

Claims

1. A light fidelity (Li-Fi) communication device comprising:
a communication interface arranged for selectively connecting to an
5 electronic device; and
a transceiver module connected to the communication interface and
arranged for selectively connecting at least one illumination element and at
least one photodetector thereto,
wherein the transceiver module is configured for:
10 converting uplink data signals received from the electronic device
to uplink driving signals that control the illumination element to transmit
uplink optical signals; and
converting downlink detection signals received from the
photodetector to downlink data signals for transmission to the electronic
15 device, the downlink detection signals converted from downlink optical
signals detected by the photodetector.
2. The device according to claim 1, further comprising the illumination element
and photodetector selectively connected to the transceiver module by respective
20 cables, the transceiver module comprising a transmitter circuit and a receiver circuit
connecting the communication interface to the illumination element and photodetector,
respectively.
3. The device according to claim 2, wherein the receiver circuit comprises a single-
to-differential conversion circuit element.
- 25 4. The device according to claim 2 or 3, wherein the receiver circuit comprises a
limiting amplifier circuit element.
5. The device according to any one of claims 2 to 4, wherein the receiver circuit
30 comprises a differential amplifier circuit element.
6. The device according to claim 1, further comprising the illumination element
and photodetector selectively connected to the transceiver module such that they are

integrally formed with the transceiver module, the transceiver module comprising a transmitter circuit and a receiver circuit connecting the communication interface to the illumination element and photodetector, respectively.

5 7. The device according to claim 6, wherein the receiver circuit comprises a trans-impedance amplifier circuit element.

8. The device according to claim 6 or 7, wherein the receiver circuit comprises a noise filtering circuit element.

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9. The device according to any one of claims 2 to 8, wherein the transmitter circuit comprises a bias and amplitude adjustment circuit element.

10. The device according to any one of claims 2 to 9, wherein the transmitter circuit
15 comprises a buffer circuit element.

11. The device according to any one of claims 2 to 10, wherein the transmitter circuit comprises an operational amplifier circuit element and/or a voltage regulator circuit element.

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12. The device according to any one of claims 2 to 11, wherein the illumination element and photodetector are combined into an integrated component.

13. The device according to any one of claims 1 to 12, further comprising a set of
25 optical elements for optical adjustment of the optical signals.

14. The device according to any one of claims 1 to 13, further comprising a battery power source or a power connector for selectively connecting to an external power source.

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15. The device according to any one of claims 1 to 14, wherein the communication interface is configured for a Power-over-Ethernet (PoE) connection.

16. A light fidelity (Li-Fi) communication system comprising:

a communication network comprising a set of network interfaces; and
a set of remote Li-Fi communication devices communicatively connected

within the communication network, each remote Li-Fi communication device
comprising:

a communication interface selectively connected to a respective
network interface;

a transceiver module connected to the communication interface;

at least one illumination element selectively connected to the
transceiver module; and

at least one photodetector selectively connected to the
transceiver module,

wherein each transceiver module is configured for:

converting downlink data signals received from the
communication network to downlink driving signals that control the
illumination element to transmit downlink optical signals; and

converting uplink detection signals received from the
photodetector to uplink data signals for transmission to the
communication network, the uplink detection signals converted from
uplink optical signals detected by the photodetector; and

wherein the downlink optical signals are transmitted to a set of local Li-Fi
communication devices and the uplink optical signals are transmitted from
the local Li-Fi communication devices.

17. The system according to claim 16, wherein the transceiver module of each
remote Li-Fi communication device comprises a transmitter circuit and a receiver
circuit according to any one of claims 2 to 11.

18. The system according to claim 16 or 17, wherein the illumination element and
photodetector of each remote L-Fi communication device are combined into an
integrated component.

19. The system according to any one of claims 16 to 18, further comprising a set of optical elements for optical adjustment of the optical signals.
20. The system according to any one of claims 16 to 19, wherein the
5 communication interface of each remote L-Fi communication device is configured for a Power-over-Ethernet (PoE) connection.