SenML

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Concept

- SensorML (SenML) provides standard models and encodings for describing the measurements obtained by sensors.
- Can be used also to set parameters on sensors.
- Different encodings: JASON, XML, EXI
- It contains
  - A set of optional attributes
  - A mandatory array of one or more entries

JSON

Optional

Mandatory

SenML	JSON	Type
Base Name	bn	String
Base Time	bt	Number
Base Units	bu	Number
Version	ver	Number
Measurement or Parameters	e	Array

SenML	JSON	Notes
Name	n	String
Units	u	String
Value	v	Floating point
String Value	sv	String
Boolean Value	bv	Boolean
Value Sum	s	Floating point
Time	t	Number
Update Time	ut	Number

Single DataPoint


```
{"e":[
      { "n": ”coap://[aaaa::c30c:0:0:1]/voltage”,
        "u": "V", "v": 120.1 }
]}
```

Multiple DataPoint


```
{"e":[
      { "n": "voltage", "t": 0, "u": "V", "v": 120.1 },
      { "n": "current", "t": 0, "u": "A", "v": 1.2 }],
   "bn": coap://[aaaa::c30c:0:0:1]"
  }
```

Multiple Measurement


```
{"e":[
      { "v": 20.0, "t": 0 },
      { "sv": "E 24' 30.621", "u": "lon", "t": 0 },
      { "sv": "N 60' 7.965", "u": "lat", "t": 0 },
      { "v": 20.3, "t": 60 },
      { "sv": "E 24' 30.622", "u": "lon", "t": 60 },
      { "sv": "N 60' 7.965", "u": "lat", "t": 60 },
   "bn": "coap://[aaaa::c30c:0:0:1]",
   "bt": 1320067464,
   "bu": "%RH"
  }
```

Units

Symbol	Description
m	meter
kg	kilogram
s	second
A	ampere
K	kelvin
cd	candela
mol	mole
Hz	hertz
rad	radian
sr	steradian
N	newton
Pa	pascal
J	joule

Units

Symbol	Description
W	watt
C	coulomb
V	volt
F	farad
Ohm	ohm
S	siemens
Wb	weber
T	tesla
H	henry
Cel	degrees Celsius
lm	lumen
lx	lux
Bq	becquerel

Units

Symbol	Description
Gy	gray
Sv	sievert
kat	katal
pH	pH acidity
%	Value of a switch. A value of 0.0 indicates
	the switch is off while 100.0 indicates on.
count	counter value
%RH	Relative Humidity
m2	area
l	volume in liters
m/s	velocity
m/s2	acceleration
l/s	flow rate in liters per second

Units

Symbol	Description
W/m2	irradiance
cd/m2	luminance
Bspl	bel sound pressure level
bit/s	bits per second
lat	degrees latitude
lon	degrees longitude
%EL	remaining battery energy level in percents
EL	remaining battery energy level in seconds
beet/m	Heart rate in beets per minute
beets	Cumulative number of heart beats
W/m2	irradiance
cd/m2	luminance
Bspl	bel sound pressure level

Exercise 1

- Write a server in Californium with two resources:
  - Light Sensor
  - Dimmer switch
- Use the SenML representation in JASON to encode the information.

- Enhance the server with a 3rd resource witch provide both the light and the dimmer status.

Exercise 2

- Write a client in Californium which parse the output of the previous server by exploiting the Java API for JSON processing:
  - https://jsonp.java.net/

Exercise 3

- Rewrite the first server but in Contiki and interact with the developed client.