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**FETCH & PATCH with Sensor Measurement Lists (SenML)
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Abstract

The Sensor Measurement Lists (SenML) media type and data model can be used to send collections of resources, such as batches of sensor data or configuration parameters. The CoAP iPATCH, PATCH, and FETCH methods enable accessing and updating parts of a resource or multiple resources with one request. This document defines semantics for the CoAP iPATCH, and FETCH methods for resources represented with the SenML data model.

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[1.](#) Introduction

The Sensor Measurement Lists (SenML) media type [[I-D.ietf-core-senml](#)] and data model can be used to transmit collections of resources, such as batches of sensor data or configuration parameters.

Example of a SenML collection is shown below:

```
[
  {"bn":"2001:db8::2/3306/0/", "n":"5850", "vb":true},
  {"n":"5851", "v":42},
  {"n":"5750", "vs":"Ceiling light"}
]
```

Here three resources "3306/0/5850", "3306/0/5851", and "3306/0/5750", of an IPSO dimmable light smart object [[IPSO](#)] are represented using a single SenML Pack with three SenML Records. All resources share the same base name "2001:db8::2/3306/0/", hence full names for resources are "2001:db8::2/3306/0/5850", etc.

The CoAP [[RFC7252](#)] iPATCH and FETCH methods [[RFC8132](#)] enable accessing and updating parts of a resource or multiple resources with one request.

This document defines semantics for the CoAP iPATCH and FETCH methods for resources represented with the SenML data model. Same semantics apply also for the CoAP PATCH method.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#) [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

Readers should also be familiar with the terms and concepts discussed in [RFC8132] and [I-D.ietf-core-senml]. Also the following terms are used in this document:

Fetch Record: One set of parameters that is used to match SenML Record(s).

Fetch Pack: One or more Fetch Records in an array structure. Presented using the SenML media type.

Patch Record: One set of parameters similar to Fetch Record but also containing instructions on how to change existing SenML Pack(s).

Patch Pack: One or more Patch Records in an array structure.

Target Record: A Record in a SenML Pack that is matching the selection criteria of a Fetch or Patch Record and hence is a target for a Fetch or Patch operation.

3. Using FETCH and iPATCH with SenML

The FETCH and iPATCH methods use the same SenML media type to enable re-use of existing SenML parsers and generators, in particular on constrained devices.

3.1. SenML FETCH

The FETCH method can be used to select and return parts of one or more SenML Packs. The SenML Records are selected by giving the name(s) of the resources using the SenML "name" and/or "base name" Fields.

For example, to select resources "5850" and "5851" from the example in [Section 1](#), the following Fetch Pack can be used:

```
[
  {"bn":"2001:db8::2/3306/0/", "n":"5850"},
  {"n":"5851"}
]
```


The result to a FETCH request with the example above would be:

```
[
  {"bn":"2001:db8::2/3306/0/", "n":"5850", "vb":true},
  {"n":"5851", "v":42},
]
```

When SenML Records contain also time values, a name may no longer uniquely identify a single Record. When no time is given in a Fetch Record, all SenML Records with the given name are matched. When time is given in the Fetch Record, only a SenML Record (if any) with equal time value and name is matched.

The resolved form of records (Section 4.6 of [\[I-D.ietf-core-senml\]](#)) is used when comparing the names and times of the Target and Fetch Records to accommodate for differences in use of the base values.

[3.2.](#) SenML iPATCH

The iPATCH method can be used to change the values of SenML Records, to add new Records, and to remove existing Records. The names and times of the Patch Records are given and matched in same way as for the Fetch Records, except each Patch Record can match at most one Target Record. Patch Packs can also include new values and other SenML Fields for the Records.

When the name in a Patch Record matches with the name in an existing Record, the time values are compared. If the time values do not exist or are equal in both Records, the Target Record is replaced with the contents of the Patch Record.

If a Patch Record contains a name, or combination of a time value and a name, that do not exist in any existing Record in the Pack, the given Record, with all the fields it contains, is added to the Pack.

If a Patch Record has a value field with value null, the matched Record (if any) is removed from the Pack.

For example, the following document could be given as iPATCH payload to change/set values of two SenML Records for the example in [Section 1](#):

```
[
  {"bn":"2001:db8::2/3306/0/", "n":"5850", "vb":false},
  {"n":"5851", "v":10}
]
```


If the request is successful, the resulting representation of the example SenML Pack would be as follows:

```
[
  {"bn":"2001:db8::2/3306/0/", "n":"5850", "vb":false},
  {"n":"5851", "v":10},
  {"n":"5750", "vs":"Ceiling light"}
]
```

4. Security Considerations

The security and privacy considerations of SenML apply also with the FETCH and iPATCH methods.

Since the the FETCH and iPATCH methods potentially allow retrieving or changing many resources at once, particular care must be taken to ensure that access control rules for different resources are respected.

5. Acknowledgements

The use of FETCH and iPATCH methods with SenML was first introduced by the OMA SpecWorks LwM2M v1.1 specification. This document generalizes the use to any SenML representation. The authors would like to thank Jaime Jimenez, Klaus Hartke, Carsten Bormann, and also everyone in the IETF CoRE and OMA SpecWorks DMSE working groups for their contributions and reviews.

6. References

6.1. Normative References

- [I-D.ietf-core-senml]
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- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC7252] Shelby, Z., Hartke, K., and C. Bormann, "The Constrained Application Protocol (CoAP)", [RFC 7252](#), DOI 10.17487/RFC7252, June 2014, <<https://www.rfc-editor.org/info/rfc7252>>.

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- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.

6.2. Informative References

- [IPSO] IPSO, "IP for Smart Objects - IPSO Objects", 2018, <<https://github.com/IPSO-Alliance/pub>>.

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