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**Datasheet for the decision  
of 3 May 2021**

**Case Number:** T 0210/19 - 3.5.07

**Application Number:** 11747930.3

**Publication Number:** 2538843

**IPC:** G06F17/40, A61B5/00, A61B5/022

**Language of the proceedings:** EN

**Title of invention:**  
BODY PARAMETER SENSOR AND MONITOR INTERFACE

**Patent Proprietor:**  
Edwards Lifesciences Corporation

**Opponent:**  
Pulsion Medical Systems SE

**Headword:**  
Body parameter sensor/EDWARDS LIFESCIENCES CORPORATION

**Relevant legal provisions:**  
EPC Art. 54, 56

**Keyword:**  
Claims - main and first to fourth auxiliary requests -  
Inventive step - (no)  
Procedural violation - violation of the right to be heard (no)



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Case Number: T 0210/19 - 3.5.07

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.07**  
**of 3 May 2021**

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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 23 November  
2018 rejecting the opposition filed against  
European patent No. 2538843 pursuant to Article  
101(2) EPC.**

**Composition of the Board:**

**Chair** J. Geschwind  
**Members:** C. Barel-Faucheux  
P. San-Bento Furtado

## Summary of Facts and Submissions

- I. The appeal was filed by the opponent (appellant) against the decision of the opposition division to reject the opposition to EP 2 538 843. This had been filed as international application number PCT/US2011/025738 and published as WO 2011/106318, with the European patent application number 11747930.3 (hereinafter "the contested patent"). It claims a priority date of 24 February 2010.
- II. The board referred in particular to the following documents:
- D1: US 2007/0043275 A1, published on 22 February 2007;
  - D4: US 6 308 089 B1, published on 23 October 2001;
  - D22: DS28E01-100, "1Kb Protected 1-Wire EEPROM with SHA-1 Engine", maxim integrated;
  - D23: "Authentication & Data Security Design Guide" by Maxim Integrated Products, Inc., edition of January 2009.
- III. The opposition division decided that the subject-matter of the claims as granted was novel and involved an inventive step.
- IV. In the statement of grounds of appeal, the appellant requested that the decision under appeal be set aside and that the patent be revoked.
- It introduced also the following documents:
- D25: "The New Oxford Dictionary of English", Oxford University Press, page 113, published in 1998;
  - D26: Lexikon Informatik und Kommunikationstechnik, VDI Verlag, Düsseldorf, page 41, published in 1990.

The appellant argued that document D1 disclosed all the features of claim 1 of the contested patent, that the subject-matter of this claim 1 lacked, at the least, an inventive step over the disclosure of document D1 or over document D1 in combination with document D4, or document D1 in combination with document D23.

The appellant argued that its right to be heard had not been respected because the opposition division had not taken into account one of the opponent's arguments, some statements of the decision under appeal had come as a surprise, and the opposition division had not established a clear opinion on what an authentication was and whether D4 related to authentication.

- V. In the letter dated 19 August 2019 in reply to the grounds of appeal, the patent proprietor (respondent) requested that the appeal be dismissed or, in the alternative, that the patent be maintained on the basis of one of the first to fourth auxiliary requests filed with the letter of reply. The respondent argued that documents D25 and D26 were filed late and should not be admitted into the appeal proceedings. It also disputed that document D22 constituted prior art in the light of the invention, since, according to the respondent, it had been published in 2012, i.e. after the priority date of the contested patent.
- VI. In a further letter dated 9 April 2020, the appellant confirmed its request and made further submissions.
- VII. In a communication pursuant to Article 15(1) RBPA, the board expressed its preliminary opinion that the subject-matter of claim 1 of the main request was novel

over document D1 (Article 54 EPC), but was not inventive over a combination of D1, D4 and the common general knowledge of the skilled person (Article 56 EPC). The board was further of the preliminary opinion that the subject-matter of claim 1 of each of the first to fourth auxiliary requests was not inventive with regard to a combination of D1 with D4 and the common general knowledge of the skilled person. Furthermore, the board considered the admissibility of documents D25 and D26 questionable under Article 12(4) RPBA 2007. The board did not agree with the appellant's arguments that the opposition division had not respected its right to be heard.

VIII. In a letter of reply dated 2 April 2021, the appellant provided further arguments asserting that its right to be heard had been breached and in support of a request for refund of the appeal fee (citing decisions T 763/04, R 16/13 and R 15/12).

In a letter of reply dated 6 April 2021, the respondent provided further arguments and filed a fifth auxiliary request.

IX. Oral proceedings with the parties were held as scheduled, by videoconference. The parties had agreed to hold the oral proceedings by these means. At the end of the oral proceedings, the Chair pronounced the board's decision.

X. During oral proceedings, the respondent withdrew its fifth auxiliary request.

XI. The appellant (opponent) requested that the decision under appeal be set aside and that the European patent

be revoked. It further requested reimbursement of the appeal fee.

XII. The respondent (patent proprietor) requested that the appeal be dismissed or, alternatively, that the patent be maintained on the basis of one of the first to fourth auxiliary requests filed with the letter of 19 August 2019.

XIII. Claim 1 of the main request (patent as granted) reads as follows (itemisation added by the board):

(E1) "A system (10) for sensing a physiological parameter for use in conjunction with a remote processor that is external to the sensing system (10),

(E2) in which sensing signals are stored in memory at a sensor (12) with which the sensing was performed, the system (10) comprising:

(E3) a physiological sensor (12) adapted to output a sensor signal representative of a sensed physiological parameter, for processing by the remote processor;

**characterized by** further comprising:

(E4) a microcontroller (16) located locally and fixedly attached to the sensor (12),

(E4.1) the microcontroller (16) having a first memory (14) and a second memory (22);

(E5) an authentication algorithm stored in the first memory (14) and configured to engage in an authentication process to authenticate the sensor (12) when queried by the remote processor;

(E6) wherein the second memory (22) is configured to receive and store data representative of a sensed physiological parameter after data from the sensor (12) has been processed by the remote processor; and

(E7) the microcontroller (16) is configured to communicate with the remote processor using a protocol employing a single wire."

XIV. Claim 1 of the first auxiliary request adds the following text after "remote processor" at the end of (E6): ", the second memory (22) configured to store a history of biomedical data of a patient over a predetermined period of time".

XV. Claim 1 of the second auxiliary request adds the following text at the end of (E4.1) of claim 1 of the first auxiliary request: ", the second memory (22) comprising a single wire interface memory".

XVI. Claim 1 of the third auxiliary request adds the following text to claim 1 of the first auxiliary request at the end of feature (E4.1): ", the first memory (14) and the second memory (22) each comprising a single wire interface memory".

XVII. Claim 1 of the fourth auxiliary request differs from claim 1 of the third auxiliary request in that it adds the following text at the end of (E5): ", wherein the authentication algorithm comprises a challenge-and-response hash algorithm".

XVIII. The parties' arguments, where relevant to this decision, are addressed in detail below.

## **Reasons for the Decision**

### *Context of the invention*

1. The invention relates to physiological sensors.

Data from a physiological sensor 12 is communicated over a cable 20 to a patient monitor 18, at which one or more processors process the raw signals from the sensor. The patient monitor 18 then sends all or selected portions of the processed data over a single wire 20e to the microcontroller 16, which stores the data in the sensor memory 22. A single wire protocol is used to transmit and receive data. For example, a pressure sensor may output raw signals to the patient monitor 18, which then calculates cardiac pressure values (paragraphs [0046] and [0038]).

2. With the statement of grounds (page 5, last paragraph), the appellant filed **documents D25 and D26** to illustrate the generally accepted meaning of the term "authentication".

The appellant concluded that "[i]n other words, any process used to verify an identity is an authentication process, regardless how simple or sophisticated such a process is. Any algorithm enabling an authentication process is an authentication algorithm".

In its letter of reply to the statement of grounds, the respondent objected to the admissibility of these documents considering that they were late-filed and had to be disregarded, as they did not go beyond the discussion of the technical meaning of the terms identification, encryption, authentication, authorisation etc. during the opposition proceedings.

The definitions of identification and authentication as "means by which a user provides a claimed identity to a system" and "means of establishing the validity of this claim", respectively, had already been introduced into the proceedings before the opposition division (see the contested decision page 8, first respondent's letter of



reply to the appeal, page 2). The board agrees with these definitions of identification and authentication in the context of the present case. Thus a reference to documents D25 and 26 is not necessary.

As a consequence, during the oral proceedings, the Chair expressed the board's opinion that there was no need to discuss the admissibility of documents D25 and D26 into the proceedings. The parties did not contest this.

### **A. Main Request - patent as granted**

#### **Novelty over D1 - claim 1**

#### **3. Features E1, E2 and E3**

3.1 D1 discloses a physiological measurement system 100 including a monitor 110 coupled via an electrical cable 128 to a sensor 130. The sensor may be a pulse oximeter, a sensor for temperature, heart rate or blood pressure, or other type of physiological sensor (paragraph [0016] and Figure 1). For example, for estimating blood oxygen saturation, light from light sources at two or more wavelengths (e.g. red and infrared) is transmitted through a patient's blood-perfused tissues (e.g. in a finger) and detected by a photo-detector. The light sources and photo-detector are typically housed within the sensor. The detected optical signal is then provided to the monitor for processing (paragraphs [0017], [0018] and Figure 2).

During normal operation, when the sensor is plugged into the monitor, the monitor receives the signal from the photo-detector within the sensor and processes this signal to obtain the desired physiological data

(paragraph [0028]). The physiological data is processed, displayed, and stored in the monitor (paragraph [0029]).

Thus, D1 discloses a system as defined by **feature E1** and a physical sensor with the characteristics defined by **feature E3**.

3.2 In the monitor 110 of the physiological measurement system 100 of D1, a buffer 260 stores the data for further processing. In an implementation, as buffer 260 periodically fills up, a processor 262 directs the transfer of the data from buffer 260 into a memory 266 of the monitor 110 (paragraph [0019] in conjunction with Figure 2). The sensor 130 may store historical physiological data and provide the data when requested. In particular, sensor 130 includes a memory 236 (e.g. a memory chip) coupled to an interface circuit 238. Through interface circuits 238 (within sensor 130) and 268 (within monitor 110), physiological data is transferred between monitor 110 and sensor 130 (paragraph [0020]; Figure 2).

Patient-specific data such as trending data or patient monitoring parameters can be actively stored in memory 236. As the patient and sensor travel from ward to ward of a hospital, and consequently plug into different oximeters, for example, the patient-specific data can be read from memory 236 of the patient's dedicated sensor and displayed on a display screen for viewing or used by the oximeter monitor (paragraph [0024]). Patient's trending data regarding the history of a patient's blood oxygen saturation level, pulse rate, pulse amplitude, perfusion data, and other patient data over a period of time can be recorded in memory 236. The oximeter monitor can continuously or

periodically store a patient's current trend data in memory 236 to maintain historical data for the patient (paragraph [0025]).

As another example, the lowest and/or highest blood oxygen saturation level, pulse rate, pulse amplitude value, temperature data, blood pressure, perfusion data, or any other patient data during the monitored time may be stored in memory 236 by the oximeter monitor (paragraph [0026]). The physiological data is processed, displayed, and stored in the monitor; in addition, this physiological data is provided to the sensor for storage in the memory 236 associated with the sensor (paragraph [0029]). The saturation data for a particular patient is processed by the monitor attached to the sensor, and the processed data is provided to the sensor for storage in the sensor memory (paragraph [0045]).

3.3 Therefore, D1 discloses **feature E2**.

3.4 The board therefore agrees that document D1 discloses the non-characterising **features E1, E2 and E3** of claim 1. This was also stated in the decision under appeal, page 5, point 2.2.1 and mentioned in the board's communication, and was not contested by the parties.

#### **4. Features E4 and E4.1**

4.1 In the grounds of appeal the appellant stated that a "microcontroller" was a term used to describe "a microprocessor and a memory together on a single chip" (page 3, first paragraph). The respondent contended that a microcontroller was a computer on a single chip that included a processor core, a memory

and I/O peripherals, while microprocessor's peripherals (ROM/RAM serial interface, timers, and I/O ports) were external to the microprocessor (letter of reply dated 6 April 2021, page 2, second full paragraph).

4.2 The respondent further argued that utilisation of a microcontroller was "only disclosed in D1 in connection with the monitor" (letter of reply to the statement of grounds, page 3, second paragraph).

4.3 The appellant asserted that the application itself had presented different alternative implementations with a microcontroller or a microprocessor in paragraphs [0052] and [0053] of the patent application as published. Which implementation was used was not relevant to the functionality supported.

The respondent acknowledged that the patent application confused the terms "microcontroller" and "microprocessor", for instance in those two paragraphs. It stated that the mistake was, however, obvious under Rule 139 EPC (letter dated 6 April 2021, page 2, third full paragraph). At the oral proceedings it further argued that the claims did not have to be interpreted on the basis of those two paragraphs, which no longer appeared in the patent specification.

4.4 The board considers the "processor core" in a microcontroller as falling within the definition of a "microprocessor" given by the respondent.

4.5 D1 discloses that, when the physiological data is compressed before storage in the sensor memory, the compression encoding circuit can be on the sensor itself (paragraph [0046]). Paragraph [0113] teaches that "minimal circuitry in the sensor could be used to

do sufficient processing to tell the monitor when to wake up".

Paragraph [0046] implicitly discloses that a processor is present in the sensor in some embodiments, since the skilled person concludes that a compression encoding circuit for compressing the physiological data implemented on the sensor itself is implemented as a processor together with a memory. As explained above, the sensor of D1 also includes I/O peripherals. However, it is not explicitly stated that these components, which form a controller, are together on a single microcontroller chip.

4.6 Therefore, the board concludes that D1 does not fully disclose **feature E4**, but discloses:

(E4') a controller, including a processor, located locally and fixedly attached to the sensor.

4.7 Paragraph [0024] of D1 states that "[m]emory 236 may, for example, be implemented as a random access memory (RAM), a FLASH memory, a programmable read only memory (PROM), an electrically erasable PROM, a similar programmable and/or erasable memory, any kind of erasable memory, a write once memory, or other memory technologies capable of write operations".

The board concurs with the opposition division's reasoning that, "depending upon the type of memory considered and the way it is configured, a 'single' memory device may be regarded as comprising a plurality of physically different memory spaces, and conversely, a plurality of different memory devices physically connected together may constitute a single memory space" (see decision page 7, point 2.2.3. (i)).

The board also agrees with the appellant's argument that a first and a second memory can be different address spaces within the same memory chip or the same memory module of an integrated circuit, and that storing an algorithm (for example a compression or authentication algorithm) and data representative of a sensed physiological parameter concurrently entails storing the former in a first memory space and the latter in a second memory space.

Consequently, D1 discloses at least implicitly (see also paragraph [0025] of D1) **feature E4.1'**:

- the controller having a first memory and a second memory.

## 5. **Feature E6**

- 5.1 According to the decision under appeal (page 8, point 2.2.5), feature E6 is disclosed in paragraphs [0025] and [0038] of D1.
- 5.2 Paragraph [0025] of D1 discloses that "[p]atient trending data regarding the history of a patient's blood oxygen saturation (SpO2) level [...] and other patient data over a period of time can be recorded in memory 236. The oximeter monitor can continuously or periodically store a patient's current trend data into memory 236 to maintain a historical data for the patient". Paragraph [0038] discloses that "[t]he pulse amplitude of the measured photoplethysmogram is an indirect measure of blood perfusion (flow) in the local tissue, changes in blood pressure, vascular tone, vasoconstriction or dilation, for example, all have an effect on the pulsatile signal strength observed with a pulse oximeter. The measured modulation, or other

measurement of perfusion, can be stored in memory 236 for patient trending purposes."

5.3 The board agrees with both the opposition division and the appellant that **feature E6** is disclosed in document **D1** (see item 5.1 above). The appealed decision stated that this had not been disputed by the patentee (see decision, page 8, point 2.2.5.). It is further noted that, in the appeal proceedings, feature E6 has not been expressly identified by the respondent as a distinguishing feature with regard to document D1.

## 6. **Feature E5**

6.1 The respondent maintained its opinion, expressed in the first-instance proceedings, that means of identification were "means by which a user provides a claimed identity to a system", whereas means for authentication were the "means of establishing validity of that claim". It argued that D1 addressed encryption but only for authorisation, which was different from authentication, and that "[f]rom the context of D1, it is apparent that the mention of 'authorized devices' was not used in its technical strict sense, similarly to the formulation that a monitor is 'not certified'". In that context, "authorized" expressed merely that the respective device held the correct keys. Changeable keys protected confidentiality better, but were not as such sufficient disclosure of an "authorization algorithm" (letter of reply to the statement of grounds, page 3, first paragraph). Document D1 did not disclose either authentication or feature E5.

6.2 The appellant argued that the term "authentication" in claim 1 could be interpreted broadly because it was not further specified in the claim. The contested patent,

including claim 6, described a challenge-and-response hash algorithm as an authentication algorithm (paragraph [0040]), whereas claim 1 was not limited to any specific implementation. As was supported by paragraph [0049], claim 1 did not limit the "authentication algorithm" to authentication of a single, specific sensor. It was enough to determine that the sensor was of a specific type or manufacturer. The same was disclosed in paragraph [0081] of document D1, which described data encryption with public and private keys used for the same purpose as that of the invention. The combination of encryption and deciphering data so that only authorised devices were supported directly disclosed authentication.

In the invention it was not even possible to identify individual sensors with the described algorithm, since it was impossible to store any possible ID or possible response in a monitor that was manufactured a long time before the individual sensors were manufactured and that should be used for many years, for example in a hospital. The responses provided by the sensors therefore had to be limited to specific pre-determined responses instead of IDs that identify the individual sensor unit.

6.3 The board agrees with the respondent that authentication, authorisation, and encryption are different concepts, even if they are often used together. Feature E5 explicitly specifies that the "authentication algorithm [is] configured to engage in an authentication process to authenticate the sensor". It is therefore clear that the sensor itself is identified and not only the group or type of sensor. The use of encryption "so that only authorized devices



are supported" in document D1 does not imply an authentication of the sensor itself.

6.4 Paragraph [0110] of D1 discloses that "[a] code can be stored in the sensor memory identifying the sensor manufacturer. This code can be read and used to indicate operability with monitors of other manufacturers, or to indicate any conversion algorithm that may be needed for a signal from a sensor to be used by a monitor from a different manufacturer. The code can also be used to allow only supported features to be used".

6.4.1 The board does not consider this as a disclosure of feature E5, since the code stored in the sensor memory identifies the manufacturer of the sensor but does not authenticate the sensor itself.

6.5 Therefore, the board concludes that feature E5 is **not disclosed either explicitly or implicitly** in document D1.

## 7. **Feature E7**

7.1 The appellant argued that paragraph [0022] of D1 taught that "interface circuits 238 [in the sensor] and 268 [in the monitor] interact via signal line(s) or wire(s) existing in conventional sensors and monitors" and that the singular form in the expression "signal wire(s)" anticipated feature E7.

7.2 However, a vague reference to a possible interaction via a signal line is not a disclosure of a single-wire protocol within the meaning of feature E7 of claim 1.

The board concurs with the opposition division that D1 does not disclose that the microcontroller of the sensor is configured to communicate with the remote processor "using a protocol employing a single wire" and hence that feature E7 is not disclosed in document D1.

8. Since document D1 does not disclose features E5 and E7 or parts of features E4 and E4.1, claim 1 of the main request is novel over document D1 (Article 54 EPC).

### **Inventive step**

9. The board concurs with the opposition division that **D1** represents the closest state of the art (see point 3.2 on page 14 of the decision).
10. From the novelty analysis given above it follows that the subject-matter of claim 1 differs from the disclosure of document D1 in that it includes features (E5) and (E7), and in that a microcontroller instead of a controller including a processor is used in features (E4) and (E4.1).

### **11. Objective technical problems**

- 11.1 The appellant argued that the distinguishing features did not achieve a synergistic effect. The technical effect of features E5, E4 and E4.1 could be achieved with any other communication solution (feature E7). The single-wire solution did not contribute to improving security. The appellant rejected the assertion of the decision under appeal that the single-wire protocol improved the security of the system due to the manner in which data collisions occurred. The appellant submitted that data collisions only limited the number

of devices that could send data at the same time and that it was always possible to eavesdrop on the data lines between the memory and the microcontroller without causing a data collision, for example with an oscilloscope or even with a further microcontroller that listened on the 1-Wire bus.

The appellant affirmed that the single-wire protocol provided a more efficient and elegant means for communication between a microcontroller and an external monitoring system. Feature E7 contributed to reducing the cabling and wiring effort in a system. The authentication of feature E5 was used to verify the identification provided by a sensor connected to the remote processor. At the oral proceedings, the appellant argued that there were two distinct technical problems: feature E5 solved the problem of improving security of the system, so that only authorised sensors were allowed; whereas feature E7 and the use of a microcontroller solved the technical problem of simplifying the implementation.

- 11.2 The respondent argued that the distinguishing features worked together in elevating the level of security. In addition to solving the problem of reliably checking the type of sensor, performed by the monitor before calibration (paragraph [0049] of the patent specification), the authentication process defined in E5 ensured that the remote processor only communicated with a genuine sensor. Sensors that were not genuine could leak sensitive patient data to malevolent third parties. An authentication process elevated the level of security. The microcontroller acted as a gatekeeper, further elevating the level of security, and feature E7 allowed for simple connections and reduced wiring. The fewer the wires, the fewer wires had to be secured.

11.3 In its letter of reply to the statement of grounds (page 2), the respondent argued that claim 1 employed a single wire for transmitting both authentication data and measurement data between the sensor and the remote processor. The measurement data was processed by the remote processor and then stored at the sensor. The utilisation of single-wire communication ensured that the remote processor could access the stored measurement data only after successful sensor authentication. A microcontroller controlled the single-wire communication.

11.3.1 In response to the argument that the utilisation of a single-wire communication ensured that the remote processor could access the stored measurement data only after successful sensor authentication, the appellant argued that corrupted firmware used in the microcontroller that did not perform a correct check for authentication could simply transmit the respective data over the single-wire bus without authentication. In this case, the single-wire bus would add nothing to the security of the data (response, pages 6 and 7).

It argued further that it was of no relevance at all which type of communication protocol was used to perform the authentication and subsequent data transmission. Instead, the person skilled in the art could choose any of a variety of communication systems available, such as a UART communication, a SPI/TWI communication, I2C communication or the like provided by the microcontrollers recited by the patentee in the description of the contested patent.

The board fails to see why the utilisation of a single-wire communication ensures that the remote processor

can access the stored measurement data only after successful sensor authentication.

- 11.4 The board is thus not convinced that the use of a single-wire protocol contributes to improving security for the reasons given by the appellant. Therefore, the board agrees with the appellant that the distinguishing features solve two distinct problems of improving security (feature E5) and simplifying implementation (the use of a microcontroller in features E4 and E4.1 and feature E7).

## **12. Inventive step of distinguishing features**

- 12.1 According to the appellant, the distinguishing features were well known to the skilled person and moreover disclosed in document D4.

Starting from D1, the skilled person, when presented with the problem of improving security, would simply resort to any of the well-known mechanisms for verifying the identification of a device, i.e. for authenticating a device, based on the common general knowledge in the art. A single-wire protocol was a well-known and widely used protocol at the effective filing date of the present application. In order to implement the system of D1 in a simplified manner, the skilled person would consider using an off-the-shelf microcontroller that supported the single-wire protocol.

The appellant further submitted that document D4 disclosed sensor authentication (column 2, last sentence, and column 5), using a memory DS2430A, which was a single-wire memory device (column 9) and in which

the memory comprised a microcontroller (column 3, lines 55 to 60).

- 12.2 The board agrees with the appellant that, at the priority date of the contested patent, the single-wire protocol was widely known, a microcontroller was a well-known efficient implementation option for a circuit including a processor, memories and I/O interfaces, and authentication was widely used to improve security in computer systems. Furthermore, those features are known from D4 to address the same problems as in claim 1 of the contested patent.

Document D4 discloses a medical probe 14 communicating with a monitoring device 12 (column 2, lines 1 to 6; Figure 1) and teaches that a memory storage component 26 in the medical probe might be a DS2430A EEPROM produced by Dallas Semiconductor (column 9, lines 9 to 11). Communications between the memory storage component and the monitoring device are transmitted through the single communication pin, allowing for simple connections and reduced wiring (column 9, lines 9 to 28, in particular lines 25 to 28). D4 discloses that the memory storage component 26 can comprise a microcontroller (column 3, lines 55 to 57).

- 12.3 The respondent contested that a skilled person would combine D1 with D4. The memory of the system of D4 was too small to hold sensed physiological parameters. Furthermore, the token card chip of D4 (which is mentioned in column 3, line 66, to column 4, line 2, and column 9, lines 21 to 23) could not replace the sensor memory of D1 but would have to be included in the sensor of D1 as an additional component. Adding the token card chip of D4 as a further component to the sensor of D1 would provide no extra benefit to

functioning of the system of D1, while adding cost and complexity. Furthermore, even if the token card chip of D4 were incorporated into the sensor circuitry of D1, the token card chip would communicate with the monitor directly, i.e. not via a microcontroller within the sensor, such that the object of the contested patent, of achieving a high level of security for the data mentioned in feature E6, would not be achieved.

The board notes that feature E6 is disclosed in D1 (see point 5. above). When combining the teaching of document D1 with the teaching of document D4, the skilled person would not necessarily integrate the token card chip from D4, which is intended for storing the use value mentioned in D4. Indeed, paragraph [0121] of D1 specifies that "[e]ach time a sensor is recycled [...], a number in the sensor memory can be incremented. This can be used to prevent operation of the sensor if it has been recycled more than the allowed number of times (e.g., 3 times)". Therefore, the skilled person would not duplicate these "use values" but would consider having a single "use value" stored in the sensor memory.

The board notes also that the token card chip is mentioned in document D4 only as a possible embodiment. As the appellant argued, the skilled person would simply choose a larger memory if the application required it.

12.4 The respondent also argued that none of the embodiments of document D4 included all the distinguishing features. The token card chip lacked a single-wire interface. The embodiment of column 9, lines 21 to 27, even taught away from the invention of claim 1 of the contested patent, because in that embodiment the memory

device DS2430A and not the microcontroller communicated directly with the remote processor. Furthermore, that device did not support authentication. Combining an off-the-shelf authentication component with document D1 would not lead to the system of claim 1.

The board does not find these arguments convincing because document D4 provides a generic teaching and the specific embodiments are only example implementations. In addition, the distinguishing features are individually well known and are directed to two independent technical problems. Combining features in this way is thus not cherry-picking of features from document D4, contrary to the respondent's argument.

The respondent's argument that the skilled person would not make the architectural changes needed to implement the system of D1 using a single-wire protocol, a microcontroller, or off-the-shelf components is not convincing. The skilled person would know how to make the necessary adaptations. The assumption that the average skilled person has such skills is made in the present application, which, as pointed out by the appellant, describes embodiments of the invention using off-the-shelf components without going into great detail about such implementations.

- 12.5 Therefore, the board is of the opinion that the skilled person, in view of the common general knowledge and the disclosure of document D4, would improve the security of the system of D1 by adding an authentication algorithm for authenticating the sensor as specified in feature E5, and would consider simplifying implementation of the system of D1 by using a microcontroller and a single-wire protocol, as described in features E7, E4 and E4.1.



- 12.6 In view of this, the board concludes that the subject-matter of claim 1 of the main request is not inventive (Article 56 EPC) over a combination of document D1, document D4 and the common general knowledge of the skilled person.

**B. First auxiliary request**

13. Claim 1 of the first auxiliary request further specifies that "the second memory [is] configured to store a history of biomedical data of a patient over a predetermined period of time". This limitation is based on claim 11 of the contested patent.

14. As already stated above, paragraph [0025] of D1 discloses that patient trending data regarding the history of a patient's physiological data, and other patient data can be recorded in the memory of the sensor over a period of time and that the oximeter monitor can continuously or periodically store a patient's current trend data in the memory of the sensor to maintain historical data for the patient.

The board is of the opinion that this feature of the system of D1 corresponds to the additional feature of claim 1 of the first auxiliary request.

15. Therefore, the board concludes that the subject-matter of claim 1 of the first auxiliary request is not inventive over a combination of document D1 with document D4 and the common general knowledge of the skilled person.

**C. Second and third auxiliary requests**

16. Claim 1 of the second auxiliary request further adds to claim 1 of the first auxiliary request that the second memory comprises a single-wire interface memory.
17. Claim 1 of the third auxiliary request adds to claim 1 of the first auxiliary request that the first memory and the second memory each comprise a single-wire interface memory.
18. These features are based on paragraph [0040] of the published application.
19. In claim 1, an authentication algorithm is stored in the first memory (14) and configured to engage in an authentication process to authenticate the sensor (12) when queried by the remote processor, and the second memory (22) is configured to receive and store data representative of a sensed physiological parameter after data from the sensor (12) has been processed by the remote processor.
20. Since single-wire interfaces and single-wire interface memories were well known at the priority date of the present application, as argued by the appellant, it would have been an obvious option for the skilled person to implement one or both memories in D1 using single-wire interface memories. The board concludes that a skilled person who was looking for a simplified implementation would seek simplified means by which the sensor microcontroller could communicate with the monitoring system and would, without needing inventive skill, configure the microcontroller to communicate with the remote processor using a protocol employing a single wire (see arguments relating to the main

request). For the same reasons, the skilled person would also use a single-wire implementation for the interfaces of the first and second memories.

21. Therefore, the board concludes that the subject-matter of claim 1 of the second and third auxiliary requests is not inventive over a combination of document D1 with document D4 and the common general knowledge of the skilled person.

#### **D. Fourth auxiliary request**

22. The fourth auxiliary request further specifies that "the authentication algorithm comprises a challenge-and-response hash algorithm".
23. This feature is also based on paragraph [0040] of the published application.
24. Challenge-and-response hash algorithms are well known for authentication. As the appellant argued, since paragraph [0049] of the description of the contested patent specifies that the memory MAXIM DS28E01 comes with a built-in implementation of the challenge-and-response authentication security implemented by the ISO/IEC 10118-3 Secure Hash Algorithm, the use of such an authentication algorithm was well known at the priority date of the contested patent. It would thus be an obvious choice for the skilled person to use such a challenge-and-response hash algorithm for improving the security of the system of D1.
25. Therefore, the board concludes that the subject-matter of claim 1 of the fourth auxiliary request is not inventive over a combination of document D1, document

D4 and the common general knowledge of the skilled person.

**26. Request for reimbursement of the appeal fee**

26.1 The appellant argued that it appeared that cited documents D1 and D4 had been found not to disclose sensor authentication merely because the word "authentication" was not used therein literally. The appellant submitted that its right to be heard had been breached in that, prior to the notification of the written decision, the opposition division had never indicated that it had any doubt as to whether cited document D4 disclosed authentication.

26.2 The board notes that, in the summons to oral proceedings, the opposition division stated that the opponent "did not provide clear arguments with respect to E5", while the patentee indicated that neither D3 nor D4 "anticipated an authentication process stored locally in the sensor memory". The opposition division concluded that it largely agreed with the patentee's arguments. Therefore, the opposition division had already indicated that it was not convinced by the appellant's argument that D4 disclosed authentication. At the oral proceedings before the opposition division, the appellant was heard on the questions of what authentication was and whether it was disclosed in the prior-art documents (see points 3.2, 3.6 and 3.8 of the minutes).

26.3 The appellant further argued, in reply to the board's communication, that an issue that was highly relevant for the opposition division's decision was not only whether cited document D4 disclosed authentication, but what authentication was in the first place. From the

course of both the written and the oral proceedings before the opposition division it was not apparent that the opposition division was unsure what authentication in general entailed. Accordingly, it came as a complete surprise to the appellant that the opposition division revealed in its decision that it was uncertain about the meaning of authentication in general.

26.4 The appellant was of the opinion that it would have been the opposition division's "procedural obligation" to clarify the meaning of the term authentication before deciding on the presence or absence thereof in the prior art. As the opposition division had concealed its uncertainty about the meaning of the term authentication during the entire proceedings, the appellant had been deprived of the right and opportunity to provide more detailed submissions in that regard.

26.5 The appellant continued that, by not stating what, in its view, authentication entailed, the opposition division also failed to provide a sufficiently reasoned decision, since it was not possible to properly assess or understand a decision stating that a prior-art document did not disclose authentication if the decision at the same time failed to indicate what understanding of the term authentication formed the basis for that statement.

26.6 The opposition division stated, in its decision, that it could not identify in the teaching of D4, and in particular in the passages mentioned by the opponent, any clear and explicit reference to an authentication process, and that D4 would not provide the skilled person with any information going beyond the teaching of D1 (page 12). The opposition division referred to

the argumentation based on D1 on page 8, which provides the patentee's definitions of identification ("means by which a user provides a claimed identity to a system"), "authentication" ("means of establishing the validity of this claim") and encryption. On page 8, the opposition division followed the patentee's argument and found that D1 did not disclose authentication, not even implicitly. In the board's opinion, the opposition division provided sufficient reasoning with regard to documents D1, D4 and the other prior-art documents. The board could review the decision under appeal and there is no indication that the alleged insufficient reasoning hindered the appellant in preparing its appeal.

26.7 In addition, the board considers that the opposition division heard the opponent's arguments. During the oral proceedings before the opposition division, the appellant has had, and took, the opportunity to express its view that D4 disclosed "authentication" (see point 3.2 of the minutes). Since the opposition division had already given its opinion in the annex to the summons that D1 did not disclose authentication and that it was not persuaded by the opponent's arguments that authentication was disclosed in document D4, the appellant should not have been surprised by the written decision.

26.8 Therefore the board considers that there has been no procedural violation and that the request for reimbursement of the appeal fee is not allowable.

#### **Concluding remarks**

27. Since none of the requests satisfies the requirements of Article 56 EPC, the patent cannot be maintained as

granted nor in amended form pursuant to Articles 100(a), 101(2), first sentence, and 101(3) (b) EPC. Therefore, the appeal is to be set aside and the patent is to be revoked.

## Order

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chair:



S. Lichtenvort

J. Geschwind

Decision electronically authenticated