

BORN (BT Wristband) PRD

Product Description

Version: 1.0

Status: Baselined

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1 Revision History

Date	Version	Author	Status	List of Changes
02.05.2013	0.1	Vera Kozyr Igor Mikhnenko	Draft	High Level Product Description created
13.05.2013	0.2	Vera Kozyr	Draft	Added requirements clarifications and pulse requirements
15.05.2013	0.3	Vera Kozyr, Konstantin Fedyaev	Draft	HW requirements clarified. Added SW requirements and performance indicators
21.05.2013	0.4	Konstantin Fedyaev	Draft	Updated SW requirements section
26.05.2013	0.5	Vera Kozyr	Draft Available	Added continuous pulse requirements (heart rate monitor)
27.05.2013	0.6	Igor Mikhnenko	Draft Available	ID info added
25.06.2013	0.7	Renat Makhkamov	Draft Available	<ul style="list-style-type: none">- Replaced device image with the last version- IP Classification updated to IP68- Removed continues pulse measurement requirement
11.07.2013	0.8	Renat Makhkakmov	Draft Available	<ul style="list-style-type: none">- Review comments incorporated
13.07.2013	1.0	Renat Makhkamov	Baselined	<ul style="list-style-type: none">- Baseline following the final comments

2 Conventions and definitions

2.1 Document rules and conventions

This document uses the key words "**MUST**", "**MUST NOT**", "**REQUIRED**", "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**NOT RECOMMENDED**", "**MAY**", and "**OPTIONAL**". These are to be interpreted as described in [RFC2119](#).

RFC 2119 gives the following definitions:

1. **MUST**- This word, or the terms "**REQUIRED**" or "**SHALL**", mean that the definition is an absolute requirement of the specification.
2. **MUST NOT**- This phrase, or the phrase "**SHALL NOT**", mean that the definition is an absolute prohibition of the specification.
3. **SHOULD** - This word, or the adjective "**RECOMMENDED**", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
4. **SHOULD NOT** - This phrase, or the phrase "**NOT RECOMMENDED**" mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
5. **MAY** - This word, or the adjective "**OPTIONAL**", mean that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation which does not include a particular option **MUST** be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which does include a particular option **MUST** be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides).

2.2 Acronyms and definitions

Term/Acronym	
HW	Hardware
ODM	Original Design Manufacture
SW	Software
ARP	Average Retail Price
ID	Industrial Design
CMF	Colors, Materials and Finishing
PR	Prototype Run (prototype build)
MCU	Microcontroller Unit
BLE	Bluetooth 4.0 Low Energy

3 PROJECT OVERVIEW

We developed a unique technology and created our own SW that allows analyzing the human health and particularly nervous system by using only few biomarkers taken with high frequency.

Biomarkers that we take for our model are high frequency micro-movements of human body. Accurate measurements ~~would~~ allow to judge about people's health and most importantly **diagnose certain diseases on early stages**.

This project aims to develop and manufacture a **Wristband Product** that would be able to read user's body micro movements and synchronize these data with our server, which will then analyze it and provide diagnostics reports by means of our proprietary SW applications and services.

3.1 VALUE PROPOSITION

Our goal is to facilitate measurable extension of human life through development of affordable, widespread technologies for detection and prevention of most common diseases.

Our **target users** are people of age 20-50 who care about their health and are interested in mHealth accessories and applications (probably already have a smartphone and use one of mHealth devices or services)

Key features:

1. **Tracking body micro movements** 24/7
2. Data synchronization (BT 4.0 LE)
 - a. Each time the user launches application on smartphone or tablet
 - b. Each time when the user connects device to PC via USB
 - c. Automatic periodical (2 hours) background sync with a smartphone or tablet via BT
3. Wearing during the night (comfortability, automatic sleep tracking, silent alarm)
4. Long battery life (charging once per 1 week)
5. Indication of battery status and user's data
6. Easy interaction with only one touch (mechanical key)
7. Durability: robust and waterproof (up to 5 meters)

Product Positioning

With our unique technology and developed SW this device can provide to our customers the following information:

- Neurological conditions
- Quality of sleep and sleep disorders
- Metabolic disorders
- Biological age vs actual
- Stress resistance
- Stress or even depression level

3.2 PROJECT GOALS

1. Develop and manufacture Wristband product according to the concept and requirements
2. Certify product for US and European markets
3. Successfully launch PR and Marketing campaign by end of January 2014
4. Start sales online and in open retail in **March 2014**.
5. Reach sales volumes target described below.

3.3 TARGET MARKETS & SALES PLAN

Different research sources predict rapid growth of mHealth devices markets for the next 3-5 years. For example:

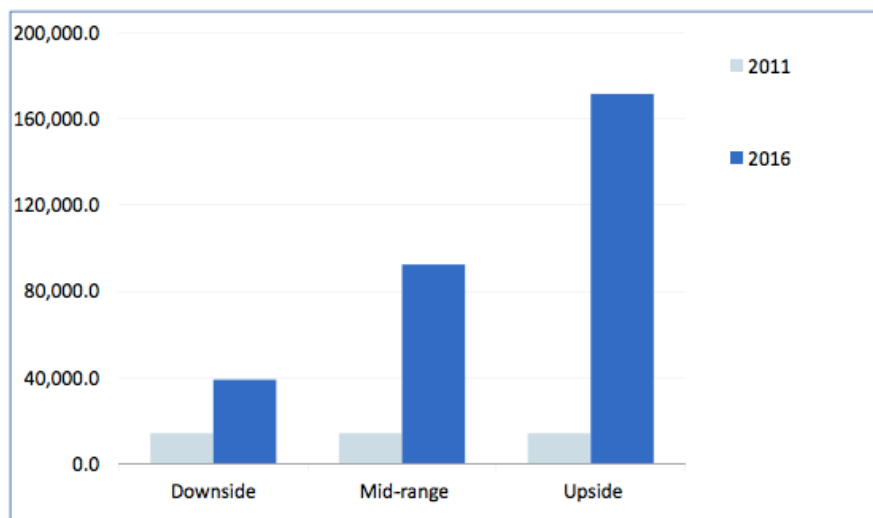
ABI Research estimates that wearable computing devices, like Apple's iWatch, will exceed 485 million annual shipments by 2018 (©2013 Allied Business Intelligence, Inc. All Rights Reserved. <http://www.abiresearch.com/press/wearable-computing-devices-like-apples-iwatch-will>)

IMS Research predicts the market for wearable sensing devices will grow to over 170 million units annually by 2016.

- 14 million wearable devices were estimated to have been shipped in 2011. By 2016, this is forecast to grow to between 39 million and 171 million, depending on the forecast scenario.

World Market for Wearable Technology by Forecast Scenario

Unit Shipments (thousands); 2011 to 2016.



Copyright IMS Research 2012 (http://www.wearable-technologies.com/c/document_library/get_file?uuid=65ab1125-6c83-4627-b8d2-bf56ac8e8fca&groupId=10192)

3.3.1 MARKETS AND PRIORITIES

1. USA

US market is the first priority. Already today this is the largest and most mature market for mHealth services and devices in the world.

2. UK/Germany

European markets are #2 priority in terms of market potential. UK and Germany are the largest markets after US for mHealth industry.

3. Japan

Japanese market is very specific and requires special attitude and product customization before launch. However it looks promising because Japanese mHealth market is growing rapidly at the moment and further forecasts are very positive.

4. Other

3.3.2 SALES PLAN 2013 - 2015

Sales forecast for Q1 2014 – Q4 2015, **1660 units**.

	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Total
USA	60	150	120	190	100	120	80	50	870
Germany		50	60	90	50	50	40	20	360
UK		60	70	110	70	50	40	30	430
Japan	TBD								
Other	TBD								
Total	60	260	250	390	220	220	160	100	1660

3.4 COMPETITORS COMPARISON

	ARP, USD	Special Features	Services	Brand & Positioning
Nike+ Fuelband	150 \$	<ul style="list-style-type: none">- Indication of<ul style="list-style-type: none">o Fuel pointso Stepso Calorieso Time- BT sync up- Water-resistant	Social service (connect with your friends, share your achievements, etc.)	Sport
FitBit Flex	99 \$	<ul style="list-style-type: none">- Easy indication- BT sync up- Water-resistant	<ul style="list-style-type: none">- Quality of sleep- Ecosystem of different devices- Open API	Never stop moving (Wellness)
Jawbone Up	129 \$	<ul style="list-style-type: none">- Vibro feedback- Long battery time- Waterproof 1 m	<ul style="list-style-type: none">- Intellectual alarm- Calories balance (incl. food)- Mood tracking	Live better (Lifestyle)
Basis Watch	199 \$	<ul style="list-style-type: none">- Big display- Pulse meter	<ul style="list-style-type: none">- Heart rate tracking- Quality of sleep- Calories tracking	Feel better, get fit
Our Device	69 \$	<ul style="list-style-type: none">- Easy indication- Comfortable form factor (wearing at night)- Waterproof 1 m	Unique Life Extension service	Health care

3.5 PROJECT KEY MILESTONES

Target Date	Milestone
04.06.2013	Product concept finalization
10.07.2013	Mechanics concept estimation ready
17.07.2013	Product requirements spec defined
01.08.2013	ODM project kick-off
29.09.2013	PRo – first proto run samples (based on soft tooling)
15.11.2013	PR1 – proto run samples (based on hard tooling)
01.12.2013	Certification start
17.01.2014	PR2 proto run samples
24.01.2014	Golden sample
03.03.2014	Sales start (US)

4 PRODUCT SPECIFICATION

4.1 ID (industrial design intent)

ID should be based on wristband form factor following basic hand ergonomics. Main design intent would focus on wearability, durability and user's comfort.

"No watch design": would mean that device should have minimum indication. Current vision is that user would be able to get battery status displayed on users' demand by pressing the hard key.

Visual perception of device should state that it's:

- Long lasting/Robust
- Waterproof
- Multi age users

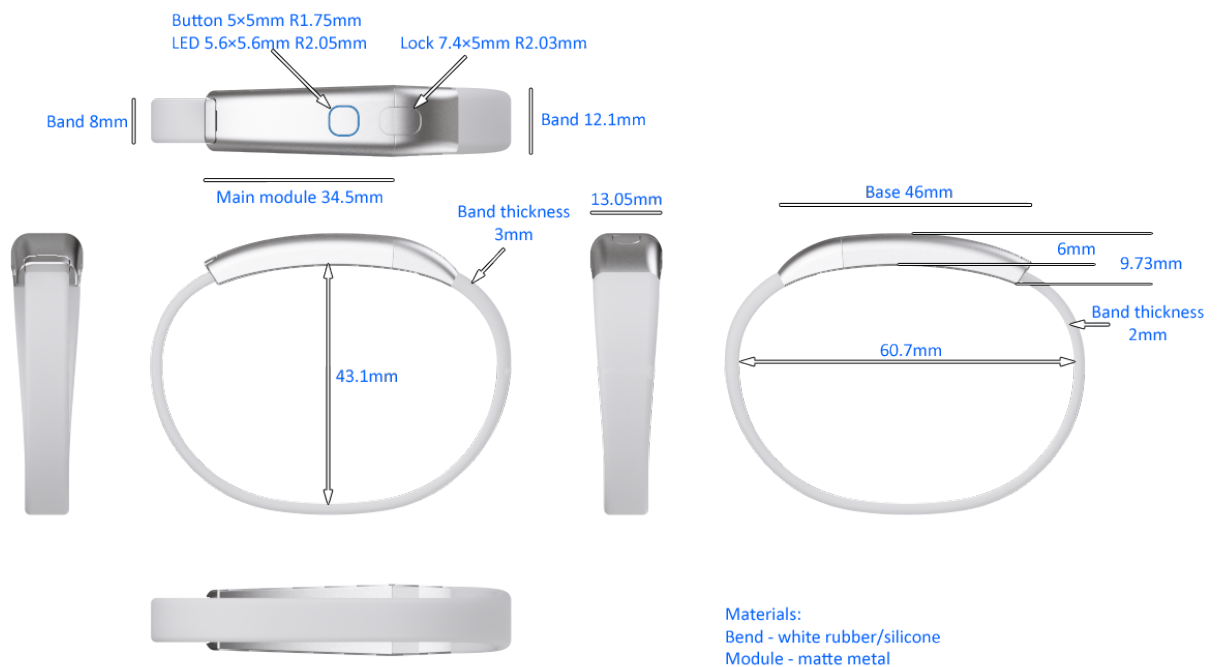


Fig.1 Device overview

CMF intro:

For creation of industrial design, designer should follow the following requirements:

- Use of solid materials – metal (magnesium, non- allergic, on skin non-contactable surfaces), elastic silicone (3d inking), Glass reinforced plastics. Status will be indicated by RGB LED.
- No paint
- No pvd or other wearing out finishing
- No color variation, only black and white color variations of a product must be taken in account.

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- Solid silicon band without buckle
- Charging use case should be well thought through in order to create seamless and comfortable interaction with the device, use USB Standard B plastic coated male connector. See USB connector details on Fig. 2



Fig. 2a. USB connector, unlocked state



Fig. 2b USB connector, locked state



Fig. 2c. Clip locking the USB connector. Front and top view



Fig. 2d Clip locking the USB connector. Front and bottom view

4.2 HARDWARE AND MECHANICS

Component	Hardware specific Data	Other requirements
Processor		
MCU	be based on Bluetooth® low energy nRF51822 (32-bit ARM® Cortex™ M0 CPU with 256kB flash + 16kB RAM) or nRF51922 =BLE&ANT+ RF Combo SoCBluetooth® low energy nRF51822 (32-bit ARM® Cortex™ M0 CPU with 256kB flash + 16kB RAM) w/balun transformer BAL-NRF01D3	Or similar low power processor, e.g. BlueCore® CSR1010™ QFN or TI CC2541
Memory		
Flash memory	Minimum 64 MB	Memory shall be enough to store user's data for 10 days period

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Indication		
LED indicators	1 full (6 colors) Multi-color LED light	
LED Controller	Ideally LED patterns shall be controlled by main processor (MCU)	Controller to enable different patterns of LED indicator
Wireless Connectivity		
Wireless protocol	Bluetooth 4.0 SMART low energy	
On Demand Synchronization	Synchronization over BT	
Auto sync	Once per 2 hours automatic sync	
Sensors		
Accelerometer	3-axis accelerometer. Data tracking in low-power mode: 5Hz (5 times per second)	BMA355 - small footprint of 1.2 mm x 1.5 mm , low-noise 150 $\mu\text{g}/\sqrt{\text{Hz}}$, 12 bit digital acceleration $\pm 2\text{ g}$, $\pm 4\text{ g}$, $\pm 8\text{ g}$, $\pm 16\text{ g}$ sensor or BMA280 , or ADXL362 MICROPOWER, 3-AXIS, $\pm 2\text{ g}/\pm 4\text{ g}/\pm 8\text{ g}$ DIGITAL OUTPUT MEMS ACCELEROMETER low power consumption (by ADI) or STMicroelectronics C3H or similar 3-axis accelerometer.
Other		
Water-proof	Device must be waterproof up to 5 meters	IP68/ IPX8
Battery	Minimum 40 mAh soft packing cylindric polymer lithium battery, smallest 3,5x11x 17 mm	Battery capacity shall be enough for the device to operate in normal conditions for at least 1 month
Vibrator		
Vibro motor	Shaftless (coin type) vibration motor	8 mm diameter 3mm height
Vibro motor controller	Ideally vibro-patterns shall be controlled by main processor (MCU)	To enable different patterns of vibration
Hard Keys		
Key	One key: mechanical	
Connectors		
Charging and Data connector	USB Standard B	
Ristband Fix Lock		
Strap Fix Lock	Implementation like TAG Heuer Solution	Will allow the user to adjust the strip size

4.3 SOFTWARE

All server-side SW and user Applications are proprietarily developed.

High level requirements for device software:

1. Device shall be able to track required sensor data (see below).
2. Device shall be able to store tracked data in internal flash memory.
 - a. In case of internal flash memory filling up – device shall ask user to start synchronization process.
 - b. In case of internal memory filling up device shall vibrate for 1 second, after that indicate this status with LED blinking red and orange periodically, 0.5 sec per each color, permanently until the user starts synchronization procedure
3. Device shall be able to upload stored data to one of receiving devices (e.g. smartphones, laptops) via Bluetooth 4.0 wireless protocol.
 - a. Device shall be able to perform periodic wireless auto-synchronization of stored data.
 - b. Automatic synchronization shall be performed in background, without any indication to user
 - c. Device shall be able to perform data synchronization on demand, by user request
 - d. In case the user initiates data synchronization procedure (synching on demand), device shall indicate synchronization procedure being active by LED blinking blue (3 sec per blink, breathing effect) until the end of synchronization.
 - e. For connection to PC - USB standard B mail connector shall be used
4. Device shall be able to keep current date and time.
 - a. On each synchronization with receiving device – device shall synchronize internal clock data with receiving device clock data.
 - b. Internal device clock time zone shall always be set to UTC time zone
5. Device shall be able to transfer data over the USB interface.
6. Device shall be able to charge using the USB interface.
7. User shall be able to flash the new SW firmware version over the USB interface and BT
8. The user shall be able to request the battery status of device by double clicking the hard key
9. Device shall indicate the battery status as following:
 - Capacity of 100% to 40%: green LED, steady, 3 seconds;
 - Capacity of 40% to 20%: orange LED, steady, 3 seconds
 - Capacity of 20% to 10%: red LED, steady, 3 seconds
 - Capacity of 10% and lower: Vibrate for 1 second and repeat vibration each time when capacity downs for 3%;
 - When capacity downs to 5% indication shall be: permanent red LED until shutdown or starting the charging
 - When capacity downs to 1% indication shall be: permanent red LED (see above) and permanent vibration until shutdown or starting the charging

- Shutdown threshold shall be 0.03 volts or battery capacity lower than 1.0% , when downs from higher values to lower
- 10. The user shall be able to request the current activity trend by double clicking the hard key
- 11. When the user's daily goal is reached device shall indicate it by 1 sec vibration followed by the blinking green LED, 3 sec
- 12. Device shall support the user's sleep tracking
- 13. When device detects that the user is sleeping, all the indication shall be disabled until the user's invocation is detected
- 14. Device shall support the silent alarm feature
Note: Silent alarm means that invocation time is established on smartphone application and this event will be reported to device by that application.
- 15. When the silent alarm feature is enabled on the smartphone application, invocation time is reached and application has informed the device about this event, device shall vibrate for 5 seconds. Alarm shall be repeated with 5 minutes interval until the key press, but not more than 3 times.
- 16. On switch on event disregard whether it is first switch on or switch on after complete discharge, or other cases, device shall vibrate for 1 second.

Required Data to read, store and transfer:

1. Body micro movements: 3-axis accelerometer sensor data
 - a. Frequency of 5 Hz (5 times per second).
 - b. Required measurement range for accelerometer data: -8g .. +8g.
 - c. Required arithmetic precision for accelerometer data: one digit after a decimal point (i.e. 12.5 m/s)
 - d. In addition, each accelerometer data sample shall be marked with current date/time stamp with precision of up to 0.01 second
 - e. Accelerometer data shall be obtained in 3D space (X, Y, Z) with data range from -99.9 m/s to +99.9 m/s.

4.4 First Switch On

1. Device shall be shipped from factory with the battery pre-charged for at least 70%
2. Device shall be switched off after factory tests through USB service application
3. Device shall be kept in switched off condition during shipment and logistics
4. The user shall be able to switch device on for the first time by long key press (2 seconds)
5. BT shall be enabled immediately when device was switched on and be ready for pairing procedure

5 LOCALIZATION

Device shall be localized for the following countries:

1. USA
2. Germany

3. United Kingdom
4. Japan

Localization only includes gift **box** and **user's manuals**.

6 PRODUCT VARIATIONS / CUSTOMIZATION

1. Device band shall be provided in 2 Color Variations (black or white)
2. Device case shall be provide in 2 color variations (metallic silver or metallic black)
3. It is assumed that device will have limited editions with special color variations. CMF spec for limited editions will be provided separately when such limited editions are required.

7 PERFORMANCE INDICATORS

Device performance SHALL meet the KPIs listed in the table below:

Number	Parameter	Required Value	Under Conditions (Comments)
Power Management			
1	Battery life time in regular operating mode	Min 7 days	1. 24 hours active data tracking, 2. Wireless sync up not less than 16 times a day, 3. LED indication active no longer than 10 seconds per day totally 4. Vibrator active no longer than 30seconds
3	Full charging time	No more than 3 hours	Charging over USB interface
Data Handling			
1	Wireless data transferring	No longer than 1 seconds for data collected during 1 hour	With max speed 1 Mbit/s (BT 4.0 standard)
2	Wired data transferring	No longer than 240 seconds for data collected during 10 days	With max speed 480 Mbit/s (USB 2.0 standard)

8 CERTIFICATION

Device shall be certified for sales in the following regions (refer to Sec. 10):

1. USA
2. Europe: Germany
3. United Kingdom
4. Japan

Detailed shall be certificated for the following industrial standards:

1. CE (for EU)
2. FCC (for US)
3. FDA (detailed requirements TBD)
4. UL for power charge
5. BQB for BT 4.0 SMART LE
6. USB 2.0.
7. JAL (for Japan)

9 ENVIRONMENTAL REQUIREMENTS

1. Device shall comply with requirements of ETSI EN 300 019 -2-7 Class 7.3 (Partly weather protected, not temperature controlled location)
2. The device SHALL fulfill ETSI EN 300 019-2-2 Class T2.3 requirements (public transportation)
3. Device must be RoHS – compliant
More detailed environmental requirements will be provided separately.

10 RELIABILITY& SAFETY

At a minimum product shall comply with the following standards:

1. DIN 40050-9 (for Germany)
2. IEC 60529 (Worldwide)
3. ISO 2281 (water-resistant watches standard)
4. IP 68 or IPX8 water proof (Worldwide)

More detailed reliability and safety requirements will be provided separately.

11 GIFT BOX AND PACKAGING

Gift Box and packaging requirements will be provided in a separate specification.

In-box content:

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Accessory	In-Box Delivery
White color band	Yes
Black color band	Yes
User manual	Yes
Warranty	Yes