

OCF “Dubai” – New healthcare Device Types for Dubai – Core Technology WG CR 2503

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***** 3.2 Symbols and abbreviations *****

3.2.x

CGM

Continuous Glucose Monitor

Device that continuously measures patient’s glucose information throughout the day and night, and notifies highs and lows for control of patient blood sugar levels.

3.2.y

NREM

Non Rapid Eye Movement

Type of sleep including 3 to 4 stages of the sleep cycle defining Light Sleep and Deep Sleep, which are cycled through before the REM type of sleep.

3.2.z

REM

Rapid Eye Movement

Type of sleep where the eyes are moving rapidly from side to side beneath the closed eyelids.

***** Annex A *****

Table 1 Per Category list of Device Types

Device Category Name	UDC Device Name	Device Name	Device (Normative) Type	Reference
Fitness		Heart Rate Monitor	oic.d.heartratemonitor	C.4
		Activity Tracker	oic.d.activitytracker	C.4
Medical		Heart Rate Monitor	oic.d.heartratemonitor	C.4
		Pulse Oximeter	oic.d.pulseoximeter	C.4
		Sleep Monitor	oic.d.sleepmonitor	C.4

		CGM	oic.d.cgm	C.4
Personal Health		Heart Rate Monitor	oic.d.heartratemonitor	C.4
		Pulse Oximeter	oic.d.pulseoximeter	C.4
		Sleep Monitor	oic.d.sleepmonitor	C.4
		Activity Tracker	oic.d.activitytracker	C.4
		CGM	oic.d.cgm	C.4

***** Annex C *****

C.4 Standardized device types

C4.1 Introduction

OCF Healthcare Device Types specify Devices in the healthcare and fitness domains of the OCF ecosystem. The Device Type exposed by the "rt" value of /oic/d of all Healthcare Devices shall have a Resource Type value ("rt") prefixed with "oic.d." The Healthcare Device Types are listed in Table C.1.

Table C.1 - Alphabetical list of Healthcare Device Types

Section	Device Name	Device Type (rt)
C.4.x	Heart Rate Monitor	oic.d.heartratemonitor
C.4.x	Pulse Oximeter	oic.d.pulseoximeter
C.4.x	Sleep Monitor	oic.d.sleepmonitor
C.4.x	Activity Tracker	oic.d.activitytracker
C.4.x	CGM(Continuous Glucose Monitor)	oic.d.cgm

When a Resource Type is listed as Optional (O) in this Annex, a Device may expose that Resource Type as a Link in the Atomic Measurement or may also expose that Resource Type as a discretely discoverable Resource outside of the Atomic Measurement. For example, if a blood pressure monitor (i.e. oic.d.bloodpressuremonitor) measures pulse rate and chooses to expose that feature over OCF, it exposes the oic.r.pulserate Resource Type as a Link in the blood pressure monitor Atomic Measurement (oic.r. bloodpressuremonitor-am). The allowed Resource Types for an instance of an Atomic Measurement (which includes both the M and O Resource Types that are implemented) shall be listed in the "rts" Property Value.

C.4.x Heart Rate Monitor

A heart rate monitor measures heart rate. Heart rate is most frequently measured using the units of beats per minute (bpm). While normal heart rate varies from person to person depending on the individual, age, body size, heart conditions, posture, medication use, etc., normal resting heart rate range for adults is from 60 to 100 according to the American Heart Association.

Table C.aa describes the Device Type for a heart rate monitor. Table C.bb describes the Atomic Measurement that is present in all instances of a heart rate monitor.

Table C.aa: Healthcare device type of heart rate monitor

Device Type (rt)	Resource Type Name	Resource Type Value	Requirement level
oic.d.heartratemonitor	Heart Rate Monitor Atomic Measurement	oic.r.heartratemonitor -am	M

Table C.bb: Atomic measurement of heart rate monitor

Atomic Measurement Resource Type Value	Resource Type Name	Resource Type Value	Requirement level
oic.r.heartratemonitor -am	Heart Rate	oic.r.heartrate	M

C.4.x.1 Required Resource Types

A heart rate monitor shall expose oic.r.heartrate to report the heart rate of a person.

C.4.x.2 OCF-defined Optional Resource Types

See Table 11 for additional commonly used Resource Types that could be used here.

C.4.x Pulse Oximeter

A pulse oximeter measures peripheral capillary oxygen saturation (SpO₂), an estimate of the amount of oxygen in the blood. Oxygen saturation is most frequently measured using percentage (%). Normal oxygen saturation is 95% or above according to the World Health Organization (WHO).

Table C.cc describes the Device Type for a pulse oximeter. Table C.dd describes the Atomic Measurement that is present in all instances of a pulse oximeter.

Table C.cc: Healthcare device type of pulse oximeter

Device Type (rt)	Resource Type Name	Resource Type Value	Requirement level
oic.d.pulseoximeter	Pulse Oximeter Atomic Measurement	oic.r.pulseoximeter-am	M

Table C.dd: Atomic measurement of pulse oximeter

Atomic Measurement Resource Type Value	Resource Type Name	Resource Type Value	Requirement level
oic.r.pulseoximeter-am	SpO ₂	oic.r.spo2	M

	Pulse Rate	oic.r.pulserate	M
	Pulsatile Occurrence	oic.r.pulsatileoccurrence	O
	Pulsatile Characteristic	oic.r.pulsatilecharacteristic	O

C.4.x.1 Required Resource Types

A pulse oximeter shall expose oic.r.spo2 to report the oxygen saturation of a person.

A pulse oximeter shall expose oic.r.pulserate to report the pulse rate of a person.

C.4.x.2 OCF-defined Optional Resource Types

A pulse oximeter measures pulsatile occurrence using the oic.r.pulsatileoccurrence Resource Type.

A pulse oximeter measures pulsatile characteristic using the oic.r.pulsatilecharacteristic Resource Type.

See Table 11 for additional commonly used Resource Types that could be used here.

C.4.x Sleep Monitor

A sleep monitor measures the duration of each one of the sleep stages, and can also compute a "Sleep Score" from these data. The stages of sleep are: NREM stage 1 (Light Sleep stage 1), NREM stage 2 (Light Sleep stage 2), NREM stage 3 (Deep Sleep stage 1), NREM stage 4 (Deep Sleep stage 2), REM.

A night of sleep is composed of several sleep cycles, with each sleep cycle progressing from Light Sleep to Deep Sleep, before reversing back from Deep Sleep to Light Sleep, ending with REM. The first cycle takes about 90 minutes. After that, the cycles average between 100 minutes and 120 minutes. Typically, an individual will go through 4 to 5 sleep cycles per night. Dreams occur during REM stages.

NREM stage 4 is not recognized in every country: in 2007, the USA merged NREM stages 3 and 4 into only one stage, NREM stage 3, thus effectively removing NREM stage 4.

Light Sleep consists of NREM stages 1 and 2. Deep Sleep consists of NREM stages 3 and 4.

Table C.ee describes the Device Type for a sleep monitor. Table C.ff describes the Atomic Measurement that is present in all instances of a sleep monitor.

Table C.ee: Healthcare device type of sleep monitor

Device Type (rt)	Resource Type Name	Resource Type Value	Requirement level
oic.d.sleepmonitor	Sleep Monitor Atomic Measurement	oic.r.sleepmonitor-am	M

Table C.ff: Atomic measurement of sleep monitor

Atomic Measurement Resource Type Value	Resource Type Name	Resource Type Value	Requirement level
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oic.r.sleepmonitor-am	Sleep	oic.r.sleep	M
	Heart Rate	oic.r.heartrate	O

C.4.x.1 Required Resource Types

A sleep monitor shall expose oic.r.sleep to report the time spent in the Awake, NREM1, NREM2, NREM3 and REM stages, and optionally the time spent in the NREM4, Light Sleep, Deep Sleep stages, and the sleep score.

C.4.x.2 OCF-defined Optional Resource Types

A sleep monitor measures the heartrate using the oic.r.heartrate Resource Type.

See Table 11 for additional commonly used Resource Types that could be used here.

C.4.x Activity Tracker

An Activity Tracker measures a user's activities. An Activity Tracker shows a user's current activity type, accumulated step counts per day since the beginning of the day (or last reset), consumed calories per day since the beginning of the day (or last reset), and alarm status.

Table C.gg describes the Device Type for an activity tracker. Table C.hh describes the Atomic Measurement that is present in all instances of an activity tracker.

Table C.gg: Healthcare device type of activity tracker

Device Type (rt)	Resource Type Name	Resource Type Value	Requirement level
oic.d.activitytracker	Activity Tracker Atomic Measurement	oic.r.activitytracker-am	M
	Clock	oic.r.clock	O
	Battery	oic.r.energy.battery	O
	Alarm	oic.r.alarm	O

Table C.hh: Atomic measurement of activity tracker

Atomic Measurement Resource Type Value	Resource Type Name	Resource Type Value	Requirement level
oic.r.activitytracker-am	Activity	oic.r.activity	M
	Heartrate	oic.r.heartrate	O

C.4.x.1 Required Resource Types

An activity tracker shall expose oic.r.activity to report the activity of a person, and optionally the number of steps per day or since last reset, plus the consumed calories per day or since last reset.

C.4.x.2 OCF-defined Optional Resource Types

An activity tracker manages the alarm status using the oic.r.alarm Resource Type.

An activity tracker measures heart rate using the oic.r.heartrate Resource Type.

An activity tracker measures time using the oic.r.clock Resource Type.

An activity tracker measures battery status using the oic.r.energy.battery Resource Type.

See Table 11 for additional commonly used Resource Types that could be used here.

C.4.x CGM (Continuous Glucose Meter)

A CGM is a device that measures the concentration of glucose in the blood, typically measured from interstitial fluid (ISF). The glucose concentration is available on a continual basis at a periodic interval from a sensor. Glucose, or blood sugar, is the human body's primary source of energy. Frequent measurements provided by a CGM give a patient greater insight as to the fluctuations in blood glucose levels throughout the day, and in turn, can reduce the risk of developing diabetic complications.

Table C.ii describes the Device Type for a CGM. Table C.jj describes the Atomic Measurement that is present in all instances of a CGM.

Table C.ii: Healthcare device type of CGM

Device Type (rt)	Resource Type Name	Resource Type Value	Requirement level
oic.d.cgm	CGM Atomic Measurement	oic.r.cgm-am	M
	Glucose sample interval	oic.r.cgm.sample	M
	CGM Calibration	oic.r.cgm.calibrate	M
	CGM Threshold	oic.r.cgm.threshold	M
	CGM Status	oic.r.cgm.status	O
	Battery	oic.r.energy.battery	O

Table C.jj: Atomic measurement of CGM

Atomic Measurement Resource Type Value	Resource Type Name	Resource Type Value	Requirement level
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oic.r.cgm-am	Glucose	oic.r.glucose	M
	CGM Sensor	oic.r.cgm.sensor	O

C.4.x.1 Required Resource Types

A CGM shall expose oic.r.glucose to report the blood glucose level in mg/dL or mmol/L.

A CGM shall manage (RETRIEVE and UPDATE) the Glucose sample interval using the oic.r.cgm.sample Resource Type.

A CGM shall manage (RETRIEVE and UPDATE) CGM Calibration using the oic.r.cgm.calibrate Resource Type.

A CGM shall manage (RETRIEVE and UPDATE) CGM Threshold using the oic.r.cgm.threshold Resource Type.

C.4.x.2 OCF-defined Optional Resource Types

A CGM measures CGM sensor information using the oic.r.cgm.sensor Resource Type.

A CGM measures CGM Status using the oic.r.cgm.status Resource Type.

A CGM measures Battery using the oic.r.energy.battery Resource Type.

See Table 11 for additional commonly used Resource Types that could be used here.

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