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Authors: T. Fossati H. Birkholz
arm Fraunhofer SIT

Parametrized Content-Format for CoAP

Abstract

This document specifies a "parametrized" CoAP Content-Format data item that allows supplementing a Content-Format with additional media type parameters.

This document also defines two new CoAP Options, Parmetrized-Content-Format and Parametrized-Multi-Valued-Accept, that build upon the "parametrized" Content-Format data item to work around some of the limitations of the existing Accept and Content-Format Options.

About This Document

This note is to be removed before publishing as an RFC.

The latest revision of this draft can be found at https://thomas-fossati.github.io/draft-coap-parametrized-cf/draft-fossati-core-parametrized-cf.html. Status information for this document may be found at https://datatracker.ietf.org/doc/draft-fossati-core-parametrized-cf/.

Discussion of this document takes place on the Constrained RESTful Environments Working Group mailing list (mailto:core@ietf.org), which is archived at https://mailarchive.ietf.org/arch/browse/core/.

Source for this draft and an issue tracker can be found at https://github.com/thomas-fossati/draft-coap-parametrized-cf.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on 12 December 2022.

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1. Introduction

CoAP squashes the combination of a media type, media type parameters and content coding into a single Content-Format number. (For an example, see Section 16.10 of [RFC8152].) This number is carried in the Content-Format and Accept Options.

This compression strategy is ideal in cases where the set of possible combinations is known upfront and has small cardinality. However, it lacks the flexibility to deal smoothly with situations where the number of combinations can grow unbounded.

An example is [I-D.lundblade-rats-eat-media-type], in which the "profile" media type parameter can carry a number of different values that are constantly minted through a loosely regulated process.

To avoid the combinatorial explosion that derives from such premises, this document defines the "parametrized" Content-Format data item (Section 3) as a mechanism to enrich a given Content-Format with additional media type parameters.

Two new CoAP Options that build upon such data item are also defined:

- *Parametrized-Content-Format (Section 4)

- *Parametrized-Multi-Valued-Accept (Section 5)

The latter also works around the limited content negotiation capabilities of the CoAP Accept Option by allowing to accept more than one Content-Format per request.

2. Conventions and Definitions

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.

3. Parametrized Content-Format

The Parametrized Content-Format is a CBOR [STD94] data item defined by the CDDL [RFC8610] in Figure 1.

The first element in the tuple is the Content-Format identifier, followed by zero or more name-value pairs representing the additional media type parameters.

The name-value pairs are optional to support the case where the Parametrized Content-Format is used in Parametrized Multi-Valued Accept Option (Section 5).

```
parametrized-content-format = [
  content-format,
  * [ parameter-name, parameter-value ]
]

content-format = 0..65535

parameter-name = textual / numeric
parameter-value = any

textual = text .abnf ("parameter-name" .det RFC6838-parameter-name)
numeric = int

RFC6838-parameter-name = '
  parameter-name = restricted-name

  restricted-name = restricted-name-first *126restricted-name-chars
  restricted-name-first  = ALPHA / DIGIT
  restricted-name-chars  = ALPHA / DIGIT / "!" / "#" /
                           "$" / "&" / "-" / "^" / "_"
  restricted-name-chars =/ "." ; Characters before first dot always
                               ; specify a facet name
  restricted-name-chars =/ "+" ; Characters after last plus always
                               ; specify a structured syntax suffix

  ALPHA         =  %x41-5A / %x61-7A  ; A-Z / a-z
  DIGIT         =  %x30-39            ; 0-9
'
```

Figure 1: CDDL for the Parametrized Content-Format

TODO describe use of numeric identifiers as alias for parameter names (requires a new registry).

3.1. Requirements

The list that follows details the semantic requirements that a Parametrized Content-Format data item must satisfy:

- The intersection between the media parameters already encoded in the Content-Format identifier and the set of parameters carried in the name-value pairs of the Parametrized Content-Format **MUST** be empty.

- Each name-value pair **MUST** be a registered parameter for the media type.

If any of the conditions listed above is not met, the entire data item is considered invalid and **MUST NOT** be processed further.

3.2. Examples

```
[
  65000,
  [ "p1", "a-string-value" ],
  [ "p2", 128 ]
]
```

Figure 2: Example #1

4. Parametrized Content-Format Option

Number	C	U	N	R	Name	Format	Length	Default
TBD24					Parametrized Content-Format Option	See Figure 3		none

Table 1: Parametrized Content-Format Option

The Parametrized Content-Format Option carries a CBOR-encoded Parametrized Content-Format data item.

```
pcf-option-fmt = bytes .cbor parametrized-content-format
```

Figure 3: Parametrized Content-Format Option Format

The semantic is identical to the Content-Format Option described in Section 5.10.3 of [RFC7252].

5. Parametrized Multi-Valued Accept Option

Number	C	U	N	R	Name	Format	Length	Default
TBD13	x				Parametrized Multi-Valued Accept Option	See Figure 4		none

Table 2: Parametrized Multi-Valued Accept Option

The Parametrized Multi-Valued Accept Option carries a single CBOR-encoded Parametrized Content-Format data item or two or more Parametrized Content-Format data items as a CBOR array.

```
one-or-more<T> = T / [ 2* T ]

pmva-option-fmt = bytes .cbor one-or-more<parametrized-content-format>
```

Figure 4: Parametrized Multi-Valued Accept Option Format

The semantic is identical to the Accept Option described in Section 5.10.4 of [RFC7252], except for the ability to list more than one acceptable (parametrized) Content-Format, which is key to enable finer-grained content negotiation.

The Content-Formats are listed in order of preference. If more than one match is found, the entry with the lowest index in the array **MUST** be selected.

6. Security Considerations

TODO Security

7. IANA Considerations

TODO IANA

8. References

8.1. Normative References

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Acknowledgments

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Authors' Addresses

Thomas Fossati
arm

Email: thomas.fossati@arm.com

Henk Birkholz
Fraunhofer SIT

Email: henk.birkholz@sit.fraunhofer.de