information bits to be shortened; and

determining the shortened bit groups based on a predetermined order.

20. The apparatus of claim 19, wherein the shortening pattern determiner is configured to determine a number of information bits to be obtained by shortening for determining the number of information bits to be shortened.

21. The apparatus of claim 19, wherein the predetermined order is 7^{th} bit group, 3^{rd} bit group, 6^{th} bit group, 5^{th} bit group, 2^{nd} bit group, 4^{th} bit group, 1^{st} bit group, 8^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 3240.

22. The apparatus of claim 19, wherein the predetermined order is 18^{th} bit group, 17^{th} bit group, 16^{th} bit group, 15^{th} bit group, 14^{th} bit group, 13^{th} bit group, 12^{th} bit group, 11^{th} bit group, 4^{th} bit group, 10^{th} bit group, 9^{th} bit group, 8^{th} bit group, 3^{rd} bit group, 2^{nd} bit group, 7^{th} bit group, 6^{th} bit group, 5^{th} bit group, 1^{st} bit group, 19^{th} bit group, 0^{th} bit group, when a codeword length is 16200, and the information bits is 7200.

23. The apparatus of claim 19, wherein when a number of bits of each bit group is 360 and the information bits is 3240, the shortening pattern determiner determines that all information bits in bit groups from 0^{th} bit group to $(m\text{-}1)^{th}$ bit group in the predetermined order are shortened; and

$(3240\text{-}K_2\text{-}360m)$ information bits in m^{th} bit group in the predetermined order are shortened,

wherein, K_2 is a number of information bits to be obtained by shortening, $(3240\text{-}K_2)$ is the number of information bits to be shortened, and $m = \left\lfloor \frac{3240 - K_2}{360} \right\rfloor$.

24. The apparatus of claim 19, wherein when a number of bits of each bit group is 360 and the information bits is 7200, the shortening pattern determiner determines that all information bits in bit groups from 0^{th} bit group to $(m\text{-}1)^{th}$ bit group in the predetermined order are shortened; and

$(7200\text{-}K_2\text{-}360m)$ information bits in m^{th} bit group in the predetermined order are

shortened,

wherein, K_2 is a number of information bits to be obtained by shortening, (7200-K_2) is the number of information bits to be shortened, and $m = \left\lfloor \frac{7200 - K_2}{360} \right\rfloor$.