

service-register HTTP/TLS/JSON

Interface Design Description

Abstract

This document describes a HTTP protocol with TLS payload security and JSON payload encoding variant of the **service-register** service.

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1 Overview

This document describes the **service-register** service interface, which enables autonomous service registration. It's implemented using protocol, encoding as stated in the following table:

| Profile ype | Type | Version |
|-------------------|-----------|--------------|
| Transfer protocol | HTTP | 1.1 |
| Data encryption | TLS | 1.3 |
| Encoding | e.g. JSON | RFC 8259 [1] |
| Compression | N/A | - |

Table 1: Communication and semantics details used for the **service-register** service interface

This document provides the Interface Design Description IDD to the *service-register – Service Description* document. For further details about how this service is meant to be used, please consult that document.

The rest of this document describes how to realize the service-register service HTTP/TLS/JSON interface in details.

2 Interface Description

The service responds with the status code 201 Created if called successfully. The error codes are, 400 Bad Request if request is malformed, 401 Unauthorized if improper client side certificate is provided, 500 Internal Server Error if Service Registry is unavailable.

```
1 POST /serviceregistry/register HTTP/1.1
2
3 {
4   "endOfValidity": "2020-03-18T22:13:32.143",
5   "interfaces": [
6     "HTTP-SECURE-JSON"
7   ],
8   "metadata": {
9     "unit": "celsius"
10  },
11  "providerSystem": {
12    "address": "192.168.0.101",
13    "authenticationInfo": "public key of the client certificate",
14    "port": 8080,
15    "metadata": {
16      "location": "building-a"
17    },
18    "systemName": "exampleprovider"
19  },
20  "secure": "TOKEN",
21  "serviceDefinition": "temperature",
22  "serviceUri": "/",
23  "version": 1
24 }
```

Listing 1: A `service-register` invocation.

```
1 {
2   "id": 14,
3   "serviceDefinition": {
4     "id": 13,
5     "serviceDefinition": "temperature",
6     "createdAt": "2020-03-18T22:13:32.143",
7     "updatedAt": "2020-03-18T22:13:32.143"
8   },
9   "provider": {
10    "id": 4,
11    "systemName": "exampleprovider",
12    "address": "192.168.0.101",
13    "port": 8080,
14    "authenticationInfo": "public key of the client certificate",
15    "metadata": {
16      "location": "building-a"
17    },
18    "createdAt": "2020-03-18T22:13:32.143",
19    "updatedAt": "2020-03-18T22:13:32.143"
20  },
21  "serviceUri": "/",
22  "endOfValidity": "2020-03-18T22:13:32.143",
23  "secure": "TOKEN",
24  "metadata": {
25    "unit": "celsius"
26  },
27  "version": 1,
28  "interfaces": [
29    {
30      "id": 1,
31      "interfaceName": "HTTP-SECURE-JSON",
32      "createdAt": "2020-03-18T22:13:32.143",
```

```
33     "updatedAt": "2020-03-18T22:13:32.143"  
34   }  
35 ],  
36 "createdAt": "2020-03-18T22:13:32.143",  
37 "updatedAt": "2020-03-18T22:13:32.143"  
38 }
```

Listing 2: A [service-register](#) response.

3 Data Models

Here, all data objects that can be part of the service calls associated with this service are listed in alphabetic order. Note that each subsection, which describes one type of object, begins with the *struct* keyword, which is meant to denote a JSON Object that must contain certain fields, or names, with values conforming to explicitly named types. As a complement to the primary types defined in this section, there is also a list of secondary types in Section 3.3, which are used to represent things like hashes, identifiers and texts.

3.1 struct **ServiceRegistryRequest**

This structure is used to register a service offering into the Service Registry.

| Field | Type | Mandatory | Description |
|-------------------|------------------|-----------|-----------------------------------------------------------|
| endOfValidity | DateTime | no | Service is available until this UTC timestamp. |
| interfaces | Array<Interface> | yes | List of interfaces the service supports. |
| metadata | Metadata | no | Metadata |
| providerSystem | Object | yes | Descriptor of the provider system. |
| secure | SecureType | no | Type of security the service uses. Default: NOT_SECURE |
| serviceDefinition | Name | yes | Identifier of the service. |
| serviceUri | URI | no | URI of the service. |
| version | Version | no | Version of the service. Default: 1 |

3.1.1 struct **providerSystem**

| Field | Type | Mandatory | Description |
|--------------------|------------|-----------|-------------------------------------------------|
| address | String | yes | A string representation of the network address. |
| authenticationInfo | String | no | Public key of the client certificate. |
| metadata | Metadata | no | Metadata |
| port | PortNumber | yes | Port of the system. |
| systemName | Name | yes | Name of the system. |

3.2 struct **ServiceRegistryResponse**

| Field | Type | Description |
|-------------------|---------------|-------------------------------------------------------------|
| createdAt | DateTime | Service instance record was created at this UTC timestamp. |
| endofValidity | DateTime | Service is available until this UTC timestamp. |
| id | Number | Identifier of the service instance |
| interfaces | Array<Object> | List of interfaces the service supports. |
| metadata | Metadata | Metadata |
| provider | Object | Descriptor of the provider system record. |
| secure | SecureType | Type of security the service uses. |
| serviceDefinition | Object | Descriptor of the serviceDefinition record. |
| serviceUri | URI | URI of the service. |
| updatedAt | DateTime | Service instance record was modified at this UTC timestamp. |
| version | Version | Version of the service. |

3.2.2 struct **interfaces**

| Field | Type | Description |
|---------------|-----------|---------------------------------------------------------------|
| createdAt | DateTime | Interface instance record was created at this UTC timestamp. |
| id | Number | Identifier of the interface instance |
| interfaceName | Interface | Specified name of the interface. |
| updatedAt | DateTime | Interface instance record was modified at this UTC timestamp. |

3.2.3 struct **provider**

| Field | Type | Description |
|--------------------|------------|------------------------------------------------------------|
| address | String | A string representation of the network address. |
| authenticationInfo | String | Public key of the client certificate. |
| createdAt | DateTime | System instance record was created at this UTC timestamp. |
| id | Number | Identifier of the system instance |
| metadata | Metadata | Metadata |
| port | PortNumber | Port of the system. |
| systemName | Name | Name of the system. |
| updatedAt | DateTime | System instance record was modified at this UTC timestamp. |

3.2.4 struct **serviceDefinition**

| Field | Type | Description |
|-------------------|----------|------------------------------------------------------------------------|
| createdAt | DateTime | Service definition instance record was created at this UTC timestamp. |
| id | Number | Identifier of the service definition instance |
| serviceDefinition | Name | Name of the service definition. |
| updatedAt | DateTime | Service definition instance record was modified at this UTC timestamp. |

3.3 Primitives

As all messages are encoded using the JSON format [2], the following primitive constructs, part of that standard, become available. Note that the official standard is defined in terms of parsing rules, while this list only concerns syntactic information. Furthermore, the Object and Array types are given optional generic type parameters, which are used in this document to signify when pair values or elements are expected to conform to certain types.

| JSON Type | Description |
|------------|--------------------------------------------------------------------------------------------------------|
| Value | Any out of Object, Array, String, Number, Boolean or Null. |
| Object <A> | An unordered collection of [String: Value] pairs, where each Value conforms to type A. |
| Array <A> | An ordered collection of Value elements, where each element conforms to type A. |
| String | An arbitrary UTF-8 string. |
| Number | Any IEEE 754 binary64 floating point number [3], except for <i>+Inf</i> , <i>-Inf</i> and <i>NaN</i> . |
| Boolean | One out of <i>true</i> or <i>false</i> . |
| Null | Must be <i>null</i> . |

With these primitives now available, we proceed to define all the types specified in the **service-register** SD document without a direct equivalent among the JSON types. Concretely, we define the **service-register** SD primitives either as *aliases* or *structs*. An *alias* is a renaming of an existing type, but with some further details about how it is intended to be used. Structs are described in the beginning of the parent section. The types are listed by name in alphabetical order.

3.3.1 alias DateTime = String

Pinpoints a moment in time in the format of ISO8601 standard "yyyy-mm-ddThh:mm:ss", where "yyy" denotes year (4 digits), "mm" denotes month starting from 01, "dd" denotes day starting from 01, "T" is the separator between date and time part, "hh" denotes hour in the 24-hour format (00-23), "MM" denotes minute (00-59), "SS" denotes second (00-59). " " is used as separator between the date and the time. An example of a valid date/time string is "2020-12-05T12:00:00"

3.3.2 alias id = Number

An identifier generated for each Object that enables to distinguish them and later to refer to a specific Object.



3.3.3 alias Interface = String

A String that describes an interface in *Protocol-SecurityType-MimeType* format. *SecurityType* can be SECURE or INSECURE. *Protocol* and *MimeType* can be anything. An example of a valid interface is: "HTTPS-SECURE-JSON" or "HTTP-INSECURE-SENML".

3.3.4 alias Name = String

A String identifier that is intended to be both human and machine-readable.

3.3.5 alias PortNumber = Number

Decimal Number in the range of 0-65535.

3.3.6 alias SecureType = String

A String that describes the security type. Possible values are *NOT_SECURE* or *CERTIFICATE* or *TOKEN*.

3.3.7 alias URI = String

A String that represents the URL subpath where the offered service is reachable, starting with a slash ("/"). An example of a valid URI is "/temperature".

3.3.8 alias Version = Number

A Number that represents the version of the service. An example of a valid version is: 1.

4 References

- [1] T. Bray, "The JavaScript Object Notation (JSON) Data Interchange Format," RFC 8259, Dec. 2017. [Online]. Available: <https://rfc-editor.org/rfc/rfc8259.txt>
- [2] —, "The JavaScript Object Notation (JSON) Data Interchange Format," RFC 7159, 2014, RFC Editor. [Online]. Available: <https://doi.org/10.17487/RFC7159>
- [3] M. Cowlishaw, "IEEE Standard for Floating-Point Arithmetic," *IEEE Std 754-2019 (Revision of IEEE 754-2008)*, July 2019. [Online]. Available: <https://doi.org/10.1109/IEEESTD.2019.8766229>



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5 Revision History

5.1 Amendments

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| 1 | YYYY-MM-DD | 4.4.0 | | Xxx Yyy |

5.2 Quality Assurance

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