CLAIMS

1. A communications method for an optical network system, wherein the communications method comprises:

receiving a data stream from a physical medium attachment layer at a line rate, wherein the data stream is a data stream on which 8-bit/10-bit encoding has been performed;

performing 8-bit/10-bit decoding on the received data stream;

performing 32-bit to 34-bit encoding on the data stream on which the 8-bit/10-bit decoding has been performed;

performing forward error correction encoding on the data stream on which the 32-bit to 34-bit encoding has been performed;

performing bit width conversion of 34-bit/10-bit on the data stream on which the forward error correction encoding has been performed; and

sending the data stream on which the bit width conversion has been performed to a physical medium dependent layer at the line rate;

wherein before the performing the bit width conversion of 34-bit/10-bit, the communications method further comprises:

forming sixty 34-bit data blocks, wherein the sixty 34-bit data blocks include: one 34-bit delimiter, the fifty-one 34-bit data blocks as the payload data, and the eight 34-bit parity blocks.

2. The communications method according to claim 1, wherein before the step of the performing 32-bit to 34-bit encoding on the data stream on which the 8-bit/10-bit decoding has been performed, the communications method further comprises:

sequentially and consecutively receiving the data stream on which the 8-bit/10-bit decoding has been performed, to obtain four data blocks, wherein any one of the data blocks is a first control character block or a data character block, and any first control character block or any data character block is an 8-bit binary code; and

determining whether a first control character block exists among the four data blocks.

3. The communications method according to claim 2, wherein the performing 32-bit to 34-bit encoding on the data stream on which the 8-bit/10-bit decoding has been performed specifically comprises:

if no first control character block exists among the four data blocks, adding a first

synchronization head to a header of a first data block among the four data blocks, and outputting the data blocks to which the first synchronization head is added, wherein the first data block is an 8-bit binary code input first, the first synchronization head comprises a 2-bit first identifier, and the first identifier is used to identify that the data blocks are all data character blocks.

4. The communications method according to claim 2, wherein the performing 32-bit to 34-bit encoding on the data stream on which the 8-bit/10-bit decoding has been performed specifically comprises:

if at least one first control character block exists among the four data blocks, adding a second synchronization head to a header of a first data block among the four data blocks, wherein the first data block is an 8-bit binary code input first, the second synchronization head comprises a 2-bit second identifier, and the second identifier is used to identify that at least one first control character block exists among the data blocks;

generating, according to a quantity of first control character blocks among the four data blocks and a location of each of the first control character blocks among the data blocks, a 4-bit control character block location mapping code, and setting the control character block location mapping code, in a location after the second synchronization head and closely adjacent to the second synchronization head;

correspondingly converting each of the first control character blocks among the four data blocks into a 4-bit second control character block; and

outputting the processed data blocks, wherein the processed data blocks comprise the second synchronization head, the control character block location mapping code, and the second control blocks that are obtained after the conversion, or the processed data blocks comprise the second synchronization head, the control character block location mapping code, the second control character block that is obtained after the conversion, and the data character blocks.

5. The communications method according to claim 4, wherein the outputting the processed data blocks specifically comprises:

if the four data blocks further comprise at least one data character block, performing no processing on the at least one data character block among the four data blocks, and retaining the data character block among the data blocks; and

outputting the processed data blocks, wherein the processed data blocks comprise the second synchronization head, the control character block location mapping code, the second control character block that is obtained after the conversion, and the data character block.

6. A communications method for an optical network system, wherein the communications method comprises:

receiving a data stream from a physical medium dependent layer at a line rate, wherein the data stream is a data stream on which 32-bit to 34-bit encoding has been performed;

performing bit width conversion of 10-bit/34-bit on the received data stream;

performing forward error correction decoding on the data stream on which the bit width conversion has been performed;

performing 32-bit to 34-bit decoding on the data stream on which the forward error correction decoding has been performed;

performing 8-bit/10-bit encoding on the data stream on which the 32-bit to 34-bit decoding has been performed; and

sending the data stream on which the 8-bit/10-bit encoding has been performed to a physical medium attachment layer;

wherein before the performing forward error correction decoding on the data stream, the communications method further comprises:

receiving sixty 34-bit data blocks, wherein the sixty 34-bit data blocks include: one 34-bit delimiter, the fifty-one 34-bit data blocks as the payload data, and the eight 34-bit parity blocks.

7. The communications method according to claim 6, wherein before the step of the performing 32-bit to 34-bit decoding on the data stream on which the forward error correction decoding has been performed, the communications method further comprises:

parsing the data stream on which the forward error correction decoding has been performed, and outputting 51 data blocks, wherein any one of the data blocks is a second control character block or a data character block, any second control character block is a 4-bit binary code, and any data character block is an 8-bit binary code;

parsing any one of the data blocks, and obtaining a synchronization head of the data blocks, wherein the synchronization head comprises: a first synchronization head or a second synchronization head, the first synchronization head comprises a 2-bit first identifier, the first identifier is used to identify that the data block is a data character block, the second synchronization head comprises a 2-bit second identifier, and the second identifier is used to identify that at least one second control character block exists among the data blocks; and

determining whether the synchronization head of the any one of the data blocks is a first synchronization head or a second synchronization head.

8. The communications method according to claim 7, wherein the step of the performing 32-bit to 34-bit decoding on the data stream on which the forward error correction decoding has been performed specifically comprises:

if the synchronization head is a first synchronization head, deleting the first synchronization head, and outputting the data blocks from which the first synchronization head is deleted.

9. The communications method according to claim 7, wherein the step of the performing 32-bit to 34-bit decoding on the data stream on which the forward error correction decoding has been performed specifically comprises:

if the synchronization head is a second synchronization head, parsing the data blocks, and obtaining a 4-bit control character block location mapping code;

obtaining a quantity of the second control character blocks among the data blocks and a location of each of the second control character blocks among the data blocks according to the control character block location mapping code;

correspondingly converting the second control character block among the data blocks into an 8-bit first control character block according to the quantity of the second control character blocks and the location of the second control character block among the data blocks;

deleting the second synchronization head and the control character block location mapping code from the data blocks, wherein the control character block location mapping code is in a location after the second synchronization head and closely adjacent to the second synchronization head; and

outputting the processed data blocks, wherein the processed data blocks comprise: the first control character block and/or the data character block, and any first control character block or any data character block is an 8-bit binary code.

10. The communications method according to claim 9, wherein the step of the outputting the processed data blocks specifically comprises:

if the data blocks further comprise at least one data character block, performing no processing on the data character block among the data blocks, and retaining the data character block; and

outputting the processed data blocks, wherein the processed data blocks comprise: the first control character block and the data character block.

11. An optical network device, wherein the optical network device comprises:

a first interface unit, configured to receive a data stream from a physical medium attachment layer at a line rate, wherein the data stream is a data stream on which 8-bit/10-bit encoding has been performed, and perform serial-to-parallel conversion on the received data stream;

an 8-bit/10-bit decoder, configured to perform 8-bit/10-bit decoding on the received data stream, and output the data stream on which the 8-bit/10-bit decoding has been performed;

a 32-bit to 34-bit encoder, configured to perform 32-bit to 34-bit encoding on the output data stream on which the 8-bit/10-bit decoding has been performed, and output the data stream on which the 32-bit to 34-bit encoding has been performed;

a forward error correction encoder, configured to perform forward error correction encoding on the output data stream on which the 32-bit to 34-bit encoding has been performed, and output the data stream on which the forward error correction encoding has been performed;

a first bit width converter, configured to perform bit width conversion of 34-bit/10-bit on the output data stream on which the forward error correction encoding has been performed; and

a second interface unit, configured to send the data stream on which the bit width conversion has been performed to a physical medium dependent layer at the line rate;

wherein the optical network device further configured to form, before the first bit width converter performs bit width conversion of 34-bit/10-bit on the output data stream, sixty 34-bit data blocks, wherein the sixty 34-bit data blocks include: one 34-bit delimiter, the fifty-one 34-bit data blocks as the payload data, and the eight 34-bit parity blocks.

12. The optical network device according to claim 11, wherein the 32-bit to 34-bit encoder comprises:

a first receiving unit, configured to sequentially and consecutively receive the data stream on which the 8-bit/10-bit decoding has been performed, to form four data blocks, wherein any one of the data blocks is a first control character block or a data character block, and any first control character block or any data character block is an 8-bit binary code; and

a first determining unit, configured to determine whether a first control character block exists among the four data blocks.

13. The optical network device according to claim 12, wherein the 32-bit to 34-bit encoder further comprises:

a first processing unit, configured to: if no first control character block exists among the four data blocks, add a first synchronization head to a header of a first data block among the four data blocks, and output the data blocks to which the first synchronization head is added, wherein the first data block is an 8-bit binary code input first, the first synchronization head comprises a 2-bit first identifier, and the first identifier is used to identify that the data blocks are all data character blocks.

14. The optical network device according to claim 12, wherein the 32-bit to 34-bit encoder

further comprises a second processing unit, and the second processing unit specifically comprises:

a synchronization head generating unit, configured to: if at least one first control character block exists among the four data blocks, add a second synchronization head to a header of a first data block among the four data blocks, wherein the first data block is an 8-bit binary code input first, the second synchronization head comprises a 2-bit second identifier, and the second identifier is used to identify that at least one first control character block exists among the data blocks;

a mapping code generating unit, configured to generate, according to a quantity of first control character blocks among the four data blocks and a location of the first control block among the data blocks, a 4-bit control character block location mapping code, and set the control character block location mapping code, in a location after the second synchronization head and closely adjacent to the second synchronization head;

a first control character block converting unit, configured to correspondingly convert the first control character block among the four data blocks into a 4-bit second control character block; and

a first outputting unit, configured to output the processed data blocks, wherein the processed data blocks comprise the second synchronization head, the control character block location mapping code, and the second control character block that is obtained after the conversion, or the processed data blocks comprise the second synchronization head, the control character block location mapping code, the second control character block that is obtained after the conversion, and the data character block.

15. The optical network device according to claim 14, wherein the first outputting unit is specifically configured to; if the four data blocks further comprise at least one data character block, perform no processing on the data character block among the four data blocks, and retain the data character block among the data blocks; and output the processed data blocks, wherein the processed data blocks comprise the second synchronization head, the control character block location mapping code, the second control character block that is obtained after the conversion, and a data block of the data character block.

16. An optical network device, wherein the optical network device comprises:

a third interface unit, configured to receive a data stream from a physical medium dependent layer at a line rate, wherein the data stream is a data stream on which 32-bit to 34-bit encoding has been performed;

a second bit width converter, configured to perform bit width conversion of 10-bit/34-bit on the received data stream;

a forward error correction decoder, configured to perform forward error correction decoding on the data stream on which the bit width conversion has been performed;

a 32-bit to 34-bit decoder, configured to perform 32-bit to 34-bit decoding on the data stream on which the forward error correction decoding has been performed;

an 8-bit/10-bit coder, configured to perform 8-bit/10-bit encoding on the data stream on which the 32-bit to 34-bit decoding has been performed; and

a fourth interface unit, configured to send the data stream on which the 8-bit/10-bit encoding has been performed to a physical medium attachment layer;

wherein the optical network device further configured to receive, before the forward error correction decoder performs forward error correction decoding on the data stream, sixty 34-bit data blocks, wherein the sixty 34-bit data blocks include: one 34-bit delimiter, the fifty-one 34-bit data blocks as the payload data, and the eight 34-bit parity blocks.

17. The optical network device according to claim 16, wherein the 32-bit to 34-bit decoder comprises:

a first parsing unit, configured to parse the data stream on which the forward error correction decoding has been performed, and output 51 data blocks, wherein any one of the data blocks is a second control character block or a data character block, any second control character block is a 4-bit binary code, and any data character block is an 8-bit binary code;

a second parsing unit, configured to parse any one of the data blocks, and obtain a synchronization head of the any one of the data blocks, wherein the synchronization head comprises: a first synchronization head or a second synchronization head, the first synchronization head comprises a 2-bit first identifier, the first identifier is used to identify that the data blocks are all data character blocks, the second synchronization head comprises a 2-bit second identifier, and the second identifier is used to identify that at least one second control character block exists among the data blocks; and

a second determining unit, configured to determine whether the synchronization head of the any one of the data blocks is a first synchronization head or a second synchronization head.

18. The optical network device according to claim 16, wherein the 32-bit to 34-bit decoder further comprises:

a third processing unit, configured to: if the synchronization head is a first synchronization head, delete the first synchronization head, and output the data blocks from which the first synchronization head is deleted.

19. The optical network device according to claim 16, wherein the 32-bit to 34-bit decoder further comprises a fourth processing unit, and the fourth processing unit specifically comprises:

a mapping code parsing unit, configured to: if the synchronization head is a second synchronization head, parse the data blocks, and obtain a 4-bit control character block location mapping code;

a second control character converting unit, configured to obtain a quantity of the second control character blocks among the data blocks and a location of the second control character block among the data blocks according to the control character block location mapping code; and correspondingly convert the second control character block among the data blocks into an 8-bit first control character block according to the quantity of the second control character blocks and the location of the second control character block among the data blocks;

a synchronization head deleting unit, configured to delete the second synchronization head and the control character block location mapping code from the data blocks, wherein the control character block location mapping code is in a location after the second synchronization head and closely adjacent to the second synchronization head; and

a second outputting unit, configured to output the processed data blocks, wherein the processed data blocks comprise: the first control character block and/or the data character block, and any first control character block or any data character block is an 8-bit binary code.

20. A communications system, wherein the communications system comprises:: any one of the optical network devices according to claims 11-15 and any one of the optical network devices according to claims16-19.