

Semantic Definition Format (SDF) modeling for Digital Twin

draft-lee-asdf-digital-twin-08

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Status of “SDF Modeling for Digital Twin”

- draft-lee-asdf-digital-twin-00 (IETF 118, Prague, November 2023)
 - Introducing SDF extensions for digital twin
- draft-lee-asdf-digital-twin-01 (ASDF interim, online, April 2024)
 - Adding the examples of a boat’s location description
- draft-lee-asdf-digital-twin-02 (ASDF interim, online, November 2024)
 - Adding sdfLocation to SDF model (Figure 1)
- draft-lee-asdf-digital-twin-03 (ASDF interim, online, November 2024)
 - Adding requirements for digital twin
- draft-lee-asdf-digital-twin-04 (IETF 121, Dublin, November 2024)
 - Adding the basic architecture of digital twin with SDF objects
- draft-lee-asdf-digital-twin-05 (ASDF interim, online, January 2025)
 - Adding the structure of SDF location in 5.1
- draft-lee-asdf-digital-twin-06 (ASDF interim, online, February 2025)
 - Split digital twin from the previous version 05
- draft-lee-asdf-digital-twin-07 (ASDF interim, online, April 2025)
 - Mapping information attributes of digital twin to qualities of sdfThing
- draft-lee-asdf-digital-twin-08 (ASDF interim, online, [June 2025](#))
 - Complement SDF mapping and an example modeling in Chapter 4

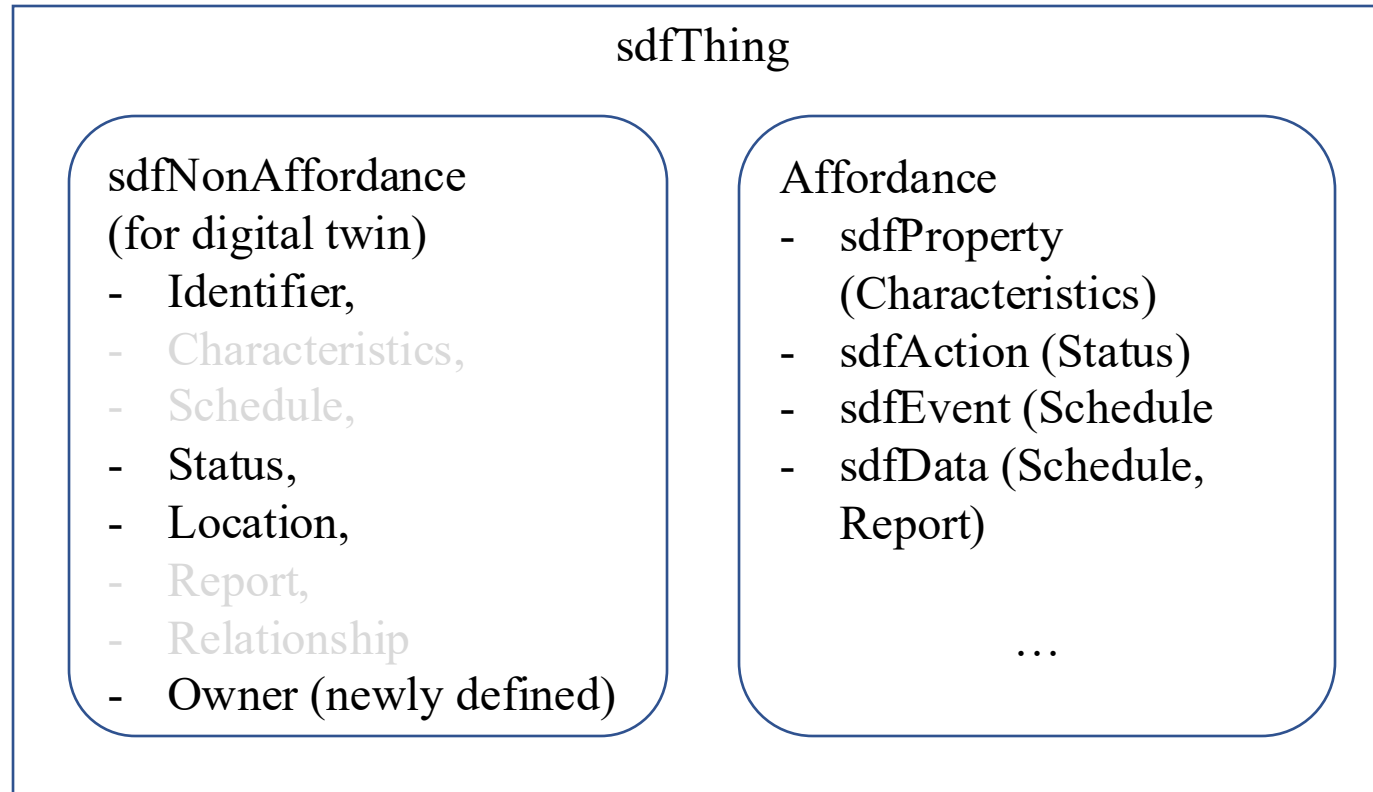
Mapping digital twin to sdfThing

- Information attributes in Digital twin (source: ISO 23247-3) vs. SDFthing

Attribute	Recommended Mapping	Description
Identifier	sdfNonAffordance	Globally unique digital twin ID (e.g., URN)
Characteristic	sdfProperty or sdfData	General description or domain properties
Schedule	sdfEvent or sdfData	Time-based actions, availability, or maintenance
Status	sdfAction or sdfProperty	Actual or calculated operating conditions
Location	sdfNonAffordance	Physical or logical location information
Report	sdfData	Measurement summaries, analytics, or logs
owner	sdfNonAffordance	Organization or entity responsible for the digital twin
Relationship	[TBD]	Inter-object/inter-twin relationships

Table 1: Digital twin modeling within sdfThing

SDF modeling for digital twin



sdfNonAffordance

- Used for digital twin modeling
- Metadata without interaction features
- Examples: identifier, location, owner
- Supports scalability and modularity

```
{
  "info": {
    "title": "An example of the heater #1 in the boat #007",
    "version": "2025-01-27",
    "copyright": "Copyright 2025. All rights reserved.",
  },
  "namespace": {
    "heater1": "https://example.com/boat007/heater1"
  },
  "defaultNamespace": "heater1",
  "sdfThing": {
    "boat007": {
      "label": "Digital Twin of Boat #007",
      "description": "A ship equipped with heating and
navigation systems",
      "sdfRequired": {
        "heater1": "#/sdfObject/heater"
      },
      "sdfNonAffordance": {
        "identifier": {
          "type": "string",
          "const": "urn:boat:007:heater:1"
        },
        "location": {
          "wgs84": {
            "latitude": "35.2988233791372",
            "longitude": "129.25478376484913",
            "altitude": "0.0"
          },
          "postal": {
            "city": "Ulsan",
            "post-code": "44110",
            "country": "South Korea"
          },
          "w3w": {
            "what3words": "toggle.mopped.garages"
          }
        },
        "owner": {
          "type": "string",
          "default": "ExamTech Ltd."
        }
      },
    },
    "sdfObject": {
      "heater1": {
        "label": "Cabin Heater",
        "description": "Temperature control system for
cabin heating",
        "sdfProperty": {
          "characteristic": {
            "description": "Technical summary of the
heater",
            "type": "string",
            "default": "12V electric heater, 800W,
automatic cutoff"
          },
          "status": {
```

Conclusion and plan

- Conclusion
 - Compliment digital twin-SDF mapping and example
- Plan
 - Use cases to represent an sifting as a digital twin
 - Including history data, relationship between objects, etc.
 - Registering, ~~modeling, example(s)~~ and guidance on how to use SDF for modeling

Thank you!

Q&A