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C. Bormann
Universität Bremen TZI
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An sdfType for Links
draft-ietf-asdf-sdftype-link-00

Abstract

This document defines and registers an sdfType "link" for the Semantic Definition Format (SDF) for Data and Interactions of Things (draft-ietf-asdf-sdf).

About This Document

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

Status information for this document may be found at
<https://datatracker.ietf.org/doc/draft-ietf-asdf-sdftype-link/>.

Discussion of this document takes place on the A Semantic Definition Format for Data and Interactions of Things Working Group mailing list (<mailto:asdf@ietf.org>), which is archived at <https://mailarchive.ietf.org/arch/browse/asdf/>. Subscribe at <https://www.ietf.org/mailman/listinfo/asdf/>.

Source for this draft and an issue tracker can be found at
<https://github.com/cabo/sdftype-link>.

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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Table of Contents

1. Introduction	2
1.1. Conventions and Definitions	3
2. The sdfType "link"	3
3. Discussion	4
4. Security Considerations	4
5. IANA Considerations	4
6. References	5
6.1. Normative References	5
6.2. Informative References	5
Acknowledgments	6
Author's Address	6

1. Introduction

The Semantic Definition Format for Data and Interactions of Things (SDF, [I-D.ietf-asdf-sdf]) is a format for domain experts to use in the creation and maintenance of data and interaction models in the Internet of Things.

A common data type that occurs in the modeling of IoT devices is the `_link_`. [RFC8288] defines the concept of Web Linking, which, apart from the target URI that any link will contain, can provide additional parameters, such as the "link relation type" that explains the relationship expressed by the link, as well as "target attributes" that provide additional information about the target of the link (without a need to "dereference", i.e., follow, the link).

This document defines and registers an sdfType "link" for the Semantic Definition Format. This type models an abstract "serialization" [RFC8288] of a link, in a way that is compatible with the way SDF maps information models to its data modeling language.

1.1. Conventions and Definitions

The definitions of [RFC6690], [RFC8288], and [I-D.ietf-asdf-sdf] apply.

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 [BCP14] (RFC2119) (RFC8174) when, and only when, they appear in all capitals, as shown here.

2. The sdfType "link"

The sdfType "link" is intended to be used with the SDF "type" of "object". The members of that object are strings that are named the same as the link parameter (attribute) names. The special parameter name "href" is used to express the link target. (Parameter names specific to the Constrained RESTful Environment (CoRE) are also discussed in [RFC9423].)

Note that attribute names and relation type names are case-insensitive in [RFC8288]. Strings that are case-insensitive in [RFC8288] MUST be in their lowercase form when used in this specification.

An example for the instance of a link is provided in Section 5 of [RFC6690]:

```
</sensors/temp>;rt="temperature-c";if="sensor",
```

To hold a link like this, we could describe an SDF affordance that is specific on the target attributes above, but does not contain instance-specific (run-time) information on the actual URI that points to the link target. An sdfProperty for that could look like:

```
{
  "sdfProperty": {
    "temp-c-link": {
      "type": "object",
      "sdfType": "link",
      "properties": {
        "href": { "type": "string" },
        "rt": { "type": "string", "const": "temperature-c" },
        "if": { "type": "string", "const": "sensor" }
      }
    }
  }
}
```

3. Discussion

Links play an important role in SDF modeling both during definition time (for adding information to a model, such as in `sdfRef`) and during run time (for making links to instances into a subject of data and interaction modeling). The present document is an early attempt at addressing the run-time usage of links, in particular links that fit the Web Linking [RFC8288] abstractions. A related draft [I-D.laari-asdf-relations] addresses definition-time links, but does seem to touch modeling run-time use of links as well (e.g., by discussing "writable" link relations).

Not all links used in ecosystems are based on URIs. E.g., OMA has "object links", which are basically pairs of numbers (object/instance). These ecosystem links may have some structure that should be modeled in the SDF model (e.g., where the object id part of a link always has to have a specific value). This structure can be mapped into URI strings using some convention, e.g., an OMA object link could be `oma-object:3303:0` (where `oma-object` is placeholder for a URI scheme to be defined). However, burying structural components of the ecosystem-specific link in a string syntax makes it hard to access and control those components from the model.

TODO: Examples are needed to show how the OCF collection pattern is addressed by the current specification.

4. Security Considerations

The security considerations of [RFC8288] apply in a general way, although modeling a link as a datatype does not incur all of the security considerations that will apply to actually interchanging these links.

(TODO)

5. IANA Considerations

// RFC Ed.: please replace RFC XXXX with this RFC number and remove this note.

IANA is requested to register the sdfType "link" in the "sdfType Values" sub-registry in the "SDF Parameters" registry, with the following completion for the registration template:

Name	Description	type	JSON Representation	Reference
link	A Web Link [RFC8288]	object	object members for link attributes	RFCXXXX

Table 1: Registration for sdfType "link"

6. References

6.1. Normative References

- [BCP14] Best Current Practice 14,
<<https://www.rfc-editor.org/info/bcp14>>.
At the time of writing, this BCP comprises the following:
- 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>>.
- 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>>.
- [I-D.ietf-asdf-sdf]
Koster, M., Bormann, C., and A. Keränen, "Semantic Definition Format (SDF) for Data and Interactions of Things", Work in Progress, Internet-Draft, draft-ietf-asdf-sdf-23, 17 March 2025, <<https://datatracker.ietf.org/doc/html/draft-ietf-asdf-sdf-23>>.
- [RFC8288] Nottingham, M., "Web Linking", RFC 8288, DOI 10.17487/RFC8288, October 2017, <<https://www.rfc-editor.org/rfc/rfc8288>>.

6.2. Informative References

- [I-D.laari-asdf-relations]
Laari, P., "Extended relation information for Semantic Definition Format (SDF)", Work in Progress, Internet-Draft, draft-laari-asdf-relations-04, 28 January 2025, <<https://datatracker.ietf.org/doc/html/draft-laari-asdf-relations-04>>.

- [RFC6690] Shelby, Z., "Constrained RESTful Environments (CoRE) Link Format", RFC 6690, DOI 10.17487/RFC6690, August 2012, <<https://www.rfc-editor.org/rfc/rfc6690>>.
- [RFC9423] Bormann, C., "Constrained RESTful Environments (CoRE) Target Attributes Registry", RFC 9423, DOI 10.17487/RFC9423, April 2024, <<https://www.rfc-editor.org/rfc/rfc9423>>.

Acknowledgments

Discussions in the OneDM liaison organization shaped this proposal.

Author's Address

Carsten Bormann
Universit t Bremen TZI
Postfach 330440
D-28359 Bremen
Germany
Phone: +49-421-218-63921
Email: cabo@tzi.org