WIS 2.0 key concepts and implementation plan

Hassan Haddouch WIS 2.0 Manager WIS Division, Infrastructure Department WMO Secretariat



WIS2 node and Global Services



Sharing data on WIS 2.0



ORGANIZATION

WIS 2.0: Global Services

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



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 Set Up a WIS2 Node

Establish Data Sharing & Notification Mechanisms

- Set up an HTTP/HTTPS endpoint for sharing data.
- Configure an MQTT broker for sending notifications.

Create Metadata Records

- Generate WIS2 discovery metadata records for datasets using the WCMP2 standard.

Publish MQTT Notifications

- Send MQTT messages to announce the availability of new metadata records and data granules.
- Structure the message payload according to the WIS2 Notification Message standard.



- Use a topic as defined by the WIS2 Topic Hierarchy.
- Include a URL that allows public internet access to download the data/metadata.

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 <u>not</u> governed by the WIS2 standard





What is a WIS2 Node ?

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

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



Adoption of WMO Standards

- 1. MQTT topic defined by the WIS2 Topic Hierarchy standard
- 2. Discovery Metadata records defined by <u>WCMP2</u> standard
- 3. MQTT payload defined by the <u>WIS2 Notification Message</u> standard



WIS2 Topic Hierarchy (WTH)

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

1950-2025







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

WIS 2.0 Notification Message (WNM)

Link to WIS2 Notification Message

```
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": "nRdTEUaIF0i40Vls9k5wiu29/TJMAlsXIVJ4pn37YQ3/NeeIY9hwtt+jElMwBuJAlg72VVPmXqD+mRjx4eo9Xw=="
      ĵ,
      "content": {
           "encoding": "base64",
           "value": "QIVGUgAA8AQAABYAACsAAAIAAAb/IQAH6AUVCwAAAAALAAABgMGWx1sAAMMAAATAAANDMxODkwMzAwMDAwMDIzN0uAACA0re...",
           "size": 240
"links": [ {
                                                                  "links" should contain a "canonical" link to download data
     "rel": "canonical",
      "type": "application/x-bufr",
     "href": "http://wis2node.example/data//WIGOS 0-76-0-3121605000000209 20240521T110000.bufr4",
      "length": 240
}] }
```

WIS2 Discovery Metadata (WCMP2)

Link to WCMP2

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": [{
                                                                                         The "channel" indicates the WIS2 topic
      "href": "mqtt://everyone:everyone@wis2node.example:1883",
                                                                                        for data publications
      "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"
}] }
```

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 <u>WIS2 Node</u>:
 - 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)



WIS2 Implementation Plan



WIS2 Implementation plan



WIS2 Global Services + services during transition period

Global Broker	Brazil		China
	China		Germany
	France		Japan
	USA	Global Cache	Republic of Korea
			USA/UK
			Saudi Arabia
Global Discovery Catalogue	Canada	Global Monitor	China
	China		Morocco
	Germany		
GTS-WIS2 Gateway	Germany	WIS2-GTS Gateway	China
	Japan	to be ready by May 2025	UK

WIS2 Nodes Update: 10 April 2025

WIS2 Node (National Centres)- 66 Nodes+			WIS2 Node (DCPC)
 Algeria Anguilla Antigua and Barbuda Argentina Bahamas Barbados Belarus 	 Denmark Dominica Eswatini France Germany Grenada Guinea 	 Montserrat Namibia New Zealand Nigeria Poland Republic of Korea Russian Federation 	 EUMETSAT ECMWF EUMETNET ASMC, Singapore
 8. Belize 9. Brazil 10.British Virgin Islands 11 Bulgaria 	8. Guyana 9. Hong Kong, China 10.India	 8. Saudi Arabia 9. Singapore 10.South Africa 11 South Sudan 	WIS2 Node (Other)
12.Burkina Faso 13.Cameroon 14.Canada	12.Iran (Islamic Republic of) 13.Israel 14.Italy	12.St. Kitts and Nevis 13.St. Vincent and the Grenadines 14.Sweden	 SCRIPPS, USA (Buoys) CAP SWIC, Hong Kong, China
16.Chad 17.China 18.Chile 19.Congo 20.Cuba 21.Curaçao and Sint Maarten	15.Jamaica 16.Japan 17.Kazakhstan 18.Kenya 19.Libya (State of) 20.Malaysia	 15.Trinidad and Tobago 16.Turks and Caicos Islands 17.United Kingdom 18.USA 19.Uruguay 20.Zambia 	• Oncrewed Aircraft Systems (OAS)
22.Cyprus	21111010000	21 Zimbabwa	

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Transition from WIS/GTS to WIS2.0





Provisions for Transition WIS1/GTS to WIS2

Provisions for the Transition from the WMO Information System (WIS) 1.0 and Global Telecommunication System to WIS 2.0



https://library.wmo.int/idurl/4/69050

- 1. Introduction
- 2. Principles
- 3. Temporary Global Services
- 4. Stopping a Message Switching System
- 5. Management of WIS1 and GTS
- 6. Management of WIS Centers
- 7. References

Principles

Provisions for the Transition from the WMO Information System (WIS) 1.0 and Global Telecommunication System to

WIS 2.0

Principle 1: Each National Meteorological and Hydrological Service (NMHS) will be able to make the migration during the agreed period 2025–2030

Principle 2: No GTS data loss during the transition: The WIS2-to-GTS and GTS-to-WIS2 gateways ensure that data sent on the GTS can be received by a site having migrated to WIS2, and data sent on WIS2 can be received by a site still on the GTS

Principle 3: Each WIS centre will decide when to decommission WIS1 and GTS: Decommissioning of GTS/WIS1 services is the decision of each National Centres (NC) /DCPC/GISC when they consider that the migration is complete for them and their users

Principle 4: New data (such as from the Global Basic Observing Network (GBON), or related to climate, hydrology and the cryosphere) will be exchanged solely on WIS2

GTS-to-WIS2 gateway



WIS2-to-GTS gateway



Purpose of WIS2 to GTS gateway

The purpose of this gateway is to enable GTS members who have not yet migrated to WIS2 to continue to receive GTS data from GTS members who have migrated to WIS2 and stopped their GTS systems.

Note: Only data that have been already published in GTS are concerned by this gateway, New data will be available **only** on WIS2.

To enable the WIS2-to-GTS Gateway to republish data on the GTS, WIS2-nodes are required to add additional information in the message properties:

```
"properties": {
    "gts": {
        "ttaaii": "FTAE31",
        "cccc": "VTBB"
    }
}
```

WIS2 Data Publishers adding GTS headers to their WIS2-notifications can stop the transmission of this data on GTS Provisions for the Transition from the WMO Information System (WIS) 1.0 and Global Telecommunication System to WIS 2.0



The role of RTHs during the transition phase

5.1.2 Regional Telecommunication Hubs

Regional Telecommunication Hubs (RTHs) shall keep their MSS operational and continue to publish data collecting the bulletins from their associated NMCs and transmitting them in the appropriate form on the MTN, either directly or through the appropriate WMC/RTH in GTS until all Members in their area of responsibility migrate from GTS to WIS2.

When RTHs have migrated to WIS2 and <u>all Members in their area of responsibility</u> have migrated to WIS2, RTHs may decide to turn off their MSS. In this case, they should contact the WMO Secretariat to switch off their MSS in a coordinated manner.



Stopping a Message Switching System



Provisions for the Transition from the WMO Information System (WIS) 1.0 and Global Telecommunication System to WIS 2.0

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