WIS 2.0 key concepts

Overview

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

Overview

No.	WIS 2.0 Principles
1	WIS 2.0: adopts Web technologies and leverages industry best practices and open standards
2	**WIS 2.0: uses Uniform Resource Locators (URL) to identify resources (i.e. Web pages, data, metadata, APIs)**
3	**WIS 2.0: prioritizes use of public telecommunications networks (i.e. Internet) when publishing digital resources**
4	WIS 2.0: requires provision of Web service(s) to access or interact with digital resources (e.g. data, information, products) published using WIS
5	WIS 2.0: encourages NCs and DCPCs to provide 'data reduction' services via WIS that process 'big data' to create results or products that are small enough to be conveniently downloaded and used by those with minimal technical infrastructure
6	WIS 2.0: will add open standard messaging protocols that use the publish-subscribe message pattern to the list of data exchange mechanisms approved for use within WIS and GTS

Overview

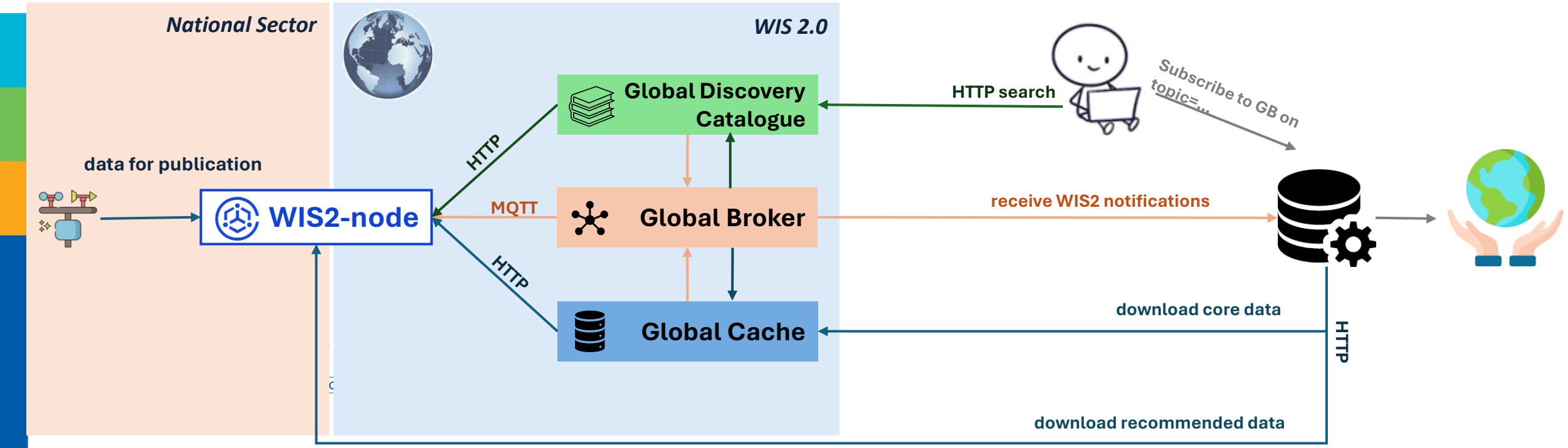
No.	WIS 2.0 Principles
7	WIS 2.0: will require all services that provide real-time distribution of messages (containing data or notifications about data availability) to cache/store the messages for a minimum of 24-hours, and allow users to request cached messages for download
8	**WIS 2.0: will adopt direct data-exchange between provider and consumer**
9	WIS 2.0: will phase out use of routeing tables and bulletin headers
10	WIS 2.0: will provide a Catalogue containing metadata that describes both data and the service(s) provided to access that data
11	WIS 2.0: encourages data providers to publish metadata describing their data and Web services in a way that can be indexed by commercial search engines

Overview

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

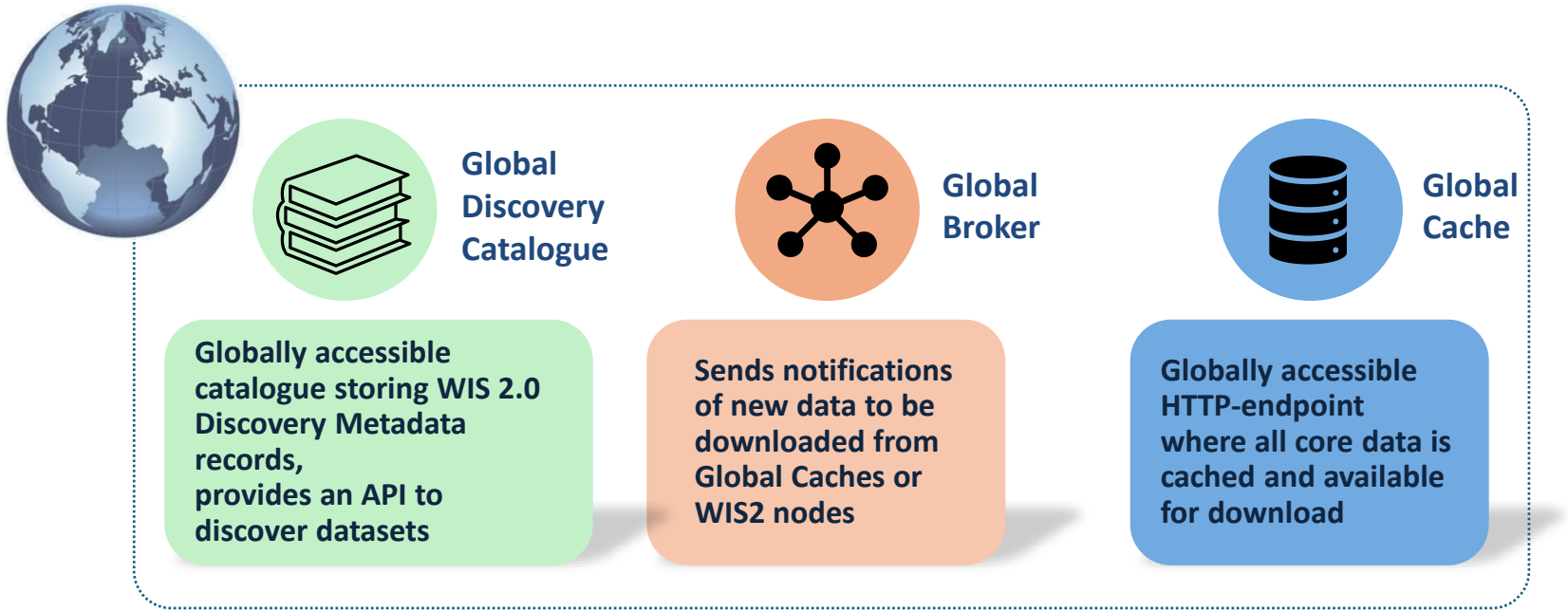
Data Consumers find datasets in the Global Discovery Catalogue and subscribe to a Global Broker to receive WIS2 Notifications

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



WIS 2.0: Global Services

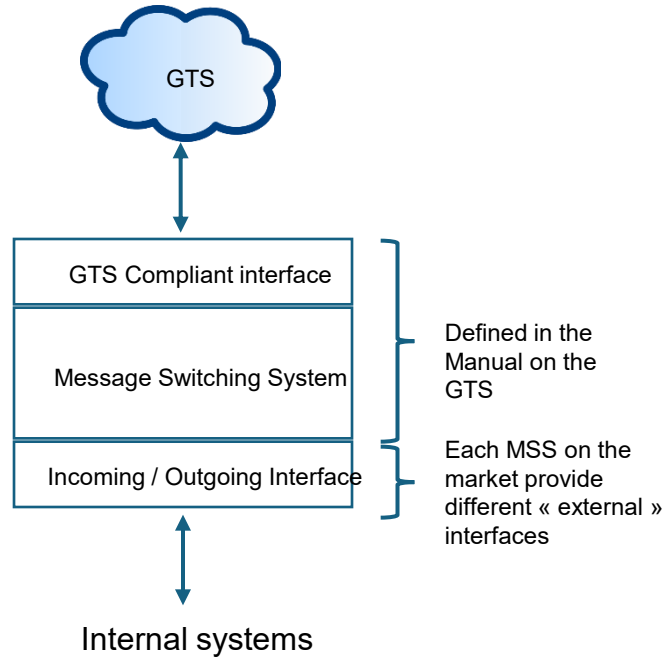
Three types of Global Services are used to enable the dissemination of data in the WIS2 network



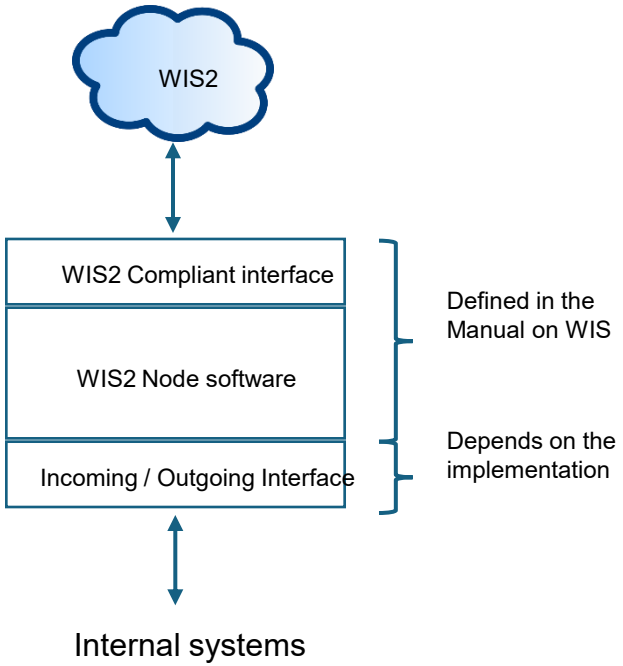
Multiple instances of the Global Services are hosted by Members around the world to ensure resiliency when one Global Service fails

What is a WIS2 Node ?

- GTS

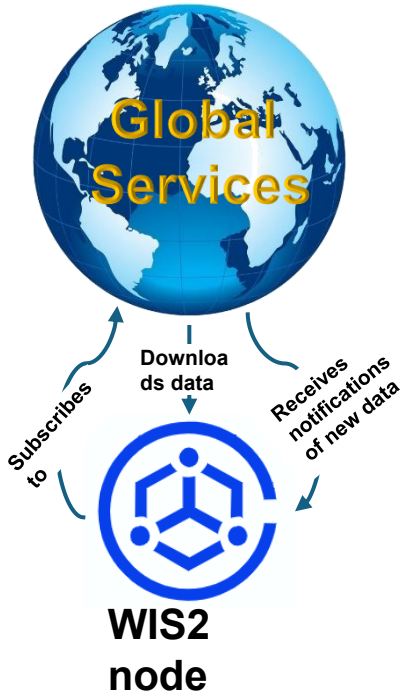


- WIS2



What is a WIS2 Node ?

- WIS2 node is the platform for data exchange instead of GTS
- NCs / DCPCs are going to implement a WIS2 Node to exchange data in WIS2
- The WIS2 Node shares data from an HTTPS service and sends notifications to MQTT subscribers
- No need to provide access to all the users in the world, only to some WIS2 Global Services



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

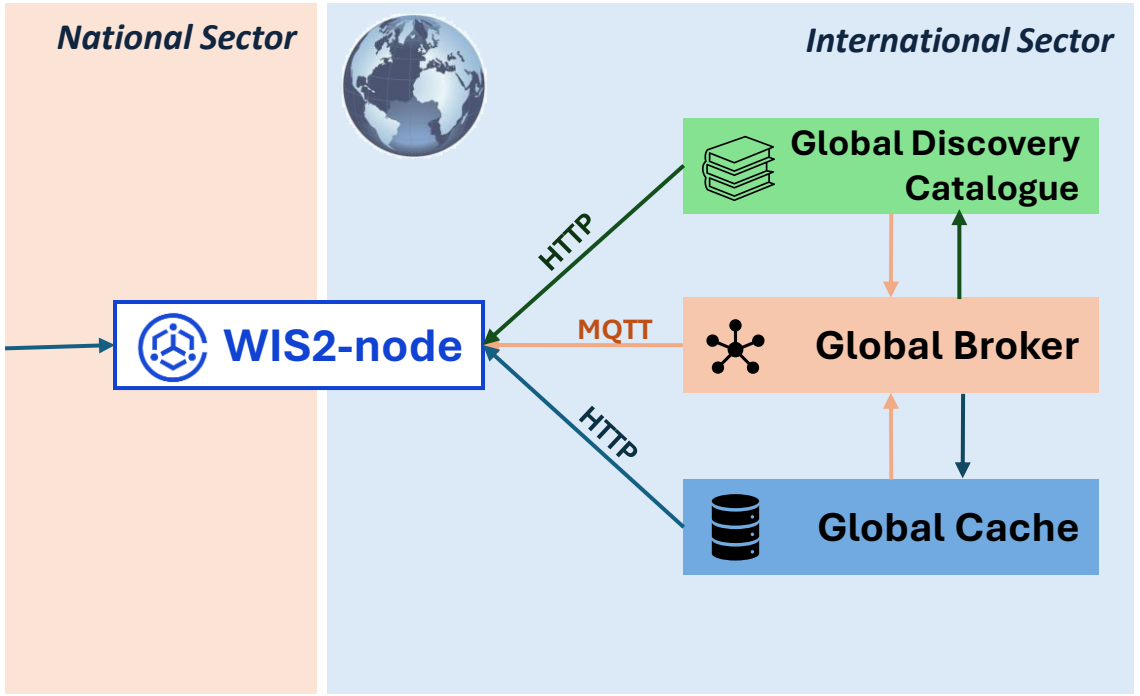
How to setup a WIS2 Node:

- 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

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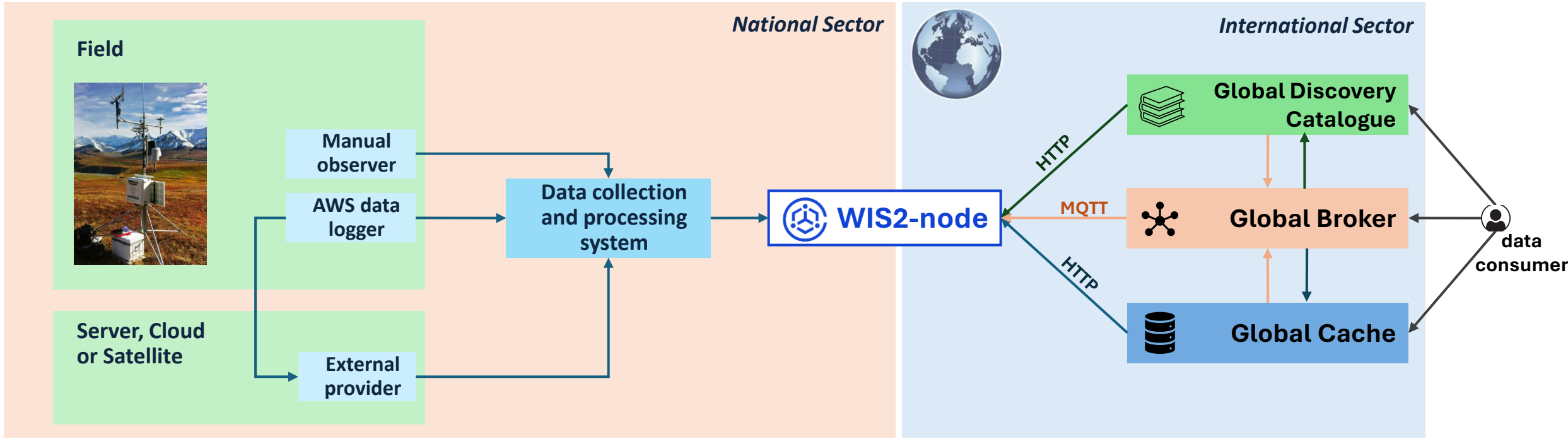
What is a WIS2 Node ?

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



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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

WIS2 Topic Hierarchy (WTH)

Link to WIS2 Topic Hierarchy documentation

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

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

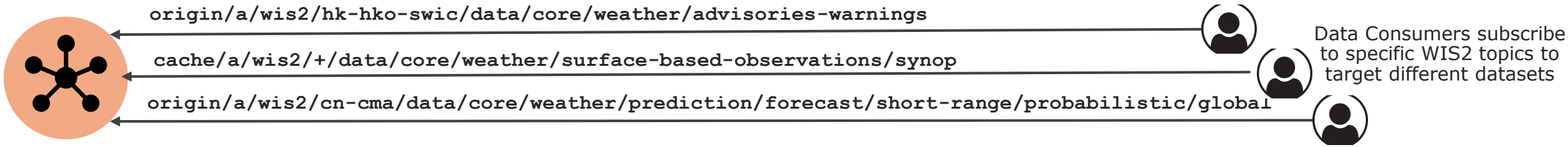
origin|cache

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/...
```



Sub-discipline topics are proposed by domain experts

The official WIS2 Topic Hierarchy is available at the WMO Codes Registry:
https://codes.wmo.int/wis/topic-hierarchy

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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:synop-obs/WIGOS_0-20000-0-82022_20251114T180000",
                "datetime": "2024-05-21T11:00:00Z",
                "pubtime": "2024-05-21T11:30:03Z",
                “metadata_id": "urn:wmo:md:br-inmet:synop-obs",
                "integrity": {
                        "method": "sha512",
                        "value": "nRdTEUaIF0i40Vls9k5wiu29/TJMAlsXIVJ4pn37YQ3/NeeIY9hwtt+jElMwBuJAlg72VVPmXqD+mRjx4eo9Xw=="
                },
                "content": {
                        "encoding": "base64",
                        “value": "QlVGUgAA8AQAABYAACsAAAIAAAb/IQAH6AUVCwAAAAALAAABgMGWx1sAAMMAAATAAANDMxODkwMzAwMDAwMDIzN0uAACA0re...",
                        "size": 240
                }
        },
        "links": [ {
                "rel": "canonical",
                "type": "application/bufr",
                "href": "http://wis2node.example/data/WIGOS_0-20000-0-82022_20251114T180000 _20240521T110000.bufr4",
                "length": 240
        } ] }
```


“links” should contain a “canonical” link to download data

WIS2 in a nutshell

- WMO Members share data using a WIS2 Node:
  - HTTP endpoint to access data-server
  - MQTT endpoint to publish WIS2-notifications for data and metadata (WCMP2)
- Global Services enable the global dissemination of data:
  - Global Discovery Catalogue: OGC-API for querying WCMP2 records published on WIS2
  - Global Cache: data-server enabling download of all core data
  - Global Broker: republishes notifications from all WIS2 components
- WIS2 standards definitions:
  - Discovery Metadata (WCMP2)
  - Payload of WIS2 notification Message (WNM)
  - WIS2 Topic Hierarchy (WTH)

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Thank you
Merci
Gracias
اركشن
谢谢
Спасибо

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