

mSafety Technical Specification

Published: May 2022
Document no: v7

System architecture

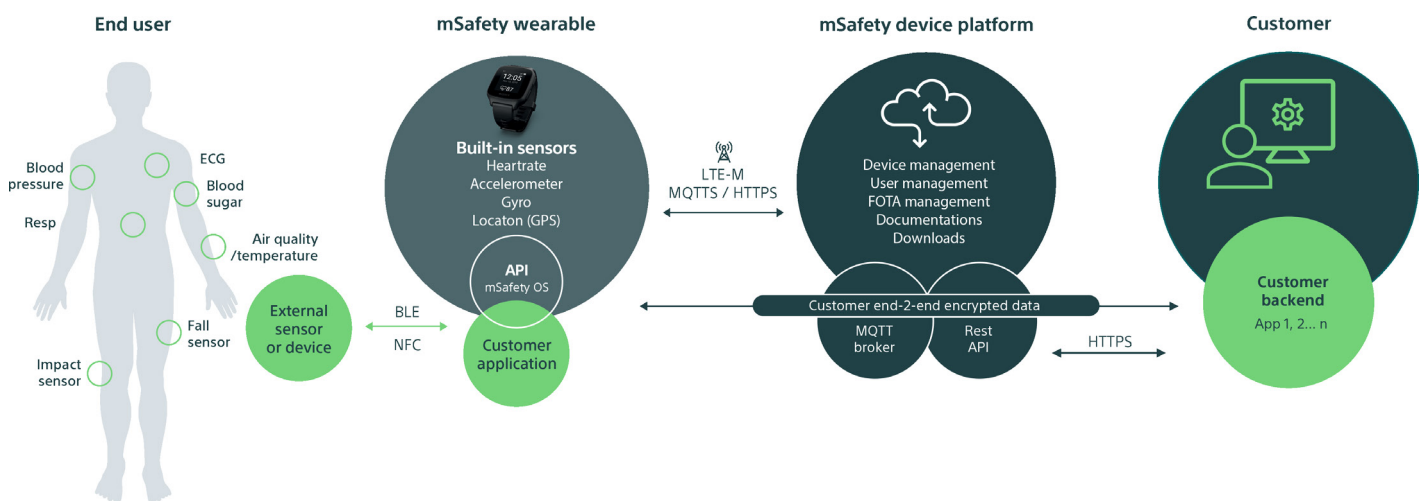
The system architecture is illustrated in the image below. mSafety customers develop their own unique mHealth applications to be embedded in the wearable, using the mSafety SDK.

The wearable communicates with the mSafety backend through MQTT over TLS 1.2.

End-to-End encryption of customer application data is supported in the mSafety SDK and through reference

code for the customer backend application. This means that no customer's application data, e.g. health data, is visible in the mSafety backend.

Customers access data from the wearable through the mSafety backend API and receive data to their own backend. The mSafety platform also includes dashboards for subscription management, remote device configuration and "Over-The-Air" software updates.



Sony wearable dataset

The LTE-modem – ALT1250MOD – in the wearable is made by Altair, a Sony company. This is an advanced LTE release 13 CAT-M1 chipset, featuring ultra-low power consumption. The modem incorporates an LTE base band processor, RFIC, PMU, memory, power amplifiers, filters and antenna switch, and a cellular-based location engine. The chipset features ultra-low power consumption in a variety of modes, including 3GPP PSM and eDRX. This provides a battery life of 7 days or more for the mSafety wearable.

The other core component of the mSafety wearable is Sony's power-efficient multicore microcontroller CXD5602 that runs 6 ARM Cortex-M4F cores with a clock speed of up to 156MHz and has an integrated GPS. Thanks to the FD-SOI (Fully Depleted Silicon On Insulator) production process, the CXD5602 chip is very power efficient.

Furthermore, mSafety supports Bluetooth Low Energy for connection with external sensors. For notifications, both a vibrator and a buzzer are provided. The device itself has built-in sensors for physical activity, heart

rate, body effort and sleep patterns. The monochrome touch display offers high visibility and has three programmable buttons. mSafety customers create applications for the wearable using a high-level SDK. This SDK provides APIs which support, for example:

- Cellular and Bluetooth communication.
- User interface components such as buttons, lists, texts, dialogues and sound/vibration notifications.
- Access to internal sensors and buzzer/vibrator.
- Security functions, for example encryption of sensor data.

The wearable meets the IP68 standards on water resistance and is manufactured according to Sony's own strict requirements.

Health and medically graded applications

The device is tailored for health and medical applications, fulfilling requirements for medical hardware manufacturing according to ISO 13485 and QSR820. Should medical certification of the customer's application be needed, this is the responsibility of the mSafety customer. Please contact the Technical Sales team for questions.

Wearable technical information

eUICC	LTE Cat-M connectivity, ready-to-use with global roaming profile (embedded Universal Integrated Circuit Card)
Size	53,2 x 45,0 x 12,75 mm
Weight	about 30g
Battery life	Depending on customers's individual use case, usage, data transmission, etc. Approx. 5 days battery life in a reference patient monitoring application (depending on network conditions): <ul style="list-style-type: none"> • LTE sending data (1 time / 15 mins) • eDRX 41secs • Activity monitor enabled • Display on (1 time / 15 mins, on for 15secs) • HR Monitor (1 time / 15 mins, 1 min measurement) • No GPS • Get data from BLE sensor (1 time / 5mins)
Water resistance	IP68
User Interface	1.4 inch 160x160 pixel Monochrome OLED with touch + 3 HW keys
Built-in sensors	Accelerometer, GPS, Gyro, Heart Rate
Algorithms	Heart Rate Variability, VO2 max, Calories, Footsteps, Position, Sleep
Built-In vibrator	For notifications
Buzzer sound pressure	>79dB
Durability	Sony Global Quality standards for wearables in rough usage (i.a. drop, shock, vibration, thermal shock, extreme temperatures)
Celular direct Cloud connection	LTE Cat-M1, rel13 Europe (B3, B8, B20, B28), Japan (B1, B8, B26), US (B2, B4, B7, B12, B13, B14)
Connectivity	Bluetooth Low Energy, GPS, LTE
GNSS	GLONASS, GPS
Sensors connection	Medical and non medical partner network

Backend

The mSafety backend solution is built on the AWS IoT Core platform - a framework for managing IoT devices. mSafety provides the fundamental structures needed for IoT devices to interact with a cloud backend in a secure and scalable way. The back-end architecture has a multi-tenant design, which means that resources from different customers are separate. The cloud solution provides features that are described below.

Device security:

- Sony generates the device X.509 client certificate and private/public key pair.
- Certificates are provisioned in the factory.
- Server & client are mutually authenticated using TLS 1.2.

Device onboarding:

- mSafety customers register new devices through the mSafety Cloud API.
- When the device is powered up for the first time, the data subscription plan is activated and an onboarding process with the mSafety backend is executed.

Cloud APIs for mSafety customers:

- REST APIs for registering devices, start subscribing to data, etc.
- Customers access cloud APIs through Web ID Token (JWT) from Google or AWS Token.

Data transfer from device to customer backend

- Customers start subscribing to device data to their backend, using the mSafety cloud API
- Customers provides an "API Endpoint" to which the mSafety backend sends device data.

Customer dashboards, supporting customers with:

- Device status management.
- Over-The-Air software updates for individuals, groups or whole fleets.
- Insights on users' health status, behavior and device.
- Setting of parameters in the wearable, e.g. data upload frequency.

Backend solution technical information

Core platform	Based on AWS IoT core, configured for high security
Platform architecture	Highly scalable cost efficient multi-tenant platform, i.e. data is isolated per customer
Device security	X.509 Client certificates pre-provisioned into device Server & Client mutually authenticated using TLS 1.2
Interface to customer	Cloud REST APIs and dashboards Access authorization to cloud APIs through Web ID Token (JWT)
Device management	Client certificate/private key provisioning Device onboarding OTA software update and configuration
Device analytics	Insights on device data usage, software versions and device health
Device Communication Protocols	MQTT over TLS 1.2
Customer access to device data	Customer provides "API Endpoint"

mSafety is a remote monitoring platform that combines network connectivity with intuitive product design. With mSafety as a foundation, our B2B customers can build a broad range of remote health & safety monitoring services in areas as diverse as elderly care, pharmaceutical trials and search & rescue. The solution consists of a purpose-built wearable device with sensors to measure e.g., heart rate, activity levels and sleep, and a secure cloud backend that allows service providers to stay connected with end-users round the clock. mSafety paves the way for more proactive health services, while delivering valuable data to the companies that deploy it.

<https://sonynetworkcom.com/msafety/>

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