CLAIMS

1. A data processing method, comprising:

performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams, so as to obtain a total of m first data streams, wherein n=q*t, m=q*s, n is an integer greater than 1, n can be exactly divided by q, q is an integer greater than or equal to 1, t is an integer greater than or equal to 1, s is an integer greater than or equal to 1, first forward error correction FEC encoding is performed on all the n lane data streams, every a codewords obtained through the first FEC encoding are distributed in b lane data streams, a≤b≤n, n can be exactly divided by b, a is an integer greater than or equal to 1, every a consecutive symbols in each lane data stream are from a different codewords, every L1 consecutive symbols in each lane data stream are from at least a different codewords, L1=N*a/b, N represents a length of the codeword, the t lane data streams comprise a total of t*a symbols (a consecutive symbols in each lane data stream), the t*a symbols comprise a total of D bits (Δ bits in each symbol, and D=Δ*t*a), the D bits are consecutive in any one of the s first data streams, Δ=M/s, and M represents a quantity of bits comprised in one symbol; and

separately performing convolutional interleaving on the m first data streams to obtain m second data streams.

2. The data processing method according to claim 1, wherein every d consecutive symbols in each first data stream are from v different codewords, every L2 consecutive symbols in each first data stream are from at least v different codewords, v can be exactly divided by a, L2=t/s*L1, and d=D/M.

3. The method according to claim 1 or 2, wherein n=32, 16 lane data streams in odd-numbered lanes of the n lane data streams are from same codewords, 16 lane data streams in even-numbered lanes of the n lane data streams are from same codewords, and the data stream in the odd-numbered lane of the n lane data streams and the data stream in the even-numbered lane of the n lane data streams are from different codewords.

4. The method according to claim 3, wherein t=8, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on a total of eight lane data streams: an $(8*i)^{th}$ lane data stream, an $(8*i+1)^{th}$ lane data stream, an $(8*i+2)^{th}$ lane data stream, an $(8*i+3)^{th}$ lane data stream, an $(8*i+4)^{th}$ lane data stream, an $(8*i+5)^{th}$ lane data stream, an $(8*i+6)^{th}$ lane data stream, and an $(8*i+7)^{th}$ lane data stream, to obtain one first data stream, wherein 0≤i≤3, a total of 16 symbols

(two consecutive symbols comprised in each of the eight lane data streams) are consecutive in the first data stream obtained through the block interleaving, every 16 consecutive symbols in the first data stream obtained through the block interleaving are from at least four different codewords, every 544 consecutive symbols are from at least four different codewords, a 0^{th} symbol, a 1^{st} symbol, a 2^{nd} symbol, and a 3^{rd} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, a 4^{th} symbol, a 5^{th} symbol, a 6^{th} symbol, and a 7^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, an 8^{th} symbol, a 9^{th} symbol, a 10^{th} symbol, and an 11^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, and a 12^{th} symbol, a 13^{th} symbol, a 14^{th} symbol, and a 15^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords.

5. The method according to claim 3, wherein t=8, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on a total of eight lane data streams: an $(8*i)^{th}$ lane data stream, an $(8*i+1)^{th}$ lane data stream, an $(8*i+2)^{th}$ lane data stream, an $(8*i+3)^{th}$ lane data stream, an $(8*i+4)^{th}$ lane data stream, an $(8*i+5)^{th}$ lane data stream, an $(8*i+6)^{th}$ lane data stream, and an $(8*i+7)^{th}$ lane data stream, to obtain one first data stream, wherein $0\leq i\leq 3$, a total of 16 symbols (a j^{th} group of two consecutive symbols comprised in each of the eight lane data streams) are consecutive in the first data stream obtained through the block interleaving, a j^{th} group of two consecutive symbols comprised in each of the eight lane data streams are consecutive in the first data stream obtained through the block interleaving, $j\geq 0$, every 16 consecutive symbols in the first data stream obtained through the block interleaving are from at least four different codewords, every 544 consecutive symbols are from at least four different codewords, a 0^{th} symbol, a 1^{st} symbol, a 2^{nd} symbol, and a 3^{rd} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, a 4^{th} symbol, a 5^{th} symbol, a 6^{th} symbol, and a 7^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, an 8^{th} symbol, a 9^{th} symbol, a 10^{th} symbol, and an 11^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, and a 12^{th} symbol, a 13^{th} symbol, a 14^{th} symbol, and a 15^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords.

6. The method according to claim 3, wherein t=8, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on a total of eight lane data streams: an $(8*i)^{th}$ lane data stream,

an $(8*i+1)^{th}$ lane data stream, an $(8*i+2)^{th}$ lane data stream, an $(8*i+3)^{th}$ lane data stream, an $(8*i+4)^{th}$ lane data stream, an $(8*i+5)^{th}$ lane data stream, an $(8*i+6)^{th}$ lane data stream, and an $(8*i+7)^{th}$ lane data stream, to obtain one first data stream, wherein $0 \leq i \leq 3$, a total of eight symbols (a j^{th} symbol comprised in each of the eight lane data streams) are consecutive in the first data stream obtained through the block interleaving, $j \geq 0$, every eight consecutive symbols in the first data stream obtained through the block interleaving are from four different codewords, a 0^{th} symbol, a 1^{st} symbol, a 2^{nd} symbol, and a 3^{rd} symbol in every eight consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, and a 4^{th} symbol, a 5^{th} symbol, a 6^{th} symbol, and a 7^{th} symbol in every eight consecutive symbols in the first data stream obtained through the block interleaving are from different codewords.

7. The method according to claim 1 or 2, wherein n=32, 16 consecutive lane data streams sorted in the front of the n lane data streams are from same codewords, 16 consecutive lane data streams sorted in the back of the n lane data streams are from same codewords, and the 16 consecutive lane data streams sorted in the front of the n lane data streams and the 16 consecutive lane data streams sorted in the back of the n lane data streams are from different codewords.

8. The method according to claim 7, wherein t=2, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on an i^{th} lane data stream and an $(i+16)^{th}$ lane data stream to obtain one first data stream, wherein $0 \leq i < 16$, two consecutive symbols in the i^{th} lane data stream and two consecutive symbols in the $(i+16)^{th}$ lane data stream are consecutive in the first data stream obtained through the block interleaving, and every four consecutive symbols in the first data stream obtained through the block interleaving are from four different codewords.

9. The method according to claim 7, wherein t=2, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on an i^{th} lane data stream and an $(i+16)^{th}$ lane data stream to obtain one first data stream, wherein $0 \leq i < 16$, a j^{th} group of consecutive β bits in the i^{th} lane data stream and a j^{th} group of consecutive β bits in the $(i+16)^{th}$ lane data stream are consecutive in the first data stream obtained through the block interleaving, $j \geq 0$, β is 1, 2, 4, 5, 10, or 20, and every four consecutive symbols in the first data stream obtained through the block interleaving are from four different codewords.

10. The method according to claim 7, wherein t=2, s=2, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on an i^{th} lane data stream and an $(i+16)^{th}$ lane data stream to obtain a $(2*i)^{th}$ first data stream and a $(2*i+1)^{th}$ first data stream, wherein $0 \leq i < 16$, a total of 20 bits (five bits in each of four symbols: two consecutive symbols in the i^{th} lane data stream and two

consecutive symbols in the $(i+16)^{th}$ lane data stream) are consecutive in the $(2*i)^{th}$ first data stream, every 20 consecutive bits in the $(2*i)^{th}$ first data stream are from four different codewords, a total of 20 bits (the other five bits in each of the four symbols: two consecutive symbols in the i^{th} lane data stream and two consecutive symbols in the $(i+16)^{th}$ lane data stream) are consecutive in the $(2*i+1)^{th}$ first data stream, and every 20 consecutive bits in the $(2*i+1)^{th}$ first data stream are from four different codewords.

11. The method according to claim 7, wherein t=8, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on a total of eight lane data streams: a $(4*i)^{th}$ lane data stream, a $(4*i+1)^{th}$ lane data stream, a $(4*i+2)^{th}$ lane data stream, a $(4*i+3)^{th}$ lane data stream, a $(4*i+16)^{th}$ lane data stream, a $(4*i+17)^{th}$ lane data stream, a $(4*i+18)^{th}$ lane data stream, and a $(4*i+19)^{th}$ lane data stream, to obtain one first data stream, wherein $0\leq i\leq 3$, a total of 16 symbols (two consecutive symbols comprised in each of the eight lane data streams) are consecutive in the first data stream obtained through the block interleaving, every 16 consecutive symbols in the first data stream obtained through the block interleaving are from at least four different codewords, every 544 consecutive symbols are from at least four different codewords, a 0^{th} symbol, a 1^{st} symbol, a 2^{nd} symbol, and a 3^{rd} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, a 4^{th} symbol, a 5^{th} symbol, a 6^{th} symbol, and a 7^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, an 8^{th} symbol, a 9^{th} symbol, a 10^{th} symbol, and an 11^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, and a 12^{th} symbol, a 13^{th} symbol, a 14^{th} symbol, and a 15^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords.

12. The method according to claim 7, wherein t=8, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on a total of eight lane data streams: a $(4*i)^{th}$ lane data stream, a $(4*i+1)^{th}$ lane data stream, a $(4*i+2)^{th}$ lane data stream, a $(4*i+3)^{th}$ lane data stream, a $(4*i+16)^{th}$ lane data stream, a $(4*i+17)^{th}$ lane data stream, a $(4*i+18)^{th}$ lane data stream, and a $(4*i+19)^{th}$ lane data stream, to obtain one first data stream, wherein $0\leq i\leq 3$, a total of 16 symbols (a j^{th} group of two consecutive symbols comprised in each of the eight lane data streams) are consecutive in the first data stream obtained through the block interleaving, a j^{th} group of two consecutive symbols comprised in each of the eight lane data streams are consecutive in the first data stream obtained through the block interleaving, $j\geq 0$, every 16 consecutive symbols in the first data stream obtained through the block interleaving are from at least four different codewords, every 544 consecutive

symbols are from at least four different codewords, a 0^{th} symbol, a 1^{st} symbol, a 2^{nd} symbol, and a 3^{rd} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, a 4^{th} symbol, a 5^{th} symbol, a 6^{th} symbol, and a 7^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, an 8^{th} symbol, a 9^{th} symbol, a 10^{th} symbol, and an 11^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, and a 12^{th} symbol, a 13^{th} symbol, a 14^{th} symbol, and a 15^{th} symbol in every 16 consecutive symbols in the first data stream obtained through the block interleaving are from different codewords.

13. The method according to claim 7, wherein t=8, s=1, and the performing block interleaving on every t lane data streams of n lane data streams to obtain s first data streams comprises:

performing block interleaving on a total of eight lane data streams: a $(4*i)^{th}$ lane data stream, a $(4*i+1)^{th}$ lane data stream, a $(4*i+2)^{th}$ lane data stream, a $(4*i+3)^{th}$ lane data stream, a $(4*i+16)^{th}$ lane data stream, a $(4*i+17)^{th}$ lane data stream, a $(4*i+18)^{th}$ lane data stream, and a $(4*i+19)^{th}$ lane data stream, to obtain one first data stream, wherein $0 \leq i \leq 3$, a total of eight symbols (a j^{th} symbol comprised in each of the eight lane data streams) are consecutive in the first data stream obtained through the block interleaving, $j \geq 0$, every eight consecutive symbols in the first data stream obtained through the block interleaving are from at least four different codewords, a 0^{th} symbol, a 1^{st} symbol, a 2^{nd} symbol, and a 3^{rd} symbol in every eight consecutive symbols in the first data stream obtained through the block interleaving are from different codewords, and a 4^{th} symbol, a 5^{th} symbol, a 6^{th} symbol, and a 7^{th} symbol in every eight consecutive symbols in the first data stream obtained through the block interleaving are from different codewords.

14. The method according to any one of claims 1-3, 7-10, wherein the performing convolutional interleaving on one first data stream to obtain one second data stream comprises:

delaying one first data stream based on p delay lines to obtain one second data stream, wherein p is an integer greater than 1, a quantity of storage units comprised in each delay line is different, a delay line with a smallest quantity of storage units comprises 0 storage units, a difference between quantities of storage units of every two adjacent delay lines is Q, each storage unit is configured to store d symbols, symbols in each lane data stream are sequentially input to the p delay lines based on sequence numbers of the p delay lines, d symbols are input to each delay line for a single time and d symbols are output from the delay line for a single time, p*d consecutive symbols in the second data stream comprise the d symbols output from the delay line, and Q is an integer greater than or equal to 1.

15. The method according to any one of claims 1-6, 11-13, wherein the performing convolutional interleaving on one first data stream to obtain one second data stream comprises:

delaying one first data stream based on p delay lines to obtain one second data stream, wherein p is an integer greater than 1, a quantity of storage units comprised in each delay line is different, a delay line with a smallest quantity of storage units comprises 0 storage units, a difference between quantities of storage units of every two adjacent delay lines is Q, each storage unit is configured to store four symbols, symbols in each lane data stream are sequentially input to the p delay lines based on sequence numbers of the p delay lines, four symbols are input to each delay line for a single time and four symbols are output from the delay line for a single time, p*4 consecutive symbols in the second data stream comprise the four symbols output from the delay line, and Q satisfies $4(p * Q - 1) \geq 272, 4(p * Q + 1) \geq 272, 4(p * Q - 1) \geq 544$, or $4(p * Q + 1) \geq 544$.

16. The method according to claim 15, wherein after the separately performing convolutional interleaving on the m first data streams to obtain m second data streams, the method further comprises:

separately performing second FEC encoding on the m second data streams to obtain m encoded data streams, wherein information data whose length is K symbols in each of the encoded data streams is from at most K different codewords, and K≥p*4.

17. The method according to any one of claims 1 to 13, wherein the performing convolutional interleaving on one first data stream to obtain one second data stream comprises:

delaying one first data stream based on p delay lines to obtain one second data stream, wherein p is an integer greater than 1, a quantity of storage units comprised in each delay line is different, a delay line with a smallest quantity of storage units comprises 0 storage units, and a difference between quantities of storage units of every two adjacent delay lines is Q; and

each storage unit is configured to store 34 bits, bits in each lane data stream are sequentially input to the p delay lines based on sequence numbers of the p delay lines, 34 bits are input to each delay line for a single time and 34 bits are output from each delay line for a single time, and p*34 consecutive bits in one second data stream comprise the 34 bits output from the delay line; or each storage unit is configured to store 68 bits, bits in each lane data stream are sequentially input to the p delay lines based on sequence numbers of the p delay lines, 68 bits are input to each delay line for a single time and 68 bits are output from each delay line for a single time, and p*68 consecutive bits in one second data stream comprise the 68 bits output from the delay line.

18. A data processing apparatus, wherein the data processing apparatus is configured to implement the method according to any one of claims 1 to 17.

19. A chip, wherein the chip is configured to implement the method according to any one of claims 1 to 17.

20. A computer-readable storage medium, wherein the computer-readable storage medium

stores computer-executable instructions; and when the computer-executable instructions are run on a processor, the method according to any one of claims 1 to 17 is implemented.

5