mapped to different values for the modulation, e.g. to the different phase changes employed in a π/4-DQPSK modulation scheme.

Advantageously, a modulator according to the invention is moreover able to support two different modulation schemes. These two modulation schemes can then be applied to signals that are to be transmitted alternatively, depending on the desired connection. They can also be applied in parallel, the currently appropriately modulated signals then being selected for transmission. If employed in a Bluetooth™ system, the second modulation scheme should be the GFSK modulation scheme defined in the current Bluetooth™ specification.

In case two modulation schemes are supported, a first lookup table can be provided for a mapping according to the invention, and a second lookup table can provided for a mapping for a conventional modulation scheme. A new modulator supplied with these two lookup tables is then able to modulate signals that are to be transmitted with the modulation scheme available at another device with which it wants to communicate.

BRIEF DESCRIPTION OF THE FIGURES

In the following, the invention is explained in more detail with reference to drawings, of which

FIG. **1** shows a block diagram of a modulator for an embodiment of a device according to the invention;

FIG. **2** illustrates the employment of different sets of a single modulation scheme for one packet;

FIG. **3** is a schematic block diagram showing components of an overall demodulator; and

FIG. **4** is a diagram showing a communication system according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** shows a block diagram of a modulator for an embodiment of an electronic device according to the invention. The device can be employed as master or slave in a Bluetooth™ piconet and supports connections using the medium data rate according to the current Bluetooth™ specification and as well connections using a higher data rate according to the invention.

The modulator of FIG. **1** comprises a first modulation block **11** including a 2-GFSK lookup table and a second modulation block **12** including a π/4-DQPSK lookup table. Both modulation blocks **11**, **12** have an input to which binary data can be fed. The second modulation block **12** has an additional input for a control signal. The output of both modulation blocks **11**, **12** is connected to a modulation switch **13**. The modulation switch **13** is further connected to a digital-to-analogue converter DAC **14**. The output of the DAC **14** forms the output of the modulator and is connected to radio transmitting means of a Bluetooth™ device which are not depicted in the figure.

The Bluetooth™ device with the depicted modulator is presently supposed to be employed as master in a piconet comprising as well other equivalent devices as current Bluetooth™ devices.

Binary data that is to be transmitted by the device is forwarded to both modulation blocks **11**, **12**.

In the first modulation block **11**, the input bits are modulated with a conventional 2-GFSK modulation scheme including a mapping based on the provided 2-GFSK lookup table. The mapping is carried out according to the requirements in the current Bluetooth™ specification. Each bit is mapped separately and equally for an entire packet. The modulation in the first modulation block **11** enables transmissions with a gross medium data rate of 1 Mbit/s and is carried out for communications with current Bluetooth™ devices.

The second modulation block **12** is provided for enabling transmissions with a gross medium data rate of 2 Mbit/s for connections with other Bluetooth™ devices equipped according to the invention. The binary data input to this modulation block **12** is modulated to this end with a π/4-DQPSK modulation scheme including a mapping based on the included π/4-DQPSK lookup table. Instead of a single bit, always a set of two consecutive bits b_0, b_1 is mapped to a phase change in degrees according to the following table, which corresponds to the lookup table:

Binary data (b_0, b_1)	Phase change (deg)
(1, 1)	+135
(1, 0)	+45
(0, 0)	−45
(0, 1)	−135

The above lookup table is used in the second modulation block **12** for all data of a packet, but the respective two consecutive bits b_0, b_1 employed for the access code and header entities differ from those employed for the payload entity. For the modulation of the signals destined for an access code or header entity, each incoming bit is used as a first bit b_0 of a set of two consecutive bits, while a second bit b_1 always set to '0' is added after each incoming bit for the respective set of bits b_0, b_1. Therefore, only +45 and −45 degree phase changes can result for the access code and header signals according to the above depicted table. For each payload entity, in contrast, the bits input to the second modulation block **12** are alternately used as first and second bit b_0, b_1. Thus, for these payload bits, any combination of binary data of the first column of the above depicted table can occur. Consequently, the mapping can result in each of the four different phase changes of the second column of the above table.

The second modulation block **12** is informed about the transition from the access code and header entities to the payload entity by a payload start indication fed to the control input of the second modulation block **12**. Since the actual modulation scheme does not have to be changed, which is always π/4-DQPSK, the switching can be carried out without any delay. The further processing of the resulting phase changes in the second modulation block corresponds to a conventional π/4-DQPSK modulation employing raised cosine pulses with a roll-off factor of 0.8.

FIG. **2** shows the structure of a Bluetooth™packet with an indication of the modulation scheme employed by the second modulation block **12** of FIG. **1**. A first section **21** of the packet contains the access code entity and the header entity, while a second section **22** of the packet corresponds to the payload entity. The signals in the first section **21** of the depicted packet were modulated with a reduced π/4-DQPSK modulation scheme using only a subset of the possible phase changes, while the signals in the second section **22** were modulated with the entire set of the employed π/4-DQPSK modulation scheme.

The modulated signals output by the two modulation blocks **11**, **12** of the modulator of FIG. **1** are then provided to the modulation switch **13** of the modulator. Depending on the data rate suited for the present connection, the modulation switch **13** selects the signals of one of the modulation blocks **11**, **12** and forwards them to the DAC **14**. The DAC **14**