ASDF
IETF 109
2020-11-17

Note Well

- You will be recorded
- Be nice, and be professional
- The IPR guidelines of the IETF apply:
  see **http://ietf.org/ipr** for details.

Repo: https://github.com/ietf-wg-asdf/asdf-working-group-notes
Notes: https://codimd.ietf.org/notes-ietf-109-asdf

Note Well

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Definitive information is in the documents listed below and other IETF BCPs. For advice, please talk to WG chairs or ADs:

- BCP 9 (Internet Standards Process)
- BCP 25 (Working Group processes)
- BCP 25 (Anti-Harassment Procedures)
- BCP 54 (Code of Conduct)
- BCP 78 (Copyright)
- BCP 79 (Patents, Participation)
- https://www.ietf.org/privacy-policy/(Privacy Policy)

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Agenda

- Introduction, admin, agenda bashing (10 min)
- ASDF status update (chairs) (10min)
- SDF 1.1 features
- AOB

Administrative

- CodiMD for notes https://codimd.ietf.org/notes-ietf-109-asdf
- Meetecho for speaking. https://meetings.conf.meetecho.com/ietf109/?group=asdf&short=&item=1
- jabber: xmpp:asdf@jabber.ietf.org
- Roll call/Blue sheet
- Note takers
- AOB?

Status update

- **Status:** ASDF WG was chartered in October
- **Chairs:** Michael Richardson and Niklas Widell
- **Progress so far:**
  - Unofficial hallway meeting — SDF 1.0 tutorial: https://youtu.be/_8i6X4AxuOk
  - Virtual interim — **SDF 1.0 draft adopted** as draft-ietf-asdf-sdf
  - IETF 109 Hackathon — Preparations for SDF 1.1
- **Meeting plans:**
  - IETF 109 — today
  - Virtual interim in December

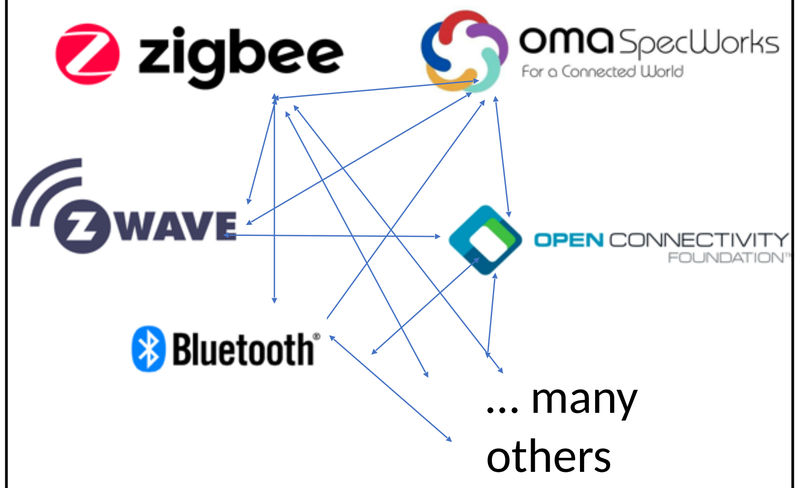
WG procedures

- Decisions on mailing list: https://www.ietf.org/mailman/listinfo/asdf
- Work on Github: https://github.com/ietf-wg-asdf
  - Use Issue tracker for issues (new features and fixes)
- Schedule (doodle) regular virtual interims between virtual physical meetings
- Plan to release intermediate “Implementation Drafts” of SDF
  - E.g., to be used by OneDM as update target for toolchains

One Data Model in a nutshell

The problem

Several standardised data models

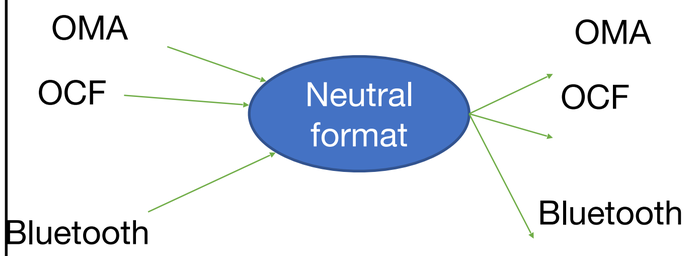


… many others

Lack of semantic interoperability across ecosystems ➔ high integration cost

Potential Solutions

- ❑ Everyone join my (or your) ecosystem ➔ *does not work*
- ✓ Facilitate translation between ecosystems via a neutral format



One Data Model

- ✓ Neutral format: Semantic Definition Format (SDF), now destined for IETF
- ✓ Create toolchains SDF ⇔ ecosystems
- ✓ Create set of adopted device models for wider re-use
- ✓ https://onedm.org/

ASDF Outreach

- Value of ASDF increases with increased adoption of SDF by organisations doing IoT data models

- Outreach so far (beyond OneDM)
  - ASDF presented to DMSE (LwM2M) group in OMA SpecWorks
  - SDF proposed to ISO/IEC JTC1 SC41 for IoT Thing modeling

- **If your organisation works with IoT data models — talk to us!**

SDF 1.1

SDF 1.1: Open Issues

- #3: Have we tested the cross-referencing/reuse well-enough?
  - #7: override/augment after reference
- #4: support for compound/composite data (can fix parameter-lists as well)
- #2: enums, #5: choices: handle more than optionality in composition
  - Related, but somewhat different
  - #2 Enum: uniformity of alternatives; need to add descriptive information
  - #5 “anyOf”: type union; misses out on description of alternatives

Hackathon: What got done

- Tested out resolutions to issue 3: cross-model referencing
  - Came up with convention on curie usage
  - Discussed transitions in namespaces during model progress and completion
- Made progress on issue 4: aggregation (compound types)
  - Fixing the way data are composed for actions and events

#3, #7

Reference:
share elements inside and outside spec

- https://github.com/ietf-wg-asdf/SDF/issues/3 (“#3”)
- Use JSON pointers right now; management of the space was untested
- What can we reference?
  - 1.0: Data type (via `sdfData`)
  - 1.1:
    - Do we need to reference (and combine?) entire affordances?
    - How much can we alter a referenced type/affordance? (#7)

Reference: Example

- `sdfData` referencing another `sdfData`:

```
“sdfData": {
  "length" : {
    "type": "number",
    "minimum": 0,
    "units": "m"
    "description": "There can be no negative lengths."
  }
...
  "cable-length" : {
    "sdfRef": "#/sdfData/length"
    "minimum": 0.05,
    "description": "Cables must be at least 5 cm."
  }
```

- Does the second `description` override or add to the first `description`?

Reference: Example

- `sdfProperty` referencing another `sdfData`:

```
"sdfData": {
  "length" : {
    "type": "number",
    "minimum": 0,
    "units": "m"
    "description": "There can be no negative lengths."
  }
},
"sdfProperty: {
  "cable-length" : {
    "sdfRef": "#/sdfData/length"
    "minimum": 0.05,
    "description": "Cables must be at least 5 cm."
  } …
```

- `sdfData` just *defines* the type, does not *declare* an affordance; `sdfProperty` does

Reference: old Example

- `sdfProperty` referencing another `sdfData` in a different specification:

```
"sdfData": {
  "length": {
    "type": "number",
    "minimum": 0,
    "units": "m"
    "description": "There can be no negative lengths."
  }
}
```

Export

Over in example.com namespace:

```
"namespace": {
  "moo": "https://example.com/#"
},
"defaultnamespace": "moo"
```

```
"sdfProperty: {
  "cable-length" : {
    "sdfRef": "foo:/sdfData/length"
    "minimum": 0.05,
    "description": "Cables must be at least 5 cm."
  } …
```

Import

```
"namespace": {
  "foo": "https://example.com/#"
}
```

- This is part of SDF 1.0, but we haven't exercised this

Reference: updated Example

- `sdfProperty` referencing another `sdfData` in a different specification:

Export

```
"sdfData": {
  "length": {
    "type": "number",
    "minimum": 0,
    "units": "m"
    "description": "There can be no negative lengths."
  }
}
```

Over in example.com namespace:

```
"namespace": {
  "moo": "https://example.com/"
},
"defaultnamespace": "moo"
```

Import

```
"sdfProperty: {
  "cable-length" : {
    "sdfRef": “foo:#/sdfData/length"
    "minimum": 0.05,
    "description": "Cables must be at least 5 cm."
  } …
```

```
"namespace": {
  "foo": "https://example.com/"
}
```

- Keep the # with the curie; this allows uniform referents for local and defaultNamespace

Reference: updated Example

- `sdfProperty` referencing another `sdfData` in a different specification:

Export

```
"sdfData": {
  "length": {
    "type": "number",
    "minimum": 0,
    "units": "m"
    "description": "There can be no negative lengths."
  }
}
```

Over in example.com namespace:

```
"namespace": {
  "moo": "https://example.com/"
},
"defaultnamespace": "moo"
```

Import

```
"sdfProperty: {
  "cable-length": {
    "sdfRef": "#/sdfData/length"
    "minimum": 0.05,
    "description": "Cables must be at least 5 cm."
  } …
```

```
"namespace": {
  "foo": "https://example.com/"
},
"defaultnamespace": "foo"
```

- Keep the # with the curie; this allows uniform referents for local and defaultNamespace

#4

Aggregation:
Composing types out of components

- https://github.com/ietf-wg-asdf/SDF/issues/4

- 1.0: Awkward composition in parameter lists (`sdf*Data` in Action/Event); unnecessarily different from Property, where Data are defined in place; `sdfRequired` is awkward way to describe optionality

- 1.1: go for (1) direct reference (only one, no “multiple inheritance”?) as well as (2) named fields (choice of specifier)

- Also: do we compose only types or entire affordances?

Aggregation: Example

- `compound1`: a property built out of two data items

```
"sdfProperty": {
  "simple1" : { "type": "string" },
  "compound1": {
    "type": "object",
    "required": ["element1"],
    "properties": {
      "element1": { "type": "number" },
      "element2": { "type": "string" }
    }
  }
}
```

  - Mirror “type”: “`object`” like in json-schema.org

- express optionality like in json-schema.org

Aggregation: get rid of pointer-lists

- 1.0: types, but not names, for parameters

```
"sdfAction": {
  "hug": {
    "sdfInputData": ["#/foo/bar/squeeze", … ],
    "sdfOutputData": ["#/foo/bar/comfort", … ]
  }
}
```

- 1.1 (in –01): can have both, plus other descriptions and semantic tags

```
"sdfAction": {
  "hug": {
    "sdfInputData": {"type": "object", "properties": { "squeeze": … }},
    "sdfOutputData": {"type": "object", "properties": { "comfort": … }}
  }
}
```

#2, #5

Choice:
Composing types out of alternatives

- https://github.com/ietf-wg-asdf/SDF/issues/2:
  named alternatives (`enum`s), with numbers (ranges) thrown in or not
  (limited to text/number/bool/*text/*number/*bool in 1.0)

- https://github.com/ietf-wg-asdf/SDF/issues/5:
  build choices out of general alternative types [`anyOf`]
  (not in 1.0; adding a variant of json-schema.org's `anyOf` allows types to be merged without naming the alternatives)

- There really isn’t much of a difference
  (except that json-schema.org has different names for these cases)

- Convenience value in:
  just giving text string names to a newly set up choice (`enum` of strings),
  vs. naming semantic tags locally (map a string to each semantic tag)

Choice: Example

- `state` — has a data type with two alternatives:

```
"sdfProperty": {
  "state": {
    "sdfEnum": {
      "on": {
        "description": "activated state, or powered state",
        "label": "On"
      },
      "off": {
        "description": "deactivated state, or non-powered state",
        "label": "Off"
      }
  }
```

- Redundant labels, no semantic foundation, but comment (`description`)

Choice: Example

- `StartUpCurrentLevel` — has a data type with two alternatives, one of which has two alternatives inside:

```
"sdfProperty": {
  "StartUpCurrentLevel": {
    "label": "StartUpCurrentLevel",
    "anyOf": [
      {
        "type": "number",
        "minimum": 1,
        "maximum": 254
      },
      {
        "sdfEnum": {
          "MinimumDeviceValuePermitted": {
            "const": 0
          },
          "SetToPreviousValue": {
            "const": 255
          }
        }
      }
    ]
  }
}
```

- Unnecessary nested choice (one as `anyOf`, one as `enum`); no name for outer alternatives
- Numeric identifiers are not at an information model level (but could still be agreed)

Choice: Example

- `brightnessWithColorTone` — has a data type with three labeled alternatives (more readable, less precise syntax):

```
sdfProperty {
  brightnessWithColorTone {
    anyOf [
      {
        type number
        label "warm"
        minimum 0
        maximum 86
      }
      {
         type number
         label "neutral"
         minimum 87
         maximum 166
      }
      {
         type number
         label "cool"
         minimum 167
         maximum 255
      }
    ]
  }
}
```

- Labels are part of the constituent types; can’t just reference a type
- Numeric identifiers are not at an information model level (but could still be agreed)

Choice: Example

- `brightnessWithColorTone` — has a data type with three labeled alternatives (more readable, less precise syntax):

```
“sdfProperty”: {
  “brightnessWithColorTone”: {
    “warm”: {
        type number
        minimum 0
        maximum 86
      }
    “neutral”: {
         type number
         minimum 87
         maximum 166
      }
    “cool”: {
         type number
         minimum 167
         maximum 255
      }
    ]
  }
}
```

- Labels are now part of the choice construct
- Numeric identifiers are not at an information model level (but could still be agreed)

Choice: choices

- A choice can:
  - Be a type union
    - The branches reliably differ, or
    - It doesn’t matter which branch is used (i.e., the same value can occur in multiple branches but means the same)
  - Be a set of named alternatives
    - This meshes well with attaching semantic information
- **Proposal:**
  - **Always go for named alternatives**
  - **Unify syntax for “enum” and “anyOf” flavors**

Defining the choice syntax

- json-schema.org “Enum” is an array of values
  - Need not be of same “type” (whatever that is for you)
  - A convention is to use text strings only
  - (But these text strings don’t ***mean*** anything)
- json-schema.org “anyOf” is an array of schema expressions
  - No labels for the branches

Choice: Example

- `state` — has a data type with two alternatives:

```
"sdfProperty": {
  "state": {
    "choice": {
      "on": {
        "description": "activated state, or powered state",
        "label": "On"
      },
      "off": {
        "description": "deactivated state, or non-powered state",
        "label": "Off"
      }
    }
```

- Use the names (map keys — must be strings) as labels (could add “const” if needed)

- Can easily add semantic tags beyond human-only “description”

Choice: Example

- `StartUpCurrentLevel` — reformulated as a data type with three alternatives:

```
"sdfProperty": {
  "StartUpCurrentLevel": {
    "choice": {
      “ActualSetting”: {
        "type": "number",
        "minimum": 1,
        "maximum": 254
      },
      "MinimumDeviceValuePermitted": {
        "const": 0
      },
      "SetToPreviousValue": {
        "const": 255
      }
    }
  }
}
```

- Unnecessary nesting fixed; outer alternatives are named (and can have descriptions)
- Numeric identifiers for branches are not at an information model level (but could still be agreed)

1.1

Next steps to SDF 1.1

- https://github.com/ietf-wg-asdf/SDF/issues
- Discuss here and on the mailing list
- Complete the choice discussion and see if we really can close #2 and #5
- Get some work done on #7, look for other small details
- Timebox this; target date?
  - Proposal: 2020-12-08 final draft in repo, **WG has a look**,
  - submit SDF 1.1 as an implementation draft 2020-12-22

Beyond SDF 1.1

- SDF success factors:
  - Enable conversion of existing ecosystem models to SDF
  - SDF attractive as development language for new ecosystem models
- How can we increase these success factors
  - Test with more ecosystems
  - Strengthen the feedback links from ecosystems to SDF development
- Proposal: Aim for SDF 1.2 in February/March (before IETF 110)

AOB?