

WIS 2.0 key concepts

Overview

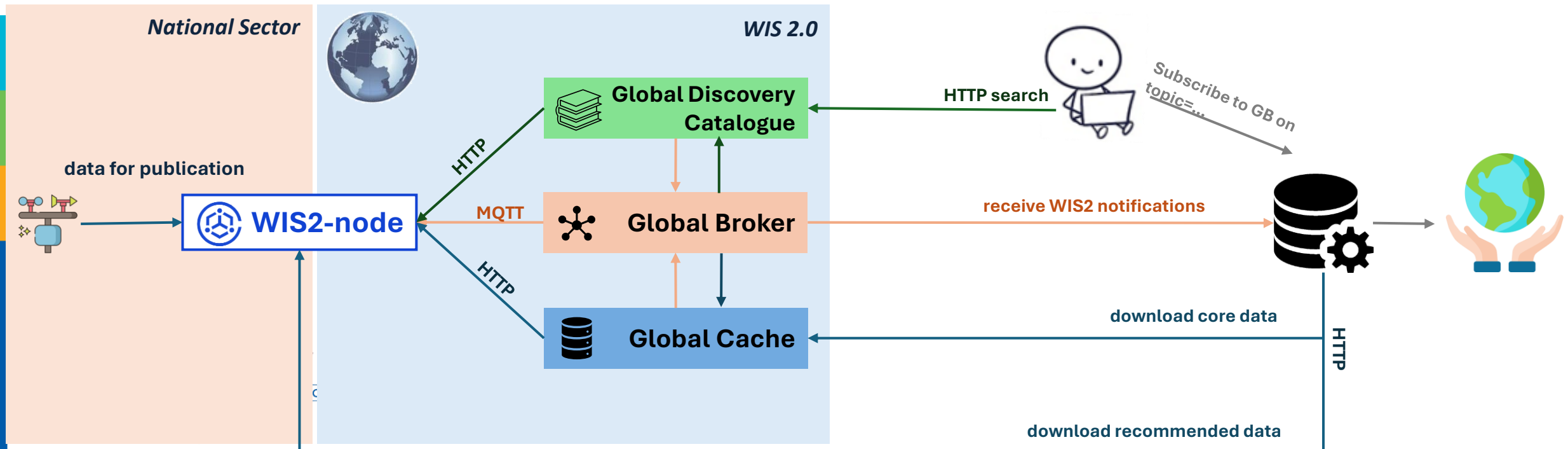
- Global Services
- WIS2 Node
- WIS2 Discovery Metadata (WCMP2)
- WIS2 Topic Hierarchy (WTH)
- WIS2 Notification Message (WNM)

Sharing data on WIS 2.0

Data Publishers operate a WIS2 Node to publish WIS2 Notifications and enable data access over HTTP

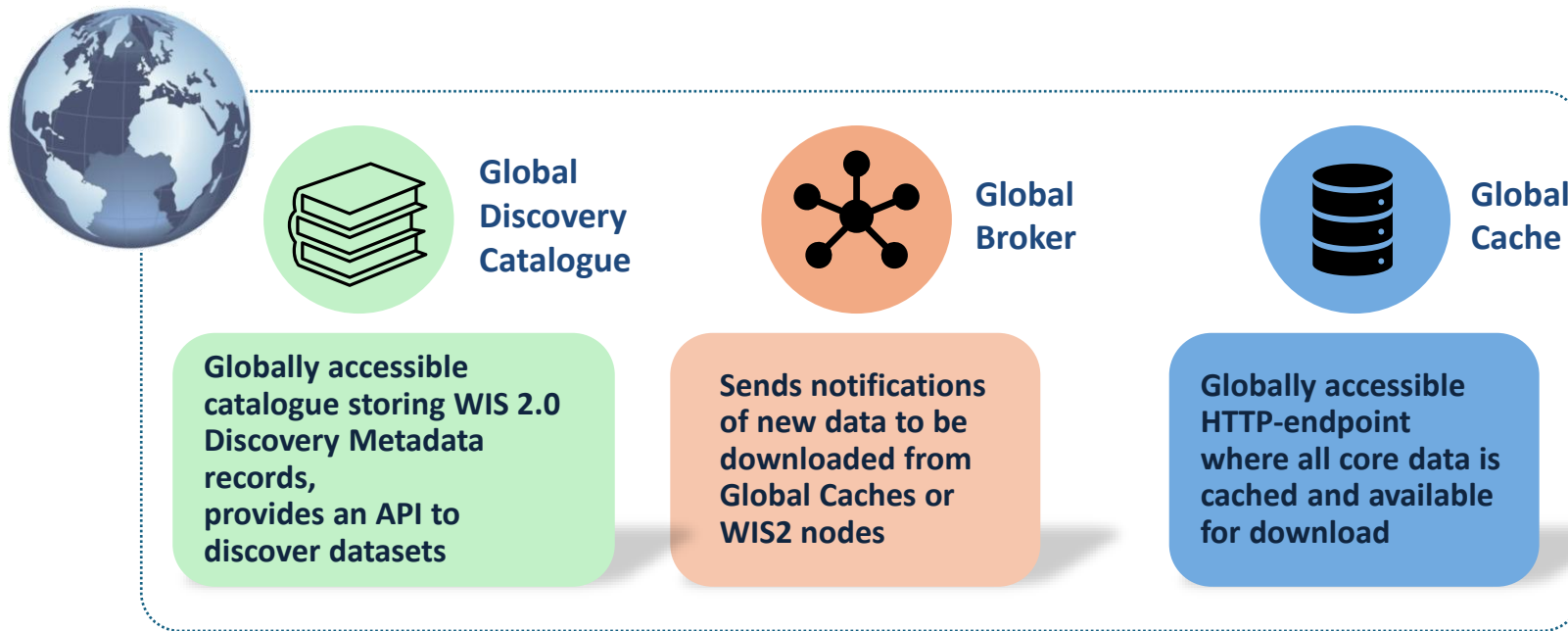
Data Consumers find datasets in the Global Discovery Catalogue and subscribe to a Global Broker to receive WIS2 Notifications

Global Caches ensure highly available, rapid access to **core data**



WIS 2.0: Global Services

Three types of Global Services are used to enable the dissemination of data in the WIS2 network



Multiple instances of the Global Services are hosted by Members around the world to ensure resiliency when one Global Service fails

What is a WIS2 Node ?



A WIS2 Node replaces the GTS Message Switching System



Each WMO Member shall implement at least one WIS2 Node to share data in WIS2

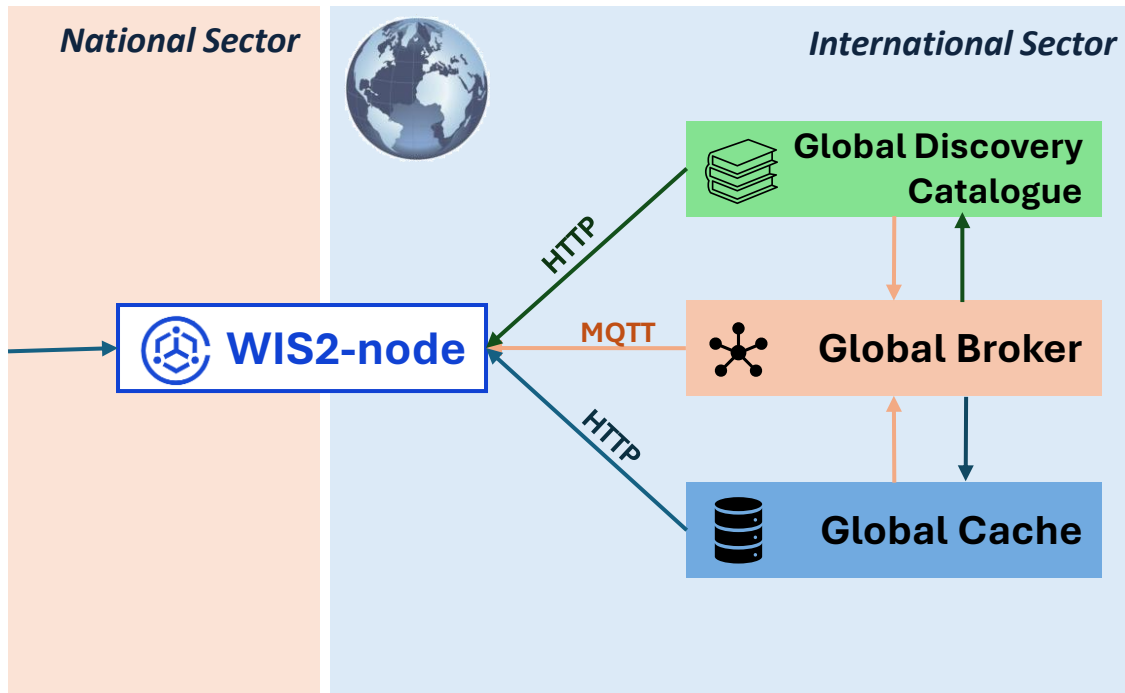
How to setup a WIS2 Node:

- Setup an **HTTP endpoint for sharing data** and an **MQTT broker for sending notifications**
- Create **WIS2 discovery metadata** records for datasets using the **WCMP2 standard**
- Publish MQTT-messages to notify the availability for each new metadata record and data granule
 - Message payload defined by the **WIS2 Notification Message standard**
 - Topic defined by the **WIS2 Topic Hierarchy**
 - Include a URL that is accessible over the public internet to download the data/metadata

What is a WIS2 Node ?

A WIS2 node is composed of 2 endpoints that need to be exposed over the public internet:

- **MQTT broker**: to publish WIS2-notifications for metadata and data
- **HTTP storage endpoint**: to enable the download of data-files and metadata records



Global Discovery Catalogues download all valid WCMP2 records from the HTTP-endpoint for notifications on topic=*origin/a/wis2/+ /metadata*

Global Brokers subscribe to topic=*origin/a/wis2/<centre-id>/#* on the WIS2 Node MQTT broker, and republishes all valid WIS2-notifications

Global Caches download data from the HTTP-endpoint for all notifications on topic=*origin/a/wis2/+ /data/core/#*

MQTT topic defined by the WIS2 Topic Hierarchy standard

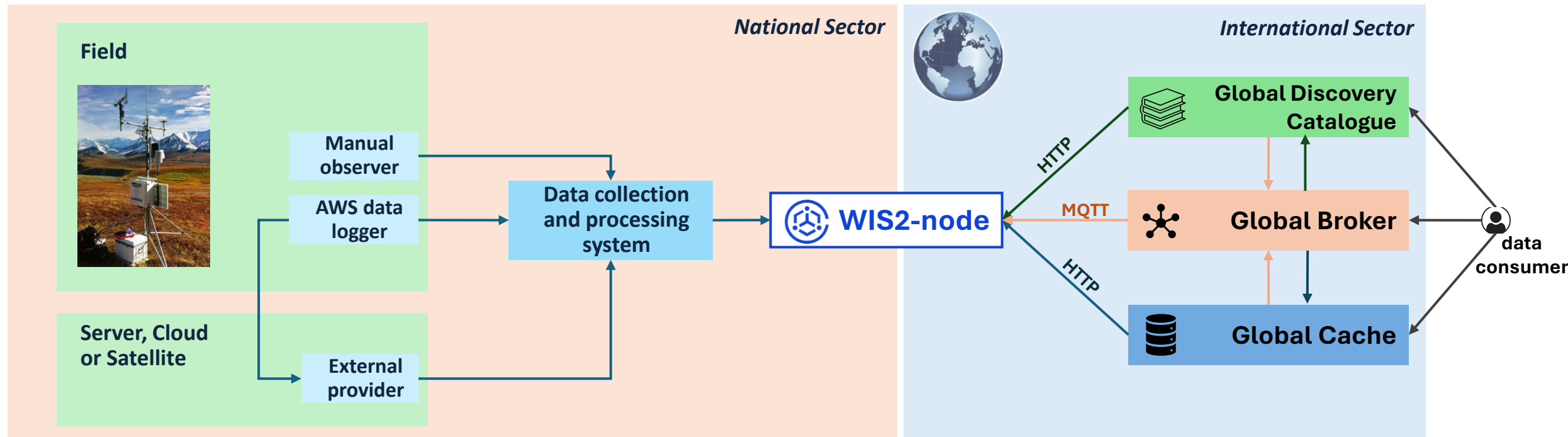
Discovery Metadata records defined by WCMP2 standard

MQTT payload defined by the WIS2 Notification Message standard

What is a WIS2 Node ?

The WIS2 Node serves as a gateway between National MET systems and the WIS 2.0 Network

How the data is collected at the source and sent into the WIS2-node is not governed by the WIS2 standard



WIS2 Discovery Metadata (WCMP2)

[Link to WCMP2 documentation](#)

The WMO Core Metadata Profile 2 (WCMP2) defines the content of Discovery Metadata records in WIS2

The Global Discovery Catalogue caches WCMP2 records and enables search for datasets using an API

```
{  "id": "urn:wmo:md:mw-mw_met_centre:surface-weather-observations",
  "conformsTo": [ http://wis.wmo.int/spec/wcmp/2/conf/core ],
  "type": "Feature",
  "properties": {
    "type": "dataset",
    "title": "Surface weather observations from Malawi",
    "description": "Surface weather observations from Malawi",
    "keywords": [ "surface weather", "temperature", "observations"],
    "themes": [ { "concepts": [ { "id": "weather" } ],
                  "scheme": "https://codes.wmo.int/wis/topic-hierarchy/earth-system-discipline"} ],
    "created": "2024-03-29T00:00:00Z",
    "updated": "2024-05-19T15:08:07Z",
    "wmo:dataPolicy": "core",
    "contacts": [..]
  },
  "time": { "interval": [ "2021-11-29", ".."], "resolution": "P1H"},
  "links": [{
    "href": "mqtt://everyone:everyone@wis2node.example:1883",
    "type": "application/json",
    "rel": "items",
    "title": "WIS2 notifications for surface weather observations from Malawi ",
    "channel": "origin/a/wis2/mw-mw_met_centre/data/core/weather/surface-based-observations/synop"
  }]
}
```

The "channel" indicates the WIS2 topic for data publications



WIS 2.0 Notification Message (WNM)

[Link to WIS2 Notification Message documentation](#)

WIS2 Notification Message Encoding defines the payload of a WIS2 notification

```
{  "id": "1e2ee0a2-6b86-4bb4-9b20-11a8c5d1516b",
  "type": "Feature",
  "version": "v04",
  "geometry": {"coordinates": [-43.64827, -18.23105, 1359], "type": "Point"},
  "properties": {
    "data_id": "br-inmet/data/core/weather/surface-based-observations/synop/WIGOS_0-76-0-3121605000000209_20240521T110000",
    "datetime": "2024-05-21T11:00:00Z",
    "pubtime": "2024-05-21T11:30:03Z",
    "integrity": {
      "method": "sha512",
      "value": "nRdTEUaIF0i40VIs9k5wiu29/TJMAIsXIVJ4pn37YQ3/NeelY9hwtt+jElMwBuJAlg72VVPmXqD+mRjx4eo9Xw=="
    },
    "content": {
      "encoding": "base64",
      "value": "QIVGUgAA8AQAABYAACsAAAIAAAb/IQAH6AUVCwAAAAALAAABgMGWx1sAAMMAAATAAANDMxODkwMzAwMDAwMDIzN0uAACA0re...",
      "size": 240
    }
  },
  "links": [ {
    "rel": "canonical",
    "type": "application/x-bufr",
    "href": "http://wis2node.example/data//WIGOS_0-76-0-3121605000000209_20240521T110000.bufr4",
    "length": 240
  } ]
}
```

"links" should contain a "canonical" link to download data

WIS2 Topic Hierarchy (WTH)

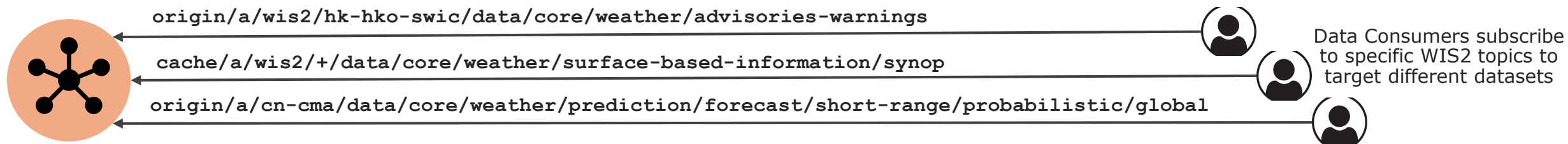
[Link to WIS2 Topic Hierarchy documentation](#)

WIS2 Topic Hierarchy defines the MQTT topics used in the WIS2 network

The WTH is composed of primary topics (levels 1-7) and sub-discipline specific topics (levels 8 and beyond)

`origin|cache` `metadata|data` `core|recommended` `weather|climate|hydrology|atmospheric-composition|cryosphere|ocean|space-weather`

`channel/version/wis2/centre-id/resource-type/data-policy/earth-system-domain/subcategory/...`



The sub-discipline topics are proposed by domain experts

WIS2 in a nutshell

- Global Services to enable the dissemination of data:
 - Global Discovery Catalogue
 - Global Cache
 - Global Broker
- WMO Members share data using a WIS2 Node:
 - HTTP endpoint to enable data access
 - MQTT endpoint to publish WIS2-notifications
- WIS2 standards to define:
 - Discovery Metadata (WCMP2)
 - Payload of WIS2 notification Message (WNM)
 - WIS2 Topic Hierarchy (WTH)