

ASDF NIPC

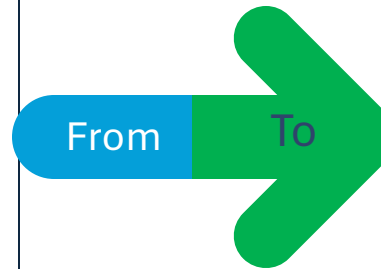
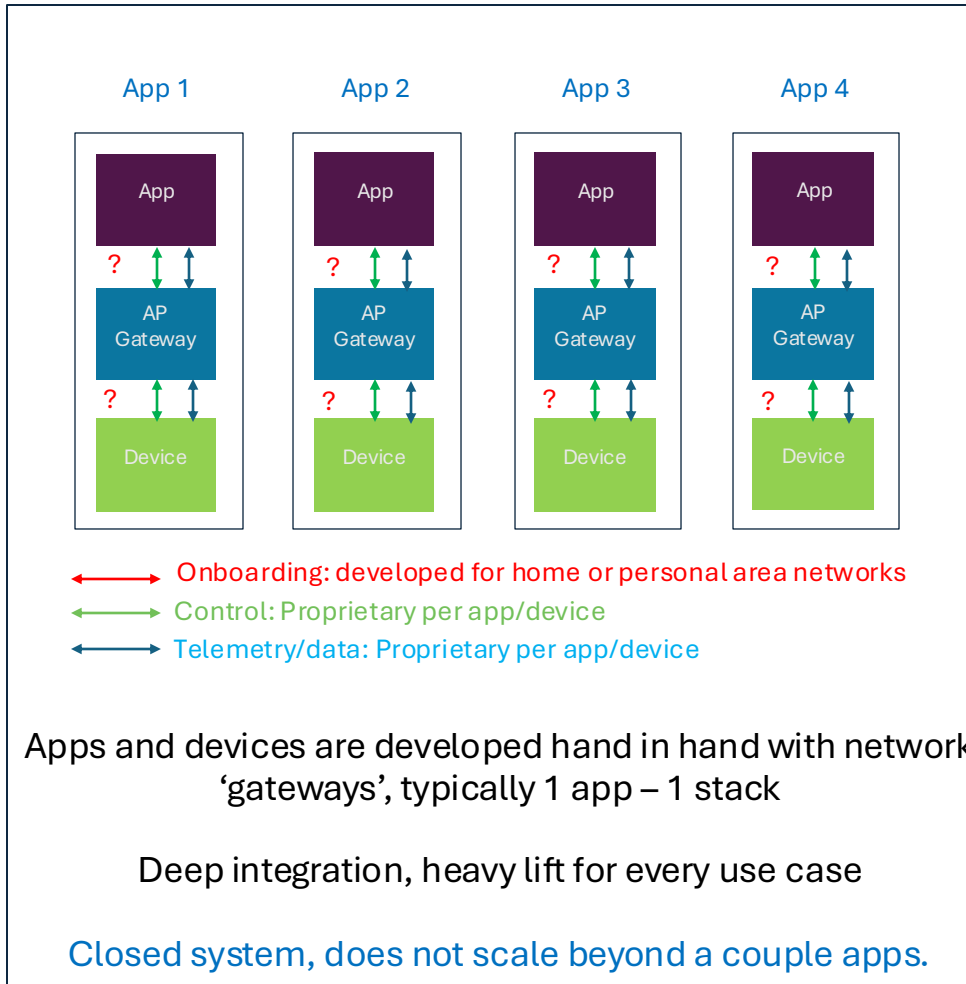
Thing to Thing Research Group Interim meeting

Bart Brinckman

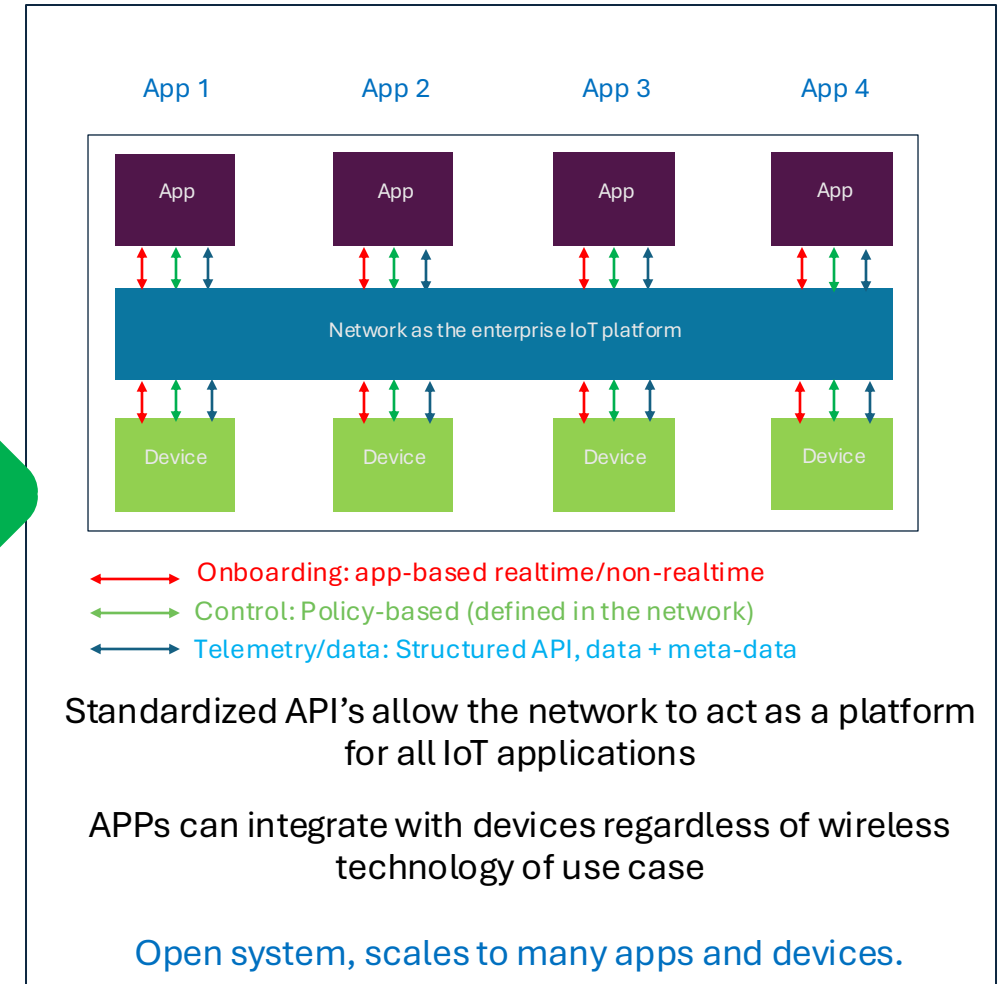
30/01/2025

Silofication in IoT deployments

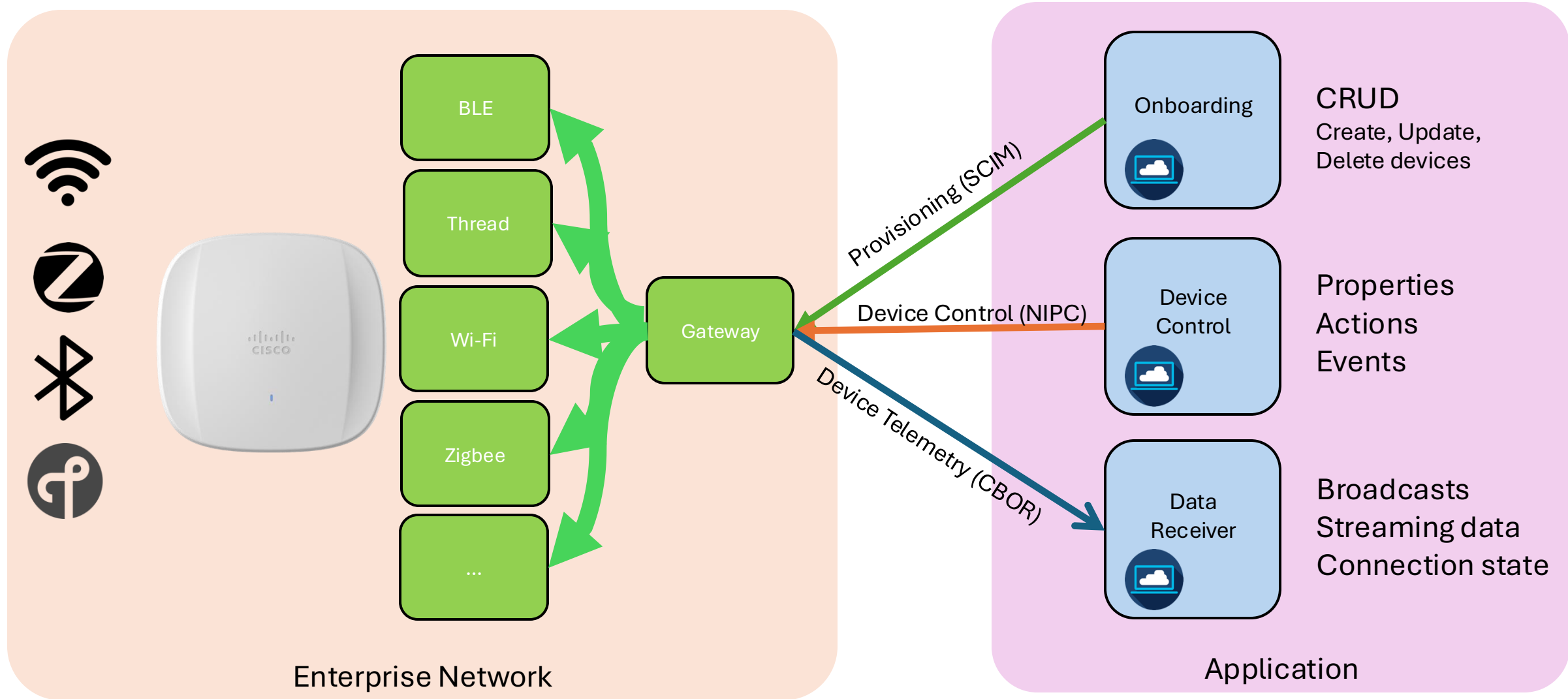
Proprietary stovepipes



Standards-based approach

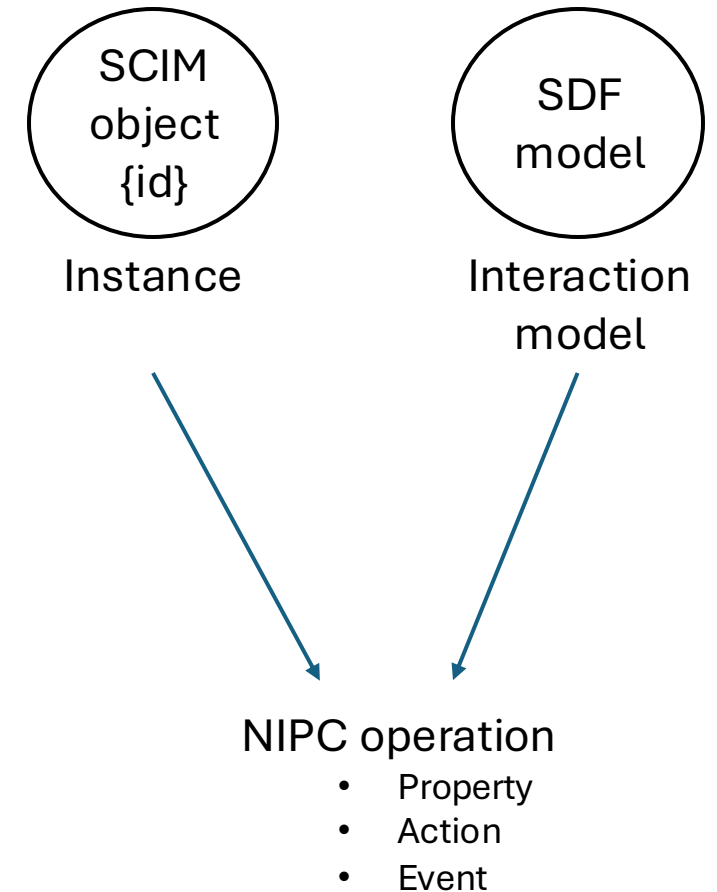


Non-IP Control (NIPC)

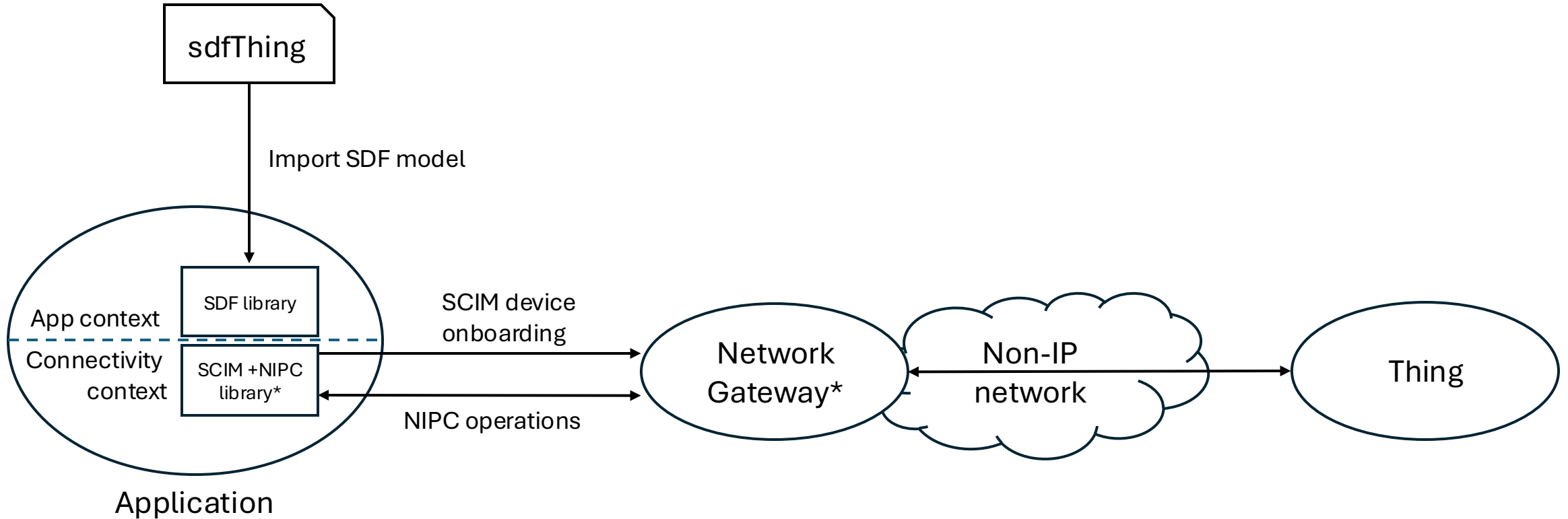


NIPC Architecture

- 1) Declare the instance:** Create a SCIM object for a device. NIPC operations leverage SCIM objects {id} (device or group id) in the path.
- 2) Declare the interaction model:** Registering NIPC properties, actions & events: declare an SDF model with protocol mapping
 - NIPC registration API's: register an SDF model for a device-id or group-id
 - Include a reference in the SCIM object for a group or device
- 3) NIPC operations:** perform operations on SDF affordances: properties, actions & events
 - Operations leverage SDF affordances defined in a registration
 - Optionally protocol mappings can be used directly in NIPC APIs
- 4) NIPC event publishing:**
 - Stream event data, device broadcast events and connection events

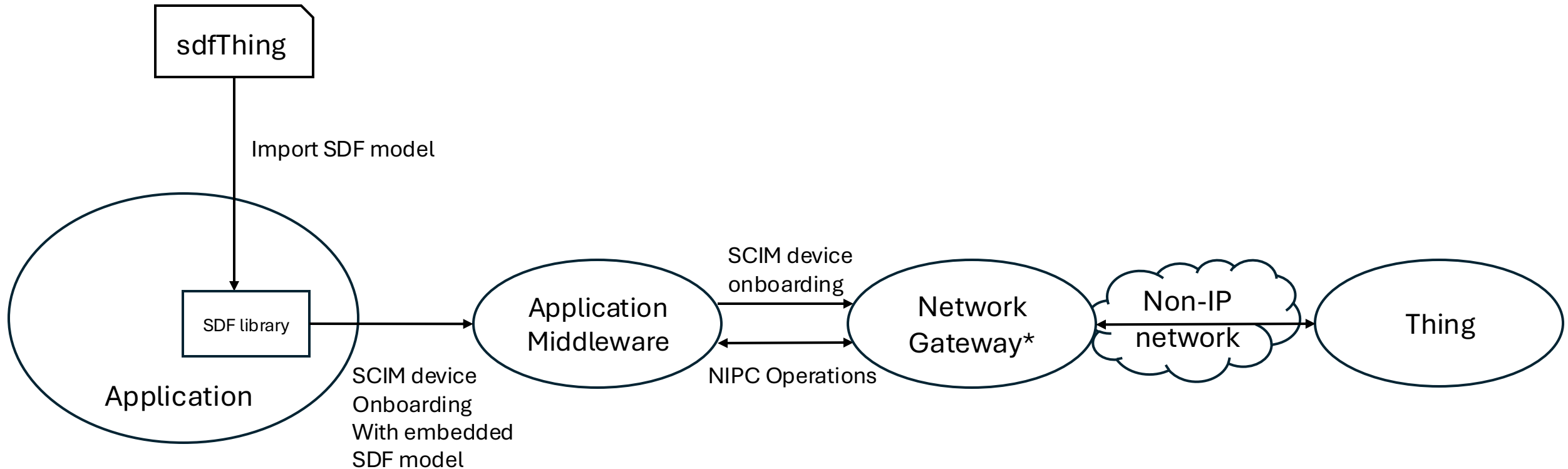


Deployment model: Network Gateway



* SCIM Server + NIPC Gateway

Deployment model: Leveraging middleware



* SCIM Server + NIPC Gateway

NIPC registrations

1. Sdf model registration

- To perform operations on NIPC properties, actions or events, these must be declared and mapped to a protocol-specific attributes.
- Registrations are for a SCIM object {id} (device or group id)
- Top level sdfThing or sdfObject
- NIPC APIs leverage SDF affordances (sdfProperties, sdfActions and sdfEvents)
- SDF affordances contain protocol mapping

POST /{id}/registration/model
-> create a model for {id}

GET /{id}/registration/model
-> get all models for {id}

PUT GET DELETE /{id}/registration/model/{sdfRef}
-> manage a model {sdfRef}

2. Data app registration

- Allows a NIPC control app (ability to perform NIPC operations on am {id}) to register a data app that will be authorized to receive specific events
- Registrations are for a SCIM object {id} (device or group id)
- Can also be declared in the device/group SCIM obj

POST PUT GET DELETE
/{id}/registration/data-app/{data-app}
-> manage a data-app

Protocol Mapping

- Protocol mapping is extensible to new protocols (IANA registration required)
- Currently defined Protocol mappings:
 - Property
 - Event
 - Broadcast
 - Connection
 - Protocol specific error codes
- Protocol mapping can be leveraged in SDF, or in a NIPC API.

```
"sdfProperty": {  
  "heartrate": {  
    "description": "The current measured heart rate",  
    "type": "number",  
    "unit": "beat/min",  
    "observable": false,  
    "writable": false,  
    "protocolMap": {  
      "ble": {  
        "serviceID": "12345678-1234-5678-1234-56789abcdef4",  
        "characteristicID": "12345678-1234-5678-1234-56789abcdef4"  
      }  
    }  
  }  
}
```

NIPC APIs

PUT

`/{id}/property/{property}` Write a value to a property on a device



GET

`/{id}/property/{property}` Read a value from a property on a device



PUT

`/{id}/property` Update a value of one or more properties on a device



GET

`/{id}/property` Read a value from one or multiple properties on a device



POST

`/{id}/event/{event}` Enable an event on a specific device



DELETE

`/{id}/event/{event}` Disable an event on a specific device



GET

`/{id}/event/{event}` Get status of an event on a specific device



GET

`/{id}/event` Get status of events on a device or group of devices



PUT

`/{id}/action/{action}` Perform an action on a device



Some experiences with NIPC

Use cases:

- Asset tracking
- People tracking
- Patient vital sign monitoring
- Production process monitoring
- Physical access control
- Connected building

Scale:

- A NIPC Gateway can be deployed across 1000's of Non-IP access points and offer a single Application gateway function to applications leveraging that footprint
- A NIPC Gateway can support 100k+ non-IoT devices with NIPC operations and events

NIPC & SDF:

- Previous NIPC draft leveraged individual affordance registration, now moved to SDF model registration
- We believe SDF will make it easier for apps to support a particular device

Resources

- IETF draft: <https://datatracker.ietf.org/doc/draft-ietf-asdf-nipc/>
- NIPC repo: <https://github.com/ietf-wg-asdf/asdf-nipc>
- Open-Source project: <https://github.com/iot-onboarding/tiedie>

Discussion