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Representing CoRE Link Collections in JSON
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Abstract

Web Linking (RFC5988) provides a way to represent links between Web resources as well as the relations expressed by them and attributes of such a link. In constrained networks, a collection of Web links can be exchanged in the CoRE link format (RFC6690). Outside of constrained environments, it may be useful to represent these collections of Web links in JSON format (RFC7159).

This specification defines a common format for representing Web links in JSON format.

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1. Introduction

Web Linking [RFC5988] provides a way to represent links between Web resources as well as the relations expressed by them and attributes of such a link. In constrained networks, a collection of Web links can be exchanged in the CoRE link format [RFC6690] to enable resource discovery, for instance by using the CoAP protocol [RFC7252].

Outside of constrained environments, it may also be useful to represent the same collections of Web links in the widely used JSON format [RFC7159]. When converting between these two formats, as usual, there are many little decisions that have to be made. If left without guidance, it is likely that a number of slightly incompatible dialects will emerge.

This specification defines a common format for representing CoRE Web Linking in JSON format.

Note that there is a separate question on how to represent Web links out of JSON documents, as discussed e.g. in [MNOT11]. While there are good reasons to stay as compatible as possible to developments in this area, the present specification is solving a different problem.

1.1. Objectives

This specification has been designed based on the following objectives:

- o Canonical mapping
 - * lossless round-tripping with [RFC6690]
 - * but not trying for bit-preserving (DER-style) round-tripping
- o The simplest thing that could possibly work
 - * Do not cater for RFC 5988 complications caused by HTTP header character set issues [RFC2047]
- o Consider other work that has links in JSON, e.g.: JSON-LD, JSON-Reference [I-D.pbryan-zyp-json-ref]
 - * Do not introduce unmotivated differences

1.2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119] when they appear in ALL CAPS. These words may also appear in this document in lower case as plain English words, absent their normative meanings.

2. Web Links in JSON

The objective of the JSON mapping defined in this document is to contain information of the formats specified in [RFC5988] and [RFC6690]. This specification therefore uses the names of the ABNF productions used in those documents.

An application/link-format document is a collection of web links ("link-value"), each of which is a collection of attributes ("link-param") applied to a "URI-Reference".

We straightforwardly map:

- o the outer collection to an array of links
- o each link to a JSON object.

In the object representing a "link-value", each target attribute or other parameter ("link-param") is represented by a JSON name/value

pair (member). The name is a string representation of the parameter or attribute name (as in "parmname"), the value is a string representation of the parameter or attribute value ("ptoken" or "quoted-string"). "quoted-string" productions are parsed (i.e, the backslash constructions evaluated) as defined in [RFC6690] and its referenced documents, before placing them in JSON strings (where they may gain back additional decorations such as backslashes as defined in [RFC7159]).

If a Link attribute ("parmname") is present more than once in a "link-value", its values are then represented as a JSON array of JSON string values; this array becomes the value of the JSON name/value pair where the attribute name is the JSON name. Attributes occurring just once MUST NOT be represented as JSON arrays but MUST be directly represented as JSON strings. (Note that the most recent version of link-format has cut down on the use of repeated parameter names; they are still allowed by [RFC5988] though. No attempt has been made to decode the possibly space-separated values for rt=, if=, and rel= into JSON arrays.)

The URI-Reference is represented as a name/value pair with the name "href" and the URI-Reference as the value. (Rationale: This usage is consistent with the use of "href" as a query parameter for link-format query filtering and with link-format reserving the link parameter "href" specifically for this use [RFC6690]).

(TBD: Should we do something special with the "hosts" relation? Should we include an anchor where the link-format does not explicitly set one?)

2.1. Examples

```
</sensors>;ct=40;title="Sensor Index",  
</sensors/temp>;rt="temperature-c";if="sensor",  
</sensors/light>;rt="light-lux";if="sensor",  
<http://www.example.com/sensors/tl23>;anchor="/sensors/temp"  
;rel="describedby",  
</t>;anchor="/sensors/temp";rel="alternate"
```

Figure 1: Example from page 15 of [RFC6690]

becomes

```
"[{ "href": "/sensors", "ct": "40", "title": "Sensor Index" }, { "href"  
": "/sensors/temp", "rt": "temperature-c", "if": "sensor" }, { "href"  
": "/sensors/light", "rt": "light-lux", "if": "sensor" }, { "href": "http://www.example.com/sensors/  
tl23", "anchor": "/sensors/
```

```
temp", "rel": "describedby"}, {"href": "/t", "anchor": "/sensors/  
temp", "rel": "alternate"}] "
```

(More examples to be added.)

3. IANA Considerations

This specification registers the following additional Internet Media Types:

Type name: application

Subtype name: link-format+json

Required parameters: None

Optional parameters: None

Encoding considerations: Resources that use the "application/link-format+json" media type are required to conform to the "application/json" Media Type and are therefore subject to the same encoding considerations specified in Section 6 {{RFC7159}}.

Security considerations: As defined in this specification

Published specification: This specification.

Applications that use this media type: None currently known.

Additional information:

Magic number(s): N/A

File extension(s): N/A

Macintosh file type code(s): TEXT

Person & email address to contact for further information:
Carsten Bormann <cabo@tzi.org>

Intended usage: COMMON

Change controller: IESG

4. Security Considerations

The security considerations of [RFC6690] apply.

(TBD.)

5. Acknowledgements

(TBD.)

6. References

6.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC5988] Nottingham, M., "Web Linking", RFC 5988, October 2010.
- [RFC6690] Shelby, Z., "Constrained RESTful Environments (CoRE) Link Format", RFC 6690, August 2012.
- [RFC7159] Bray, T., "The JavaScript Object Notation (JSON) Data Interchange Format", RFC 7159, March 2014.

6.2. Informative References

- [I-D.pbryan-zyp-json-ref] Bryan, P. and K. Zyp, "JSON Reference", draft-pbryan-zyp-json-ref-03 (work in progress), September 2012.
- [MNOT11] Nottingham, M., "Linking in JSON", November 2011, <http://www.mnot.net/blog/2011/11/25/linking_in_json>.
- [RFC2047] Moore, K., "MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for Non-ASCII Text", RFC 2047, November 1996.
- [RFC7252] Shelby, Z., Hartke, K., and C. Bormann, "The Constrained Application Protocol (CoAP)", RFC 7252, June 2014.

Appendix A. Implementation

This appendix provides a simple reference implementation of the mapping between CoRE link format and Links-in-JSON.

(TBD - the reference implementation was used to create the above examples, but I still have to clean it up for readability and paste it in at 69 columns max.)

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