

Claims

WHAT IS CLAIMED

1. A computer peripheral device (100) comprising
 - computer peripheral function circuitry (101) to provide one or more predefined peripheral functions to a computer (10);
 - a human interface to receive and/or to present data from or to a user;
 - an encoder (110) to encode a datastream using the data;
 - a communication circuitry configured to implement a wireless data communication with a receiver device (200) to couple to the computer (10), the communication circuitry further configured to:
 - transmit the datastream in accordance with a wireless communication protocol, wherein the communication protocol operates with a first frequency band (B1) and a second frequency band (B2), which are non-overlapping, one being located in a lower frequency range than the other, wherein each of the first and second frequency bands (B1, B2) is divided into a plurality of sub-bands, and wherein each sub-band of the plurality of sub-bands is further divided into a plurality of frequency channels,
 - wherein transmitting the datastream in accordance with the wireless communication protocol comprises
 - transmitting data of the datastream via an operation frequency channel during a first time slot (TS1) and a second time slot (TS2), wherein the first time slot (TS1) and the second time slot (TS2) have fixed durations and alternate in a periodic sequence;
 - wherein, during the first time slot (TS1), the operation frequency channel is a first operation frequency channel (1CH_n) selected according to a first frequency hopping sequence (S1) from one frequency channel of the plurality of frequency channels of one sub-band of the plurality of sub-bands (1SB) of the first frequency band (B1),
 - wherein the first operation frequency channel (1CH_n) is selected as a next first operation frequency channel (1CH_{n+1}) of the first frequency hopping sequence (S1) due to a first error condition becoming satisfied,
 - wherein during the second time slot (TS2), the operation frequency channel is a second operation frequency channel (2CH_n) selected according to a second

frequency hopping sequence (S2) from one frequency channel of the plurality of frequency channels of one sub-band of the plurality of sub-bands (2SB) of the second frequency band (B2),

wherein the second operation frequency channel (2CH) is selected as a next second operation frequency channel (2CH_{n+1}) due to a second error condition becoming satisfied,

wherein any two adjacent frequency channels of the first frequency hopping sequence (S1) or any two adjacent frequency channels of the second frequency hopping sequence (S2) are of different sub-bands.

2. The computer peripheral device (100) of claim 1, wherein the communication unit comprises:

a first transmitter (Tx1) configured to transmit first data (UL1) of the datastream over the operation frequency channel (14);

a first receiver (Rx1) configured to receive second data (DL1);

a first frequency channel selector (140) configured to select the operation frequency channel (14) as the first operation frequency channel (1CH_n), and configured to select the operation frequency channel (14) as the second operation frequency channel (2CH_n) in accordance to the wireless communication protocol.

3. The computer peripheral device (100) of claim 1 or claim 2, further comprising a comparator configured to carry out a determination whether the second data (DL1) comprises a confirmation (ACK1, ACK2) of receipt of the first data (UL1) by the receiver device (200) for the respective time slot.

4. The computer peripheral device (100) of claim 3, wherein the first error condition becomes satisfied when the determination fails to confirm the receipt of the first data (UL1) for the first operation frequency channel (1CH_n), and a count of determination failures for said frequency channel exceeds a first pre-determined threshold.

5. The computer peripheral device (100) of claim 3 or claim 4, wherein the second error condition becomes satisfied when the determination fails to confirm the receipt of the first

data (UL1) for the second operation frequency channel (2CHn), and a count of determination failures for said frequency channel exceeds a second pre-determined threshold.

6. The computer peripheral device (100) of any of the previous claims, wherein each of the first time slot (TS1) and the second time slot (TS2) has a same fixed duration selected from 10 microseconds to 10 milliseconds.

7. The computer peripheral device (100) of any of the previous claims, further comprising a hopping sequence generator (250) configured to generate the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2).

8. The computer peripheral device (100) of claim 7, wherein the hopping sequence generator (250) is configured to dynamically update the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2).

9. The computer peripheral device (100) of claim 7 or claim 8, wherein the hopping sequence generator (250) is configured to transmit the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2) over the operation frequency channel to the receiver device (200).

10. The computer peripheral device (100) of any of the previous claims, wherein the first frequency channel selector (140) is configured to store or update each of the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2) with a new first frequency hopping sequence (S1) and a new second frequency hopping sequence (S2) received by the first receiver (Rx1) from the receiver device (200).

11. The computer peripheral device (100) of any of claims 1 to 10 being a human interface device such as a computer mouse (101) or a keyboard.

12. A receiver device (200) being coupleable to a computer (10), and including a communication circuitry configured to implement a wireless data communication with the computer peripheral device (100) according to any of the previous claims.

13. The receiver device (200) of claim 12, further comprising a determination circuit to carry out a determination whether first data (UL1) was received and transmit a confirmation (ACK1, ACK2) of receipt of the first data (UL1) to the computer peripheral device (100).

14. The receiver device (200) of claim 13, wherein the first error condition becomes satisfied when the determination fails to confirm the receipt of the first data (UL1) for the first operation frequency channel (1CHn), and a count of determination failures for said frequency channel exceeds a first pre-determined threshold.

15. The receiver device (200) of claim 13 or claim 14, wherein the second error condition becomes satisfied when the determination fails to confirm the receipt of the first data (UL1) for the second operation frequency channel (2CHn), and a count of determination failures for said frequency channel exceeds a second pre-determined threshold.

16. The receiver device (200) of any of the previous claims, further comprising a hopping sequence generator (250) configured to generate the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2).

17. The receiver device (200) of claim 16, wherein the hopping sequence generator (250) is configured to dynamically update the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2).

18. The receiver device (200) of claim 15 or claim 16, wherein the hopping sequence generator (250) is configured to transmit the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2) over the operation frequency channel to the computer peripheral device (100).

19. The receiver device (200) of any of the previous claims, wherein the first frequency channel selector (140) is configured to store or update each of the first frequency hopping sequence (S1) and the second frequency hopping sequence (S2) with a new first frequency

hopping sequence (S1) and a new second frequency hopping sequence (S2) received by the second receiver (Rx2) from the computer peripheral device (100).

20. A wireless data communication method (300), for communication between a computer peripheral device (100) and a receiver device (200), comprising:

transmitting a datastream (350) from a computer peripheral device (100) to a receiver device (200), in accordance with a wireless communication protocol,

wherein the communication protocol operates with a first frequency band (B1) and a second frequency band (B2), which are non-overlapping, one being located in a lower frequency range than the other, wherein each of the first and second frequency bands (B1, B2) is divided into a plurality of sub-bands, and wherein each sub-band of the plurality of sub-bands is further divided into a plurality of frequency channels,

wherein transmitting the datastream in accordance with the wireless communication protocol comprises

transmitting data of the datastream via an operation frequency channel during a first time slot (TS1) and a second time slot (TS2), wherein the first time slot (TS1) and the second time slot (TS2) have fixed durations and alternate in a periodic sequence;

wherein, during the first time slot (TS1), the operation frequency channel is a first operation frequency channel (1CH_n) selected according to a first frequency hopping sequence (S1) from one frequency channel of the plurality of frequency channels of one sub-band of the plurality of sub-bands (1SB) of the first frequency band (B1),

wherein the first operation frequency channel (1CH_n) is selected as a next first operation frequency channel (1CH_{n+1}) of the first frequency hopping sequence (S1) due to a first error condition becoming satisfied,

wherein during the second time slot (TS2), the operation frequency channel is a second operation frequency channel (2CH_n) selected according to a second frequency hopping sequence (S2) from one frequency channel of the plurality of frequency channels of one sub-band of the plurality of sub-bands (2SB) of the second frequency band (B2),

wherein the second operation frequency channel (2CH) is selected as a next second operation frequency channel (2CH_{n+1}) due to a second error condition becoming satisfied,

wherein any two adjacent frequency channels of the first frequency hopping sequence (S1) or any two adjacent frequency channels of the second frequency hopping sequence (S2) are of different sub-bands.

21. The wireless data communication method (300) of claim 20, wherein each of the first time slot (TS1) and the second time slot (TS2) has a fixed duration selected from 10 microseconds to 10 milliseconds.

22. The wireless data communication method (300) of claim 20 or claim 21, wherein a count of failed transmissions has exceeded a pre-determined threshold for the operation frequency channel, and thereby the first error condition has become satisfied.

23. The wireless data communication method (300) of claim 20, wherein the count of failed transmissions is carried out concurrently by the computer peripheral device (100) and by the receiver device (200).

24. The wireless data communication method (300) of any one of claims 20 to 23, wherein selecting the first operation frequency channel (1CH_n) as a next first operation frequency channel (1CH_{n+1}) or selecting the second operation frequency channel (2CH_n) as a next second operation frequency channel (2CH_{n+1}) is carried out by a first frequency channel selector (140) comprised by the computer peripheral device (100), and concurrently, by a second frequency channel selector (240) comprised by the receiver device (200).

25. The wireless data communication method (300) of any one of claims 20 to 24, wherein the peripheral device (100) is human interface device such as a computer mouse (101) or a keyboard.

26. The wireless data communication method (300) of any one of claims 20 to 25, wherein the receiver device (200) is a USB dongle (201).