INTERNATIONAL CIVIL AVIATION ORGANIZATION

THE MIDDLE EAST AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (MIDANPIRG)

REPORT OF THE TWELFTH MEETING OF MET SUB-GROUP (MET SG/12)

(Virtual, 12 - 13 November 2024)

The views expressed in this Report should be taken as those of the MIDANPIRG MET Sub-Group and not of the Organization. This Report will, however, be submitted to the MIDANPIRG and any formal action taken will be published in due course as a Supplement to the Report.

Approved by the Meeting
and published by authority of the Secretary General

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PART I – HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The Twelfth Meeting of the Meteorology Sub-Group of the Middle East Air Navigation Planning and Implementation Regional Group (MET SG/12) was held virtually from 12 to 13 November 2024.

2. OPENING

2.1 The meeting was opened by Mr. Radhouan Aissaoui Regional Officer, Information management (IM) ICAO MID Regional Office.

2.2 Mr. Radhouan Aissaoui introduced to the group Mrs. Nino Gelovani, the new Regional Officer Air Navigation Systems Implementation/Meteorology, who joined the EUR/NAT office from the first of July and is also in charge of the MID Region. He thanked the participants for joining the meeting, as well as the Secure Aviation Data Information Service (SADIS) provider and World Area Forecast Center (WAFC) for their contributions to the meeting. He thanked also the World Meteorological Organization (WMO) for its active involvement and contribution to the MID Region in MET domain. He noted that SADIS developments include significant changes in 2024 as there will be a significant increase in meteorological information in space and time that will be System Wide Information Management (SWIM) compliant. In the context of SWIM, he emphasized the importance of implementing the ICAO Meteorological Information Exchange Model (IWXXM), which is a crucial step to enable SWIM services.

2.3 He also emphasized the importance of States supporting the development of the MID Region Air Navigation Report (2023) by reviewing and updating the implementation levels of Priority 1 Aviation System Block Upgrade (ASBU) elements related to the AMET thread. Additionally, this information contributes to updating the MID eANP Volume III—AMET Tables.

2.4 Mrs. Nino Gelovani addressed her welcome to the Group. She thanked the MID Region representatives for their steadfast support and meticulous efforts in organizing this meeting. She also thanked all states and External participants for their valuable input. She emphasized that this meeting represents a vital platform for dialogue, collaboration, and shared progress and wished everyone a valuable and productive meeting.

3. ATTENDANCE

3.1 The meeting was attended by a total of forty-three (43) participants from ten (10) MID States (Bahrain, Egypt, Iran, Iraq, Jordan, Libya, Oman, Qatar, Saudi Arabia and United Arab Emirates) and two (2) other States (Austria and UK) and two (2) other States and two (2) Organization, (IATA & WMO). The list of participants is provided at **Attachment A**.

4. OFFICERS AND SECRETARIAT

4.1 Mrs. Nino Gelovani, Regional Officer for Air Navigation Systems Implementation (Meteorology) at ICAO Europe and North Atlantic, served as Secretary of the meeting. She was supported by Mr. Radhouan Aissaoui, Regional Officer for Implementation Management from the ICAO Middle East Office, as well as Ms. Manal Wissa and Mrs. Lamiaa Mohammed, who co-chaired the meeting.

5. LANGUAGE

5.1 The meeting was conducted in English and documentation posted under meetings on the ICAO MID Regional Office website

6. AGENDA

6.1 The following Agenda was adopted:

Agenda Item 1: Adoption of the Provisional Agenda

Agenda Item 2: Follow-up on MIDANPIRG/21 Conclusions and Decisions relevant to MET

Agenda Item 3: Global and Regional Developments

Agenda Item 4: MET Planning and Implementation issues

- Performance Framework for MET implementation in the MID Region
- Review of the implementation of WAFS and SADIS
- Review of requirements for OPMET data as well as IWXXM implementation

Agenda Item 5: Review of air navigation deficiencies in the MET field

Agenda Item 6: Future Work Programme

Agenda Item 7: Any other business

7. CONCLUSIONS AND DECISIONS - DEFINITIONS

7.1 All MIDANPIRG Sub-Groups and Task Forces record their actions in the form of Conclusions and Decisions with the following significance:

a) **Conclusions** deal with the matters which, in accordance with the Group's terms of reference, merit directly the attention of States on which further action will be initiated by ICAO in accordance with established procedures; and

b) **Decisions** deal with matters of concern only to the MIDANPIRG and its contributory bodies.

8. LIST OF DRAFT CONCLUSIONS AND DRAFT DECISIONS

DRAFT CONCLUSION 12/1: IWXXM IMPLEMENTATION DEFICIENCIES

DRAFT CONCLUSION 12/2: WORKSHOP ON ENHANCING METEOROLOGICAL SERVICES CAPABILITIES

DRAFT DECISION 12/3: REVISED MET SG TORS

DRAFT CONCLUSION 12/4: SURVEY ON STATES' COMPLIANCE WITH EXISTING AND FORTHCOMING GLOBAL AND REGIONAL MET REQUIREMENTS

PART II: REPORT ON AGENDA ITEMS

REPORT ON AGENDA ITEM 1: ADOPTION OF THE PROVISIONAL AGENDA

1.1 The subject was addressed in WP/1 presented by the Secretariat. The meeting reviewed and adopted the Provisional Agenda as described at Para 6 of the History of the Meeting.

REPORT ON AGENDA ITEM 2: FOLLOW-UP ON MIDANPIRG/21 CONCLUSIONS AND DECISIONS RELEVANT TO MET

2.1 The subject was addressed in WP/2 presented by the Secretariat. The meeting noted the status of the MIDANPIRG/21 Conclusions and Decisions relevant to MET and the follow-up actions taken by concerned parties as at **Appendix 2A**.

REPORT ON AGENDA ITEM 3: GLOBAL AND REGIONAL DEVELOPMENTS

Progress on the amendment to Annex 3 and a new PANS-MET

3.1 The subject was addressed in WP/3, presented by the Technical Officer MET from ICAO HQ. The meeting recalled Recommendation (5/2) by the Meteorology Divisional Meeting (2014) (MET-DIV/14), which tasked the METP to restructure Annex 3 by clearly separating performance and functional requirements (new Annex 3) from the technical specifications (new PANS-MET). This separation facilitates the migration of the provision of aeronautical meteorological information from a "product-centric" to an "information-based" environment with the System Wide Information Management (SWIM) and the evolution of the provision of aeronautical meteorological services in line with the Global Air Navigation Plan (GANP).

3.2 The meeting noted METP/5 proposals addressing the developments of the restructured Annex 3 and PANS-MET and the amendments relating to a) space weather information services, b) QVA, c) IAVW, d) IWXXM, e) the World Area Forecast System (WAFS); and f) improved definition of meteorological authority and introduction of a new definition of meteorological service provider. The Air Navigation Commission (ANC) authorized the transmission of these proposals to the Contracting States and appropriate international organizations (State Letter AN 10/1-23/1 dated 26 January 2023) for comments by 26 July 2023. More details are available in Appendices B – J to State letter AN 10/1-23/1 dated 26 January 2023 for more details.

3.3 The meeting was informed that the proposed amendment to Annex 3 and a new PANS-MET (Doc 10157) will be consolidated as Amendment 82 to Annex 3 and proposed for the Council's approval, together with other consequential amendments to Annexes 6, Parts I, II and III, 11, 15, PANS-ABC, PANS-AIM, and PANS-ATM.

3.4 It was also stressed that the applicability date of this amendment, originally expected as 28 November 2024, was re-determined as 27 November 2025. Consequently, the amendment proposal arising from the second meeting of the IMP (IMP/2) for the inclusion of a recommendation on the use of SWIM-enabled information services for the supply of meteorological information will become applicable on 28 November 2024, as Amendment 81 to Annex 3 (State letter AN 10/1.1-24/33 refers).

3.5 The proposed amendments to Annexes 3, 6 Parts I, II and III, 10, Volume II, 11 and 15 are envisaged for applicability on 28 November 2024, except for proposed amendments to Annex 3 related to QVA information, which should be indicated as 27 November 2025. The proposed amendments to PANS-ABC (Doc 8400), PANS-AIM (Doc 10066), PANS-ATM (DOC 4444), and PANS-MET (Doc 10157) are envisaged for applicability on 28 November 2024, except for proposed amendments to PANS-MET related to QVA information which should be indicated as 27 November 2025.

3.6 The meeting was reminded to update their national regulations to reflect these upcoming changes to the provisions related to meteorological services for international civil aviation.

WMO activities of relevance to ICAO

3.7 WMO updated the meeting about their recent developments in IP/05. For example, the 2024 update in the working arrangements between ICAO and WMO will enhance the coordination in aeronautical meteorology and related fields between the two Organizations and marked the first significant update of the working arrangements since 1963. These arrangements will now be reviewed every five years and updated as/when necessary.

3.8 The meeting noted that with reference to the WMO reform of its governance

structures in 2019, a new non-governmental Standing Committee on Services for Aviation (SC-AVI) was established under a new intergovernmental Commission for Weather, Climate, Water and Related Environmental Services and Applications (abbreviated to 'Services Commission' or SERCOM).

3.9 The meeting noted also that the WMO continues to play an active role in many MET-related stakeholder groups, inter alia, ICAO's METP and its working groups, and the Accident Classification Task Force (ACTF) of the International Air Transport Association (IATA). The WMO also serves as contact for enquiries on the impacts of climate change and variability on aviation for members of the aeronautical community.

3.10 The meeting acknowledged that the WMO, at the request of ICAO, is responsible for developing and publishing the IWXXM schemas. The currently valid schema is version 2023-1, available here. The WMO Task Team on Aviation Data (TT-AvData), under the Commission for Observation, Infrastructure and Information Systems (abbreviated to 'Infrastructure Commission' or INFCOM), the Infrastructure Commission (INFCOM), will provide a schema to support Amendment 82 of ICAO Annex 3 with intended applicability in November 2025.

3.11 The meeting discussed stakeholders' need for guidance on which schema to use and for a change management process when the IWXXM schema is updated. EUR Doc 18 contains some guidance on which IWXXM version to use from which date. In addition, the Meteorological SWIM Services Sub-Group (MET3SG) of EUROCONTROL defined SWIM service definitions, which also specify the schema. On a global level, METP and WMO are formalizing the communication process of IWXXM schema releases to stakeholders in a timely manner. This is expected to be formalized by the METP/6 meeting.

3.12 In the context of SWIM, it was highlighted that the new task team on the interoperability needs between the WMO Information System (WIS) and SWIM, TT-WIS2-SWIM Interoperability, was established based on a decision by INFCOM-3 (15 to19 April 2024). The task team brings together experts from the INFCOM Standing Committee on Information Management and Technology (SC-IMT) and the METP Working Group on Meteorological Information Exchange (WG-MIE).

3.13 The discussion underscored that the IATA Accident Classification Task Force (ACTF) is supported by WMO, which is a crucial contributor to preparing the annual IATA Safety Report. This report provides an in-depth review and insight into global and regional accident rates and contributing factors, including those relating to meteorological conditions. The METG was encouraged to review the latest (2022) IATA Safety Report (https://www.iata.org/en/publications/safety-report/).

3.14 The meeting noted an upcoming amendment to the Aeronautical Meteorological Personnel (AMP) qualification and competency requirements contained in WMO-No. 49, Volume I, supported by guidance in WMO-No. 1209, with an applicability date of 1 January 2026.

3.15 The meeting was provided with information regarding the WMO 2024 Aeronautical Meteorology Scientific Conference (AeroMetSci-2024) held in Geneva to discuss advancements in meteorological services and climate change impacts on aviation. Further information can be found on WMO's Services for Aviation website.

3.16 Additional information on WMO's activities is accessible via the Services for Aviation website at https://community.wmo.int/activity-areas/aviation.

3.17 The meeting noted that the Secretariat of the AVI Division is contactable via email: aviation@wmo.int.

REPORT ON AGENDA ITEM 4: MET PLANNING AND IMPLEMENTATION ISSUES

Performance Framework for MET Implementation in the MID Region

4.1 The subject was addressed in WP/4 presented by the Secretariat.

4.2 The meeting reviewed the MID Air Navigation Report (2023) focusing on the MET Part, as outlined in **Appendix 4A.** It was noted that the tabular data had been incorporated into the MID eANP Volume III—AMET Tables.

4.3 The meeting recalled the importance of the upcoming MID Region Air Navigation Report – 2024. States were encouraged to submit information regarding their level of implementation of the AMET thread priority 1 elements to the ICAO MID office by 15 December 2024.

4.4 The meeting strongly urged States to provide comprehensive data on the level of implementation of AMET thread priority 1 elements. This information is essential to accurately assess the current state of implementation and identify areas requiring improvement.

4.5 The World Meteorological Organization (WMO) highlighted that, according to the GANP ASBU threads, the BO-AMET Module Block 0: Global, Regional, and Local Meteorological Information was expected to be completed by 2019. Therefore, States were encouraged to update their B1-AMET Tables to reflect progress and ensure alignment with current implementation expectations.

o WAFS & SADIS update

4.6 The subject was addressed in IP4 and Presentation presented by the SADIS (Secure Aviation Data Information Service) Provider State.

4.7 The meeting was informed on upcoming changes to the WAFS SIGWX forecasts, with the introduction of new multi-timestep SIGWX in IWXXM format and changes to the existing T+24 forecasts planned for 23 January 2025. These changes have been agreed though the ICAO MET Panel Meteorological Operations Group (MOG) at its annual meetings. Additional information about these changes is available online from a webinar recording and a dedicated website, which also includes a flyer. The SADIS Provider encouraged MET SG Members/participants to share the website and flyer with regulators, airlines, operators, flight planning organizations, and other aviation stakeholders so that all users of the existing T+24 SIGWX charts be aware of the changes planned for 26th November 2024.The survey can also be accessed at the following link: https://response.questback.com/metoffice/siu8qqrbmg.

4.8 The meeting noted that both WAFCs have been working on a significant upgrade to the WAFS SIGWX forecasts. Currently, only a 24-hour SIGWX forecast is produced 4 times daily (based on the 00, 06, 12, and 18 UTC model data), and this no longer meets the needs of the aviation industry, particularly for short-haul and ultra-long-haul flights. The new automated SIGWX will provide forecasts for a 6-hour to 48-hour period (at three hourly intervals) and will be issued 4 times daily. Furthermore, the SADIS API will provide access to the new WAFS SIGWX forecasts.

4.9 The meeting was informed that the T+24 SIGWX png charts will continue to be distributed via the old SADIS FTP and WIFS (WAFS Internet File Service) systems until November 2028 with the following changes:

- no embedded cumulonimbus cloud;
- turbulence areas (both clear air turbulence (CAT) and orographic turbulence) instead of only CAT areas;
- tropopause height as contours;
- upper boundary of high-level SIGWX forecasts: FL600 instead of FL630;
- for the medium-level SIGWX: no in-cloud turbulence (currently there are combined in-cloud turbulence and icing areas) and instead just icing will be provided. In addition a new "T'' line style will be used for icing.

4.10 The meeting was informed that the new SIGWX is designed for digital use and will enable different SIGWX features to be toggled on and off, the map area, projection, and colors to be customized according to user needs, and the movement and development/dissipation of features identified. Additionally, Users requiring charts for briefing purposes are expected to create them from the digital data set.

4.11 Constraints in what the BUFR code can accommodate means that there will be some differences between the WAFC produced T+24 charts and those that are created from the BUFR data. Tropopause data will be provided in the form of spot heights (as it is now) and the medium level "MCLOUD" file which contains cumulonimbus and icing information will have icing areas that lie inside of cumulonimbus areas removed so that end users visualization code is still able to use existing rules for clear label placement.

4.12 Test BUFR files are available from the SADIS manager on request, and in addition data will be published here. It is important to note that the BUFR format SIGWX data will be retired in November 2026.

4.13 The attendees noted IP/04, in which, the SADIS Provider presented changes to the provision of WAFS data on SADIS that WG-MOG had agreed upon at its annual meetings and on SADIS operational matters.

4.14 It was recalled that, on 24 January 2024, after the 06 UTC model run, the 1.25-degree cumulonimbus, CAT, and cumulonimbus data sets were retired, as they had been removed from ICAO Annex 3 in 2020. On 30 January 2024, WAFC London switched to a new infrastructure for producing WAFS gridded data, offering both high-resolution data for SADIS API and lower-resolution data for SADIS FTP, enhancing resilience with automated monitoring.

4.15 The meeting acknowledged that on 7 February 2024, high-resolution WAFS data became available in pre-operational mode via the SADIS API, with operational status achieved on 19 March 2024. This marked the official availability of enhanced WAFS data sets.

4.16 The meeting also noted that both WAFCs verify their wind and temperature forecasts regularly. WAFC London also verifies the harmonized/blended cumulonimbus cloud and turbulence forecasts; WAFC Washington provides verification data for the harmonized/blended icing data sets. Additional verification metrics of the new WAFS gridded data sets are expected to be introduced by 2026.

4.17 The meeting noted that the SADIS API is SWIM-compliant and published in the EUROCONTROL SWIM registry. It provides access to high-resolution WAFS gridded data, WAFS SIGWX forecasts, and OPMET data.

4.18 The meeting noted also that the annual SADIS efficacy survey for 2024 commenced on 1 July 2024, and users are being notified of it through SADIS administrative messages. ICAO was requested to send a letter to SADIS focal points to encourage them to complete the survey.

4.19 Lastly, the meeting reclled that at the end of February each year an updated "Status of Implementation of SADIS" document is published on the METP Public Webpages (in the SADIS/WIFS reference documentation section). This document also includes an indication of which users have signed up to SADIS API.

IWXXM IMPLEMENTATION

4.20 The subject was addressed in WP/5, presented by the Secretariat.

4.21 The meeting recalled that provisions related to IWXXM became a requirement in Amendment 78 to Annex 3, which became effective on 5 November 2020. Specifically, the following MET-related data shall be disseminated in IWXXM form in addition to the Traditional Alphanumeric Code (TAC) form: METAR and SPECI, TAF, SIGMET and AIRMET, Tropical Cyclone Advisory, Volcanic Ash Advisory, and Space Weather Advisory Information.

4.22 The status of IWXXM implementation in the MID Region was updated with input from ROC Jeddah, as provided in **Appendix 4B**. Notably, the following States have implemented IWXXM v3.0: Bahrain, Jordan, Saudi Arabia, Qatar, and the United Arab Emirates. Kuwait also plans to implement IWXXM in 2024.

4.23 States that have implemented IWXXM were encouraged to assist those that still need to do so. In addition, States that have not yet implemented IWXXM were urged to review ICAO Doc 10003 (Manual on the ICAO Meteorological Information Exchange Model) and the ICAO MID IWXXM Implementation Webinar material provided at the following website: https://www.icao.int/MID/Pages/2021/ .

4.24 The meeting noted that States should be strongly encouraged to implement IWXXM as soon as possible since these translation services are not intended to continue indefinitely.

4.25 Furthermore, the meeting agreed that States that do not implement IWXXM by MIDANPIRG/22 will be proposed to be added to the list of air navigation deficiencies in the MID Region (subject to MIDANPIRG/22 approval). Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 12/01: IWXXM IMPLEMENTATION DEFICIENCIES

That, States that have not implemented IWXXM for OPMET exchange as per ICAO and WMO provisions be included in the list of Air Navigation Deficiencies.

IWXXM implementation, as well as SWIM requirements, Interregional coordination/distribution of OPMET data

4.26 The subject was addressed in the presentation, and WP/07 presented by the data Management Group (DMG (Vice-chair – Austria)).

4.27 The meeting was informed of the following current tasks and challenges of the DMG:

Managing and Maintaining EUR ICAO Doc 018

- OPMET data exchange:
- Monitoring & Optimizing
- Management of changes
- Maintaining the EUR RODEX and SADIS OPMET Catalogue
- Developing a tool for an automated METNO-Procedure (RODC)
- Handling problems via the PHP tool
- Monitor and support IWXXM implementation in the EUR region
- Providing PI for the EUR eANP, Volume III in regard to the ASBU thread elements AMET B0 and AMET B1
- Developing a CONOPS for the transition from AFS to SWIM

4.28 The meeting reviewed the latest changes proposed by the DMG for approval.

4.29 The meeting was informed that each year, from 1 to 14 February, the DMG performs the EUR OPMET Data Monitoring Exercise (ref.: EUR Doc 018, Appendix C) for routine OPMET data (3-day monitoring, 1 to 3 February) and non-routine OPMET data (14-day monitoring, 1 to 14 February).

4.30 The monitoring results show that the exchange of required OPMET in TAC format is well established between EUR and other ICAO regions.

4.31 The meeting recalled that one of the objectives of the scheduled monitoring was to ensure that the AFS and SADIS OPMET data programs are identical. Any deficiencies identified in the monitoring results are managed by creating a Problem Ticket in the DMG Problem Handling Procedure (PHP) for action by the responsible ROC.

4.32 The meeting was updated with the IWXXM's current technical implementation status in the EUR/NAT region. It was highlighted that, based on the latest information available about the support of AMHS by COM-Centres as well as the NOCs, 16 out of 52 EUR/NAT States are not or only partly fulfilling this requirement. It was highlighted that several States have also reported that the upgrade of the systems is ongoing and that they will be capable of doing so within the following months. A similar situation can be spotted for the AFS connections in the MID Region.

4.33 The meeting noted that in the MID Region, the AMHS link between Nicosia and Jeddah has been operational since 24 January 2023. This enabled the IROGs Jeddah and Vienna to exchange IWXXM data between the EUR and MID Regions. After some testing of the new IWXXM data in March 2023, the new bulletin headers were announced via the METNO procedure. The routing within the EUR Region was officially activated on AIRAC, dated 4 April 2023.

4.34 The meeting acknowledged that, the IWXXM data flow is being analyzed, and coordination will take place between Jeddah and Vienna to optimize the exchange of IWXXM data. What has been identified so far is that IWXXM bulletins from the EUR Region are sent back.

4.35 It was indicated that the MET-Switch test system activates the validation of IWXXM messages. If a problem is identified, IROG Jeddah will be informed accordingly so that further actions can be taken.

4.36 The meeting noted that IROG Toulouse investigated the current data exchange between AFI and EUR and identified that not only EUR data is distributed to Dakar and Pretoria but also data from other Regions. According to the routing schema, the ICAO Regions shall aim to exchange data directly between them and not via an IROG of another Region. Coordination between

EUR-IROGs and the other Regions will continue to improve the current situation.

4.37 The meeting noted also that IROG London continues to work with IROG Washington to align OPMET data on SADIS and WIFS, ensuring the dissemination of required data between the EUR and NACC Regions. However, IROG Washington is not yet able to exchange IWXXM data with IROG London, and this is unlikely to change in the near future. Test IWXXM data was expected from Canada in Q2 2024. WAFC Washington will provide a selection of test IWXXM messages by email for ROC Vienna and ROC London to run through their systems.

4.38 The meeting highlighted that IROG London and IROG Singapore have coordinated on the operational exchange of IWXXM data since December 2022 and they exchange all available IWXXM data between the two Regions.

Transition from AFS OPMET distribution to SWIM

4.39 The subject was addressed in the WP/7 presented by DMG (Austria). The meeting updated the current situation and, foremost, the challenges that must be faced during SWIM implementation.

4.40 The meeting noted that DMG had developed the initial draft of the concept of Operations (CONOPS) for transitioning from OPMET-Data Exchange via AFS to SWIM. The CONOPS was provided to the meeting for consideration, as provided in **Appendix 4C**. The draft document details the current and future data exchange systems and outlines several potential transition scenarios. DMG identified several vital topics for which stakeholders may require additional guidance.

4.41 The meeting asked States to review, especially the CONOPS, and provide feedback to DMG.

4.42 The meeting was informed that the RODEX system in the EUR Region, overseen by DMG, utilizes essential procedures for managing data quality, such as Data Availability Management, Quality Management, Change Management, and Problem Management, to ensure robust OPMET data exchange within the Region. DMG is unaware of equivalent data management and quality procedures for a global SWIM environment.

4.43 The meeting recalled that no IWXXM schema has been developed for Aerodrome warnings, GAMET messages, Pilot reports, and Notification Messages, and there is no plan to do so. The meeting noted that developing IWXXM schemas for these products may not provide significant benefits. However, assessing whether the data as a whole or in parts can be transitioned to the SWIM environment is essential.

4.46 The WMO inquired whether there is an equivalent to the DMG (Data Management Group) in the MID Region, similar to the structure in the EUR/NAT Region. It was emphasized that establishing such a group would be highly beneficial for enhancing the exchange and monitoring of OPMET data within the region, fostering greater coordination, and improving the overall quality and reliability of meteorological information. It was proposed to discuss the subject during the MET SG/13 meeting.

REPORT ON AGENDA ITEM 5: REVIEW OF AIR NAVIGATION DEFICIENCIES IN THE MET FIELD

5.1 The subject was addressed in WP/6 presented by the Secretariat.

5.2 The meeting recalled that MIDANPIRG/21 reviewed the contents of the MIDANPIRG Air Navigation Deficiency Database (MANDD). MIDANPIRG/21 agreed to remove the deficiencies reported against Jordan related to SADIS service. The meeting noted that the total number of MET deficiencies is fourteen (14) priority 'A' deficiencies, five (5) of which were related to QMS and nine (9) related to METAR, TAF, SIGMET, and WAFS.

5.3 The meeting also noted that several deficiencies listed in the MANDD still did not have a specific Corrective Action Plan (CAP). States were urged to provide this information for each deficiency (MIDANPIRG Conclusion 15/35 refers).

5.4 The meeting noted that most deficiencies have remained on the list for over 10 years, with many States not updating their CAPs. Following discussions, it was agreed to organize and conduct a workshop in close coordination with the WMO. This Workshop will raise awareness among States and guide to support practical activities aimed at addressing and removing the identified deficiencies. Therefore, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 12/02: WORKSHOP ON ENHANCING METEOROLOGICAL SERVICES CAPABILITIES

That, the ICAO MID Office, in collaboration with the WMO and Member States, organize a Workshop to be held alongside the upcoming MET SG/13 meeting in 2025. This Workshop aims to support States in strengthening their understanding and capabilities to address current deficiencies, thereby enhancing the overall effectiveness of their meteorological services and fostering improved regional cooperation.

5.5 The list of deficiencies was updated based on the information above as provided at **Appendix 5A**.

REPORT ON AGENDA ITEM 6: FUTURE WORK PROGRAMME

6.1 The Secretariat presented WP/7, which addressed the Future Work Programme. The meeting reviewed the Terms of Reference (TORs) of the MET Sub-Group (MET SG) and proposed amendments for further improvement. Accordingly, the meeting agreed to the following Draft Decision:

DRAFT DECISION 12/3: REVISED MET SG TORS

That, the revised Terms of References (TORs) of the MET SG, are endorsed as at ***Appendix 6A.***

6.2 The inclusion of Space Weather Information in the MET SG's TORs was proposed as an essential enhancement to ensure comprehensive coverage of aviation meteorological requirements.

6.3 The discussion underscored the need to developing and conducting a comprehensive survey to assess States' compliance with existing and forthcoming global and regional MET requirements. This survey would also help identify states' specific needs to facilitate targeted assistance and planning. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 12/4: SURVEY ON STATES' COMPLIANCE WITH EXISTING AND FORTHCOMING GLOBAL AND REGIONAL MET REQUIREMENTS

That, the ICAO MID Regional Office conduct a survey to assess States' compliance with both current and upcoming global and regional MET requirements.

6.4 The meeting agreed that the next MET SG meeting (MET SG/13) should be scheduled for Q4 2024, with November 2024 as the preferred timeframe. The specific venue for the meeting will be determined and communicated in due course.

REPORT ON AGENDA ITEM 7: ANY OTHER BUSINESS

7.1 The meeting emphasized that to strengthen the synergies of the MID-MET SG, active engagement from States is essential to address both current and future challenges in providing MET services for international aviation. States with near or full MET implementation are encouraged to support those that have not yet achieved full implementation, particularly in addressing the numerous existing deficiencies.

APPENDICES

FOLLOW-UP ON MIDANPIRG/21 CONCLUSIONS & DECISIONS

No.	CONCLUSIONS AND DECISIONS	CONCERNS/ CHALLENGES (RATIONALE)	DELIVERABLE/ TO BE INITIATED BY		TARGET DATE	STATUS/REMARKS
C.21/2	**MID REGION AIR NAVIGATION STRATEGY, EDITION, FEBRUARY 2024** That, the MID Region Air Navigation Strategy, Edition February 2024 (ICAO MID DOC 002), is endorsed and be published by the ICAO MID Office.	To harmonize the implementation within the Region	Revised version of MID Doc 002	ICAO MID	Feb 2024	**Completed**
C.21/3	**NATIONAL AIR NAVIGATION PLAN (NANP)** That, the MID States with support of ICAO MID Office develop their National Air Navigation Plan (NANP) by end of December 2024.	Implementation of RANP within the MID Region	National Air Navigation Plans	MID States	Dec 2024	**Completed** Kuwait ANP developed Jordan ANP ongoing Requests from Iran and Qatar
C.21/4	**MID AIR NAVIGATION REPORT - 2023** That, the MID Air Navigation Report-2023 is endorsed and be published by the ICAO MID Office.	Reflect the implementation Status of RANP within the MID Region	MID Air Navigation Report 2023	ICAO MID	March 2024	**Completed**
D.21/33	**MIDANPIRG REVISED STRUCTURE** *That, the revised MIDANPIRG Structure 2024 is endorsed to be included in MIDANPIRG Procedural Handbook.*	Consistency in establishment of experts groups	Revised MIDANPIRG structure	MIDANPIRG	2025	On going

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MID REGION ASBU Threads & Elements (AMET B0) Monitoring Table

Priority 1: Elements that have the highest contribution to the improvement of air navigation safety, capacity and/or efficiency in the MID Region. These elements should be implemented where applicable and will be used for the purpose of regional air navigation monitoring and reporting.

Priority 2: Elements recommended for implementation based on identified operational needs and benefits.

Priority 1 Thread: Any thread with at least 1 priority 1 element.

AMET					
Element	**Title**	**Applicability**	**Performance Indicators/**	**Performance Indicators/**	**Performance Indicators/**
AMET B0/1	Meteorological observations products	All states	Indicator*: Regional average implementation status of B0/1 (Meteorological observations products). Supporting Metrics: Number of States that provide the following Meteorological observations products, as required: 1. Automatic Weather Observation System (AWOS) information (including real-time exchange of wind and RVR data) 2. Local reports (MET REPORT/SPECIAL) 3. Aerodrome reports (METAR/SPECI) 4. Lightning Information 5. Ground-based weather radar information 6. Meteorological satellite imagery 7. Aircraft meteorological report (ie. ADS-B, AIREP, etc.) 8. Vertical wind and temperature profiles 9. Wind shear alerts	80%	Dec 2021
AMET B0/2	Meteorological forecast and warning products	All states	Indicator*: Regional average implementation status of B0/2 (Meteorological forecasts and warning products) Supporting Metrics: Number of States that provides the following Meteorological forecast and warning products, as required:	90%	Dec 2021

			1. World Area Forecast System (WAFS) gridded products 2. Significant Weather (SIGWX) 3. Aerodrome Forecast (TAF) 4. Trend Forecast (TREND) 5. Take-off Forecast 6. SIGMET 7. Aerodrome Warning 8. Wind Shear Warning		
AMET B0/3	Climatological and historical meteorological products	All states	Indicator: % of States that provide Climatological and historical meteorological products, as required. Supporting Metric: Number of States that provide Climatological and historical meteorological products, as required	85%	Dec 2021
AMET B0/4	Dissemination of meteorological products	All states	Indicator: % of States disseminating Meteorological products using a variety of formats and means (TAC, Gridded, Graphical, BUFR code, IWXXM) Supporting Metric: Number of States disseminating Meteorological products using a variety of formats and means (TAC, Gridded, Graphical, BUFR code, IWXXM)	85%	Dec 2021

AMET Implementation Level = 58 %

B0/1

State	AWOS	Local Report	Aerodrome report	Lighting info	Ground based weather radar info	MET SAT imagery	A/C met report	Vertical wind & Temp profile	Wind shear alert	Average
Bahrain	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Egypt	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Iran	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info
Iraq	Y	Y	Y	Y	N	N	N	N	N	44%
Jordan	Y	Y	Y	Y	Y	Y	Y	Y	N	89%
Kuwait	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Lebanon	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info
Libya	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info
Oman	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Qatar	Y	Y	Y	N	Y	Y	Y	Y	Y	89%
Saudi Arabia	Y	Y	Y	Y	Y	Y	Y	Y	0.25Y	92%
Sudan	N	Y	Y	Y	N	Y	N	N	Y	56%
Syria	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info
UAE	Y	Y	Y	Y	Y	Y	Y	Y	.25Y	92%
Yemen	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info	No Info
Total average	60%	67%	67%	60%	53%	60%	53%	53%	43%	57%

B0/2

State	WAFS	SIGWX	TAF	Trend	Take-off forecast	SIGMET	AERODROME WARNING	Wind shear warning	Average
Bahrain	Y	Y	Y	Y	Y	Y	Y	Y	100%
Egypt	Y	Y	Y	Y	Y	Y	Y	Y	100%
Iran	No Info	No Info	Y	No Info	No Info	Y	No Info	No Info	25%
Iraq	N	N	Y	Y	N	Y	N	N	38%
Jordan	N	Y	Y	Y	Y	Y	Y	Y	88%
Kuwait	N	N	Y	Y	Y	Y	N	Y	63%
Lebanon	No Info	No Info	Y	No Info	No Info	Y	No Info	No Info	25%
Libya	Y	No Info	N	N	No Info	N	No Info	No Info	13%
Oman	Y	Y	Y	Y	Y	Y	Y	Y	100%
Qatar	Y	Y	Y	Y	Y	Y	Y	Y	100%
Saudi Arabia	Y	Y	Y	Y	Y	Y	Y	0.25Y	91%
Sudan	N	Y	Y	Y	No Info	Y	Y	Y	67%
Syria	No Info	No Info	N	N	No Info	N	No Info	No Info	0
UAE	Y	Y	Y	Y	Y	Y	Y	Y	100%
Yemen	No Info	No Info	N	N	No Info	N	No Info	No Info	0
Total average	47%	53%	80%	67%	53%	80%	53%	55%	61%

B0/3 & B0/4

State	B0/3	B0/4	Average
Bahrain	Y	Y	100%
Egypt	Y	0.5Y	75%
Iran	No info	0.5Y	25%
Iraq	No info	Y	50%
Jordan	Y	Y	100%
Kuwait	Y	0.5Y	75%
Lebanon	No info	0.5Y	25%
Libya	No info	N	0
Oman	Y	Y	100%
Qatar	Y	Y	100%
Saudi Arabia	Y	Y	100%
Sudan	N	N	0
Syria	No info	N	0
UAE	Y	Y	100%
Yemen	No info	N	0
average	53%	60.0%	57%

	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi Arabia	Sudan	Syria	UAE	Yemen
B0/1															
B0/2															
B0/3															
B0/4															
Average Impl.															

Average Regional Implementation is 58%

APPENDIX 4B

Table – Status of IWXXM Implementation in the MID Region

State	Expected implementation date	Comment
Bahrain	Completed	IWXMM v3.0
Egypt		In Progress
Iraq		
Iran		Support planned until end of 2022
Jordan	completed	IWXMM v3.0
Kuwait	2024	
Lebanon	End 2023	
Libya		
Oman	Q1 2024	
Qatar	Completed	IWXXM v2.1 Testing IWXXM v3.0 between MET and COM Centres Need to exchange with ROC Jeddah
Saudi Arabia	completed	IWXXM v3.0
Sudan		
Syria		
United Arab Emirates	completed	IWXXM v3.0
Yemen		

CONOPS for the Transition from OPMET-Data Exchange via AFS to SWIM

1 Introduction

This paper has been written to start the discussion on how the transition from the current exchange schemas (like the RODEX (Regional OPMET Data Exchange) in the EUR-region) to a fully SWIM-compliant version could be executed. It starts with some basic information about SWIM, followed by a short explanation of the current exchange system. After that a very short outlook on enhanced services and the data exchange until 2029 and beyond is given.

Last but most important for this document, there are different scenarios outlined including proposals on how the current RODEX-schema with its ROCs and RODBs could be used to support the process of moving towards a SWIM environment.

This document also includes information on important topics which are paramount to be discussed to support developments for a harmonized global implementation.

2 SWIM in a nutshell

The following paragraphs provide an overview on the basic principles and obligations regarding SWIM, both from an ICAO- as well as EU-perspective. It also gives some basic information on what SWIM is well as the SWIM-services.

2.1 ICAO SWIM

SWIM is part of the ICAO GANP (Global Air Navigation Plan) which is "*ICAO's highest air navigation strategic document and the plan to drive the evolution of the global air navigation system*". The goal of SWIM is to implement a harmonized, interoperable technical solution for the exchange of

- Aeronautical Information Exchange (airspace structure, aerodrome mapping, digital NOTAM)
- Meteorological Information Exchange
- Flight Information Exchange (electronic Flight Plan, Arrival & Departure messages)

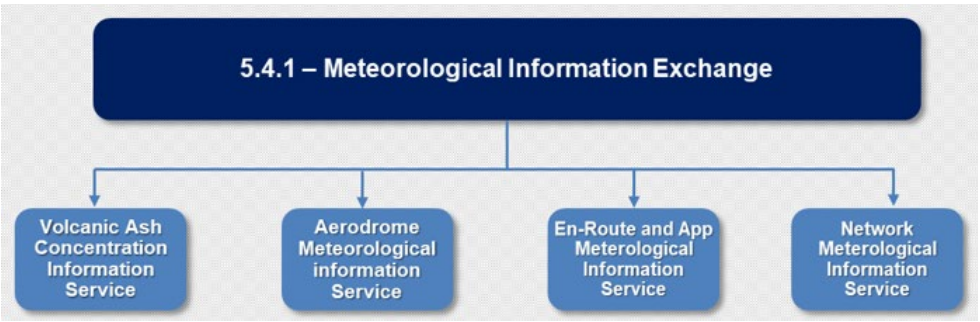
This document focuses on the Meteorological Data Exchange via SWIM-services which shall be implemented by the end of 2031. This is supported by the ICAO plan to remove TAC code-format, for products/data for which an IWXXM version exists, as standard for the operational data exchange from ANNEX 3, to be applicable by November 2030.

2.2 European Union SWIM

The EU is going a step further by moving faster to implement SWIM. With the Commission Implementing Regulation (EU) 2021/116, also known as Common Project One (CP1), EU-States are obliged to implement several ATM functionalities as defined in the SESAR Deployment Program. According to CP1, SWIM must be implemented and operationally used by the 31.12.2025.

The SESAR Deployment Program consists of 6 ATM Families. SWIM is AF5 and does not only contain MET but also the following sub-families:

AF 5.4.1 is further subdivided into the following services:



2.3 The Principle of SWIM

The following is taken from the SESAR Deployment Program:

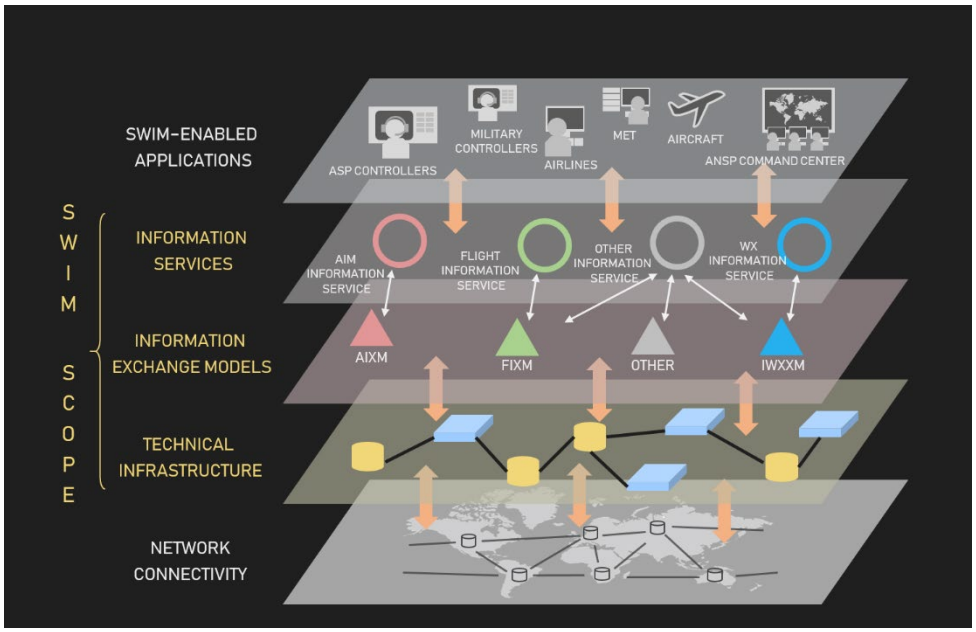
> *System Wide Information Management (SWIM) is a global Air Traffic Management (ATM) industry initiative to harmonize the exchange of Aeronautical, Weather, Network and Flight information for all Stakeholders.*
>
> *SWIM supports implementation of a collaborative network for planning and decision-making. The ATM interconnected network will allow operational stakeholders to participate in CDM processes when timely exchange of information between ATM actors improves a common situational awareness, planning activities and operational performance. SWIM brings*

standards and best practices in information technology including service-oriented architecture to the European ATM systems, lowering integration costs, enhancing architectural flexibility, lowering complexity and maintenance cost.

In a nutshell, the goal of SWIM is to have the right data available at the right time, at the right place and, if possible, in better quality. This could as well be realized in having tailored products for stakeholders.

2.3.1 Key elements for the implementation to SWIM

One of the key elements is the availability of the technical infrastructure to be able to provide SWIM-services.

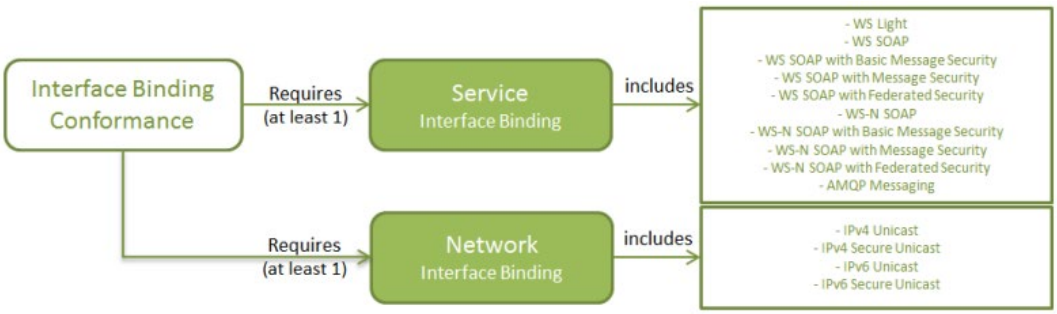


As can be seen from the above graphic, the network connectivity is out of scope of SWIM. The plan is, that SWIM can and will use the public internet as well as VPNs like "New PENS" to provide services.

The technical infrastructure needed to exchange data (advertise, subscribe and consume services) though needs to be in place. Information on the requirements for the TI is given in the SWIM TI Yellow Profile. This document explains how the binding between the systems is to be implemented, by that achieving the interoperability between systems.

The Yellow Profile differentiates between "Network Interface Bindings" and "Service Interface Bindings".

The following picture displays the possible solutions/methods that are covered by the SWIM TI-Yellow Profile.



Especially for the SWIM Service Binding, there is another essential key element to be taken into consideration è Security. To achieve a secure system not only authentication is a key element (Username/Password) but also a PKI (Public Key Infrastructure), which needs to be implemented. By

using public keys, it is ensured that the exchanged data is safe to be used by users, and for data providers, it ensures that the users are allowed to access the data. PKI is also covered in the SESAR Deployment Program, both for a common and a local solution. The details for that can be found in Family 5.1.1 (Common SWIM PKI and cyber security) as well as family 5.1.2. (Stakeholders SWIM PKI and cyber security) of the SESAR Deployment Program.

EUROCONTROL has developed a Common PKI infrastructure (EACP: European Aviation Common PKI) which will be offered to members to be used.

2.4 SWIM Services

At the moment only a few SWIM services are offered by MET-data providers. These can be found on the EUROCONTROL SWIM Service Registry where stakeholders can advertise services for users. A SWIM service is described by a service definition and a service description.

1.4.1 SWIM Service Definition

Following is the Executive Summary of the EC Specification for SWIM Information Definition:

> *This specification contains requirements for information definitions in the context of Initial System Wide Information Management (iSWIM) in Europe. Information definitions, the formal descriptions of exchanged information, are produced or reused by operational stakeholders. They act as the means whereby the exchanged information is clearly defined, understood and harmonised between stakeholders. Examples of information definitions are the description of information exchanged by services, standardised information exchange models, data catalogues used to list details on the exchanged information, and information exchanges captured as part of a business process model. The requirements come in two broad categories: general requirements for information definitions and requirements on how to document semantic correspondence to the ATM Information Reference Model (AIRM). The general requirements include, for example, the need for an edition and a reference date. The semantic correspondence requirements facilitate semantic interoperability, which is the ability of computer systems to exchange data with unambiguous, shared meaning. The requirements ensure that information definitions conform to the semantics of the AIRM, the common reference language for iSWIM.*

1.4.2 SWIM Service Description

Following is the Executive Summary of the "EC Specification for SWIM Information Description":

> *This specification contains requirements for service descriptions in the context of System Wide Information Management (SWIM) in Europe. Service descriptions describe implemented information services. The requirements focus on the minimum content of a service description to be produced by an information service provider. The content includes a description of what a service does, how a service works, how to access a service, and other information for consuming a service. This means that the service description contains the information needed by an information service consumer to use, or consider using, the service.*

3 How does OPMET-data exchange work nowadays?

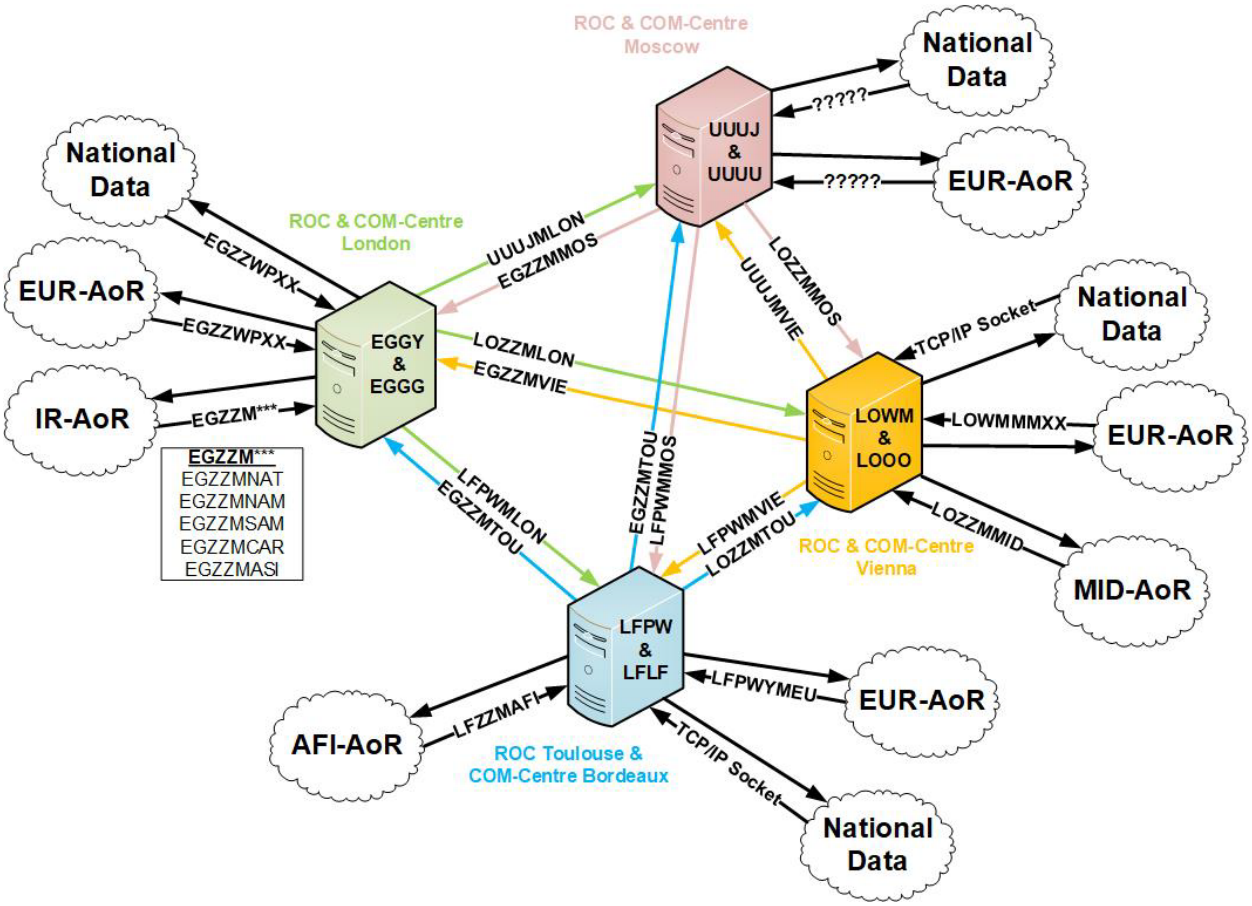
Following, the basic principles of today's OPMET-data exchange are explained. Detailed information about the ICAO EUR RODEX can be found in ICAO EUR Doc 018.

3.1 Data Exchange

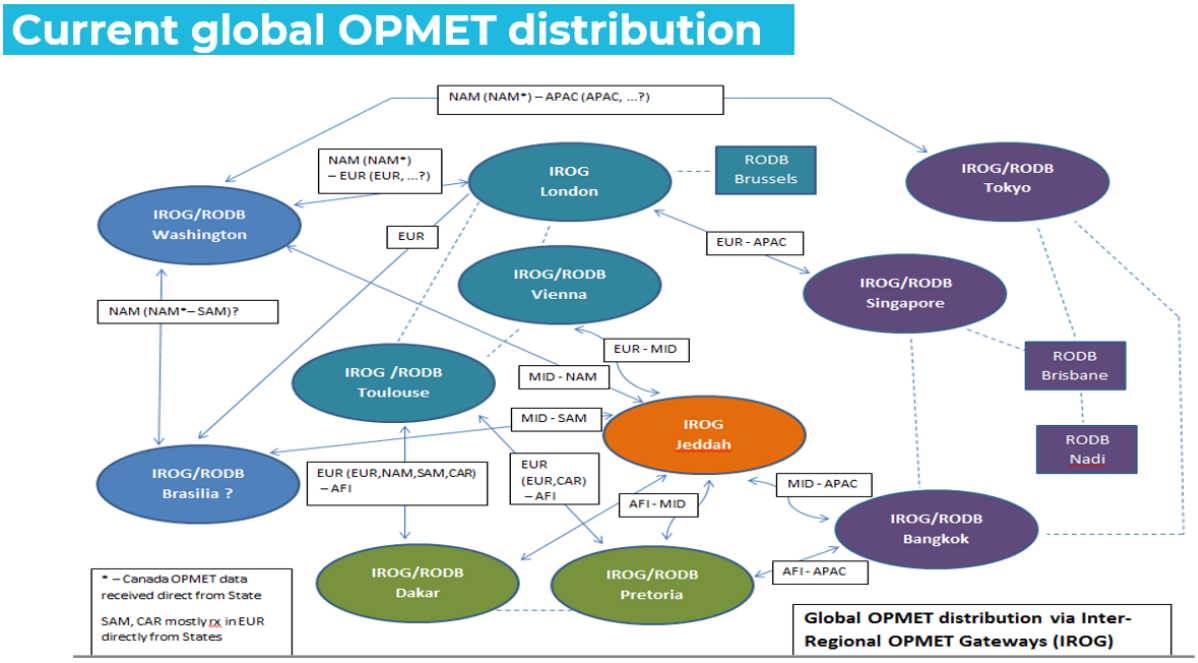
Today we have, in most of the ICAO regions, managed networks for the exchange of operational meteorological data (OPMET data). In the EUR-region this is called RODEX (Regional OPMET Data Exchange) system, which consists of a message switching center in every State, each having dedicated tasks to fulfil. The core elements in this system are the Regional OPMET Centers (ROCs) which each

have a defined area of responsibility from which they receive data for further exchange and to which they provide worldwide OPMET data depending on their individual needs.

This general principle is displayed in below graphic.



Apart from those regional centers, there are also Interregional OPMET Gateways (IROGs) which provide the same functionalities as a ROC but between ICAO regions.



3.2 Management of OPMET Data Exchange

All the centers in the EUR RODEX take care of the proper exchange of required OPMET-data and also act, depending on their role, as focal point for users. Examples for such tasks could be

- to act in case of problems with the availability or correctness of data
- to organize new, not yet available data
- to provide available but not yet routed data

Users have a dedicated single point of contact for any issues or questions in regard to OPMET-data exchange.

4 How will OPMET-data exchange work in a SWIM-environment?

This chapter provides a high-level overview of the SWIM principles from a MET-provider as well as from a user/consumer perspective.

4.1 MET-Provider

Within SWIM, a MET-provider shall offer the meteorological data via services. To accomplish that the service definition (the formal descriptions of exchanged information) needs to be developed. Such service definitions have been developed by MET3SG (EUROCONTROL working group) and could be taken on board by ICAO. This service definition is reusable and will ideally be used by all MET-providers to ensure that consumers can expect the same content from all providers. Such a service definition defines items like

- Geographical Extent (is it for an aerodrome, an FIR or an area covering a bigger area)
- Who are the services consumers
- Operational Environment
- Service Functions like publish/subscribe or request/reply
- Quality of Service

and several others.

Based on such a service definition a MET-Provider can develop the Service Description which will additionally include all information a service consumer needs for accessing the service. As this is different for all providers (contact-addresses, security tokens, IP-addresses…) this can't be standardized.

From an EU CP1 point of view, MET-providers as a minimum are mandated to provide METAR/SPECI, TAF and SIGMET messages in IWXXM-format as a SWIM-service. This can be seen as the first step in the direction to develop enhanced meteorological SWIM-services which, according to current plans, are to be operationally available until 2030.

4.2 User/Consumer of MET-Services

A User/Consumer of the current OPMET-data will have to subscribe to all the new services directly from the provider. Stakeholders are not in favor of such an approach, as this would mean that connections per airports, per datatype is needed. The preferred approach is to have one e.g. observations service per State per datatype. Instead of having single services per airport, there would be only one service which includes the provision of all airports. Of course, this service will need to offer a filtering function, so that a consumer can define those airports the data is needed from.

Still this will very likely cause a high demand on resources to

- review current data reception and define the amount and type of data needed
- discover the needed data/services in the SWIM-registry and identify possible needs for new interfaces
- subscribe to all needed data/services and integrate those in the used software solutions for operations

For airlines, this service of integrating MET-services into the briefing tool will very likely be provided by the software providers of briefing systems. But for smaller companies, depending on which tools they use and whether the contract covers the development of such a change, this changes likely will turn out to be challenging.

Also, the MET-providers, providing the function of an AMO (Aerodrome Meteorological Office), have to integrate MET-services due to their obligation to provide pre-flight briefing to airspace users.

5 OPMET-data exchange from 2025 to 2030 (and beyond?)

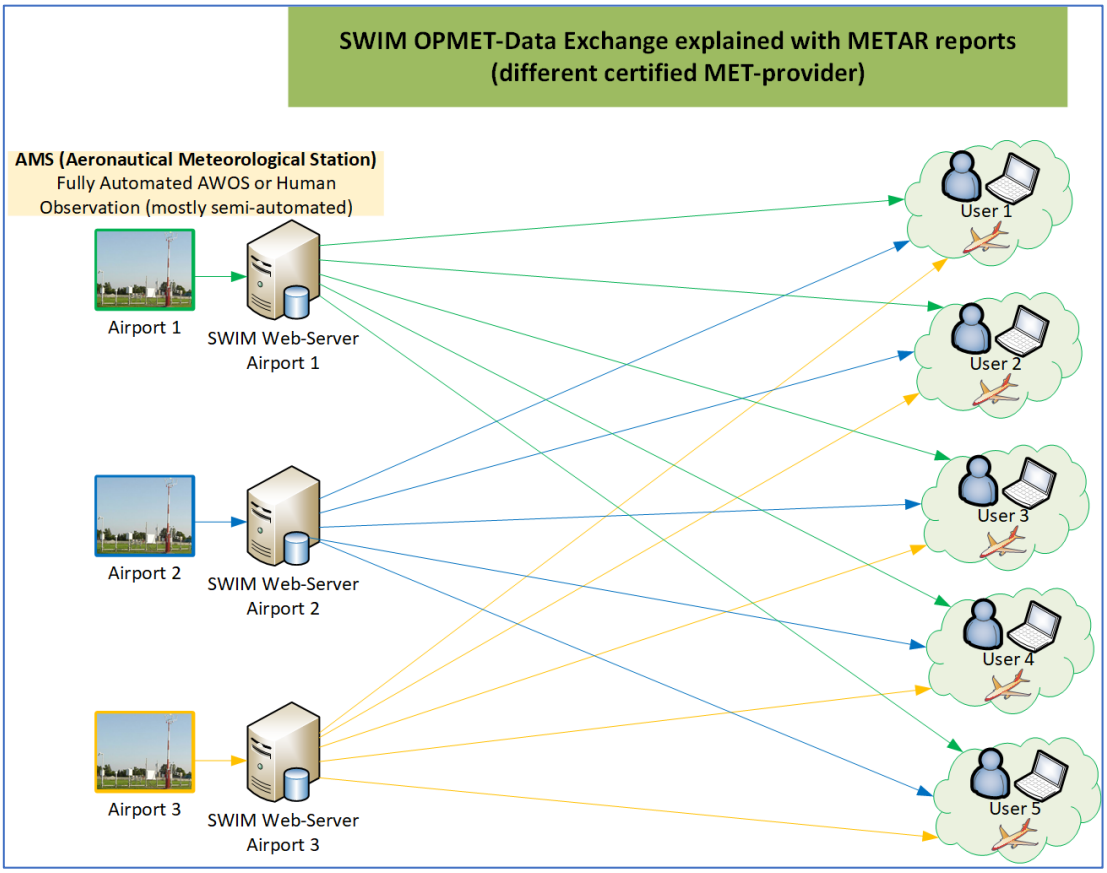
The European Union is, with its CP1 regulation, ahead of the global ICAO schedule. This can be seen as an additional risk as there is a chance to end up in a situation, where:

- MET providers must comply with
  - ICAO-regulations to provide, at least until 2030 from today's perspective, OPMET-data in TAC as well as IWXXM format; and
  - EU-regulations to provide MET-services to fulfil the requirements defined in EU Reg. 2017/373.
- Users/consumers regulated by EU CP1 have to be prepared to
  - Use TAC/IWXXM-formatted OPMET data from outside the European Union exchanged via AFS (AMHS)
  - Consume MET-services prepared by MET-providers regulated by CP1

Whether MET-Services from within the EU will be used also by non-EU stakeholders can't be foreseen. Based on the experience with the implementation of IWXXM-data, which is currently exchanged via the AFS, the probability to happen is low.

But it can also be seen as a chance. With the implementation and usage of SWIM (even if there are different regions) providing enhanced data and services, this could foster global implementation when stakeholders will realize the benefits of new services.

A drawback for this to happen is the problem explained under paragraph 3.2, where a consumer would need to connect and subscribe to each individual service provided by the designated MET provider. This situation, being the original SWIM concept, is displayed in the following graphic.



First discussions already took place, within the already mentioned EUROCONTROL MET3SG-group, between stakeholders, mainly triggered by the consumer side, about the planned provision of one service

per datatype, per provider. The outcome of the discussions is that there shall be one instance per type per State implemented. This means that a State shall implement

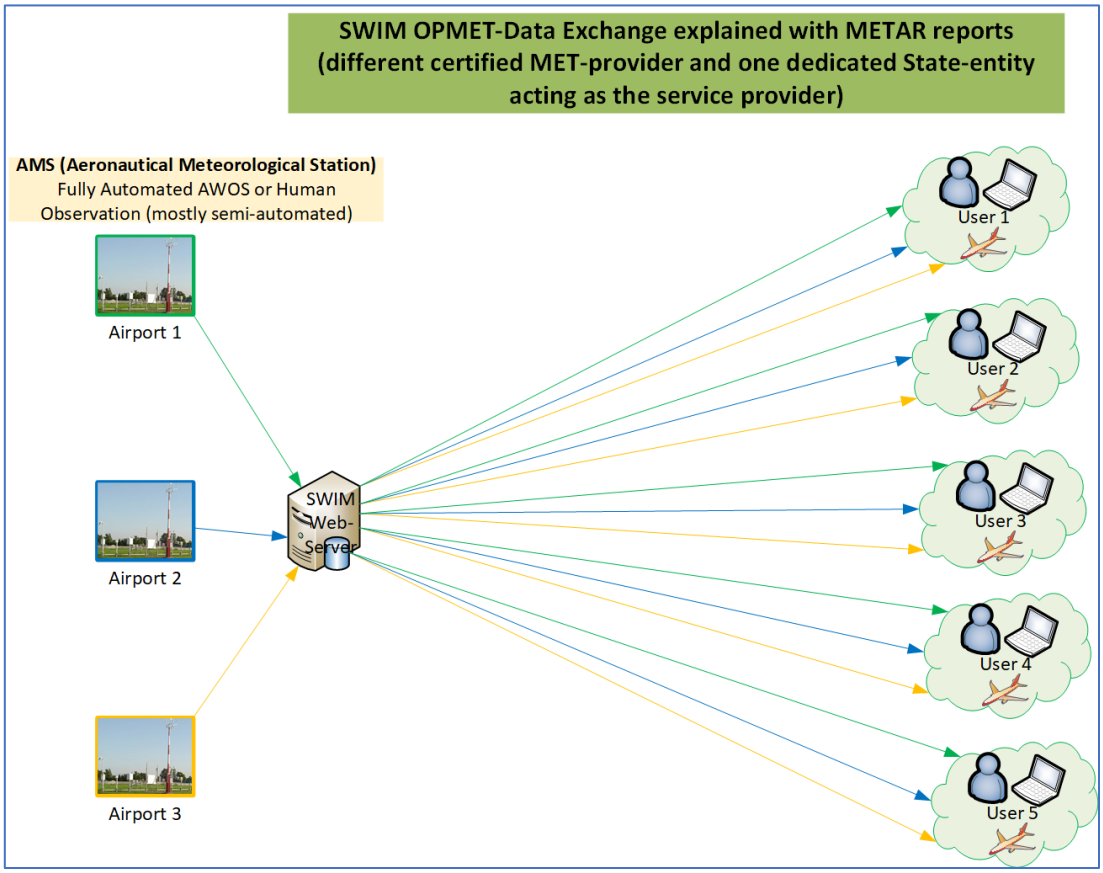
- One METAR/SPECI SWIM Service via which all METAR/SPECI of that State are provided
- One TAF SWIM Service via which all TAF of that State are provided
- One SIGMET SWIM Service via which all SIGMET (if there are more than one FIR/UIR) of that State are provided

The first two services shall provide data at least for those airports listed in the ICAO EUR Doc 7754, Volume II, MET Table II-2. This means that a State will have to define a responsible entity (either the current NOC or a certified MET-Provider) who will provide that service on behalf of the State respectively the other METPs (in case there are more than one). This will reduce the number of services a consumer needs to subscribe to significantly.

The current service definitions developed by MET3SG ask for just one filter option. A consumer shall either be able to consume all data provided via the service or to filter by location indicator respectively FIR/UIR-indicator. It has also been clarified that a dedicated request for data shall provide the latest available version (for METAR/SPECI, TAF) respectively all valid SIGMET at the time of requesting.

Of course it is up to the service provider to add additional options deemed to be useful for consumers.

The next graphics shows the improvement with that solution:

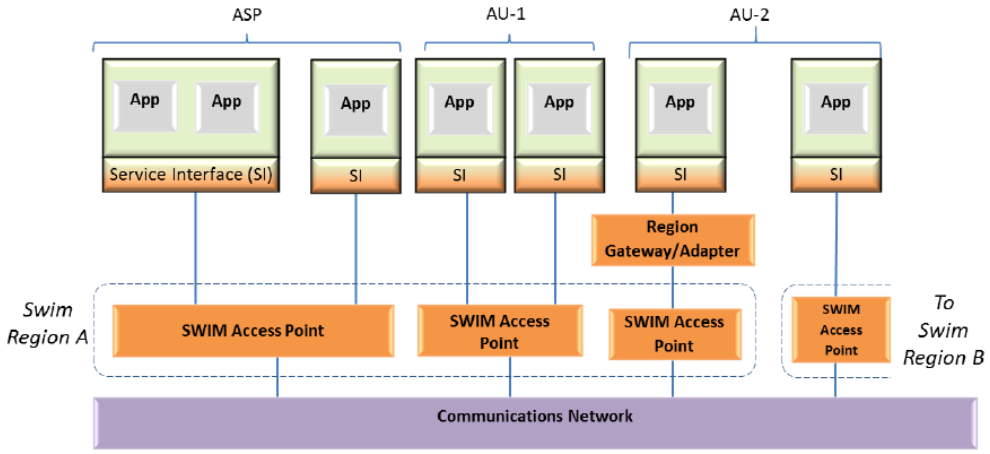


Still the users need to coordinate with every State they need data from. Therefore, users are also asking for centralized services, like the current ROCs, which act as a single point of contact for SWIM services.

With the ICAO initiative “No Country Left Behind” there is an additional risk, that the global implementation of SWIM is further delayed beyond 2029. As APAC is also working on a SWIM implementation, we might see several island solutions, making it necessary to run and use parallel systems for a long period of time. This is also considered/expected by ICAO IMP (Information

Management Panel) who indicated in the (draft) “Manual on System Wide Information Management SWIM Concept”, that it is very likely to have different SWIM-regions with slightly different standards. This means, that there might be a need for gateways between those regions.

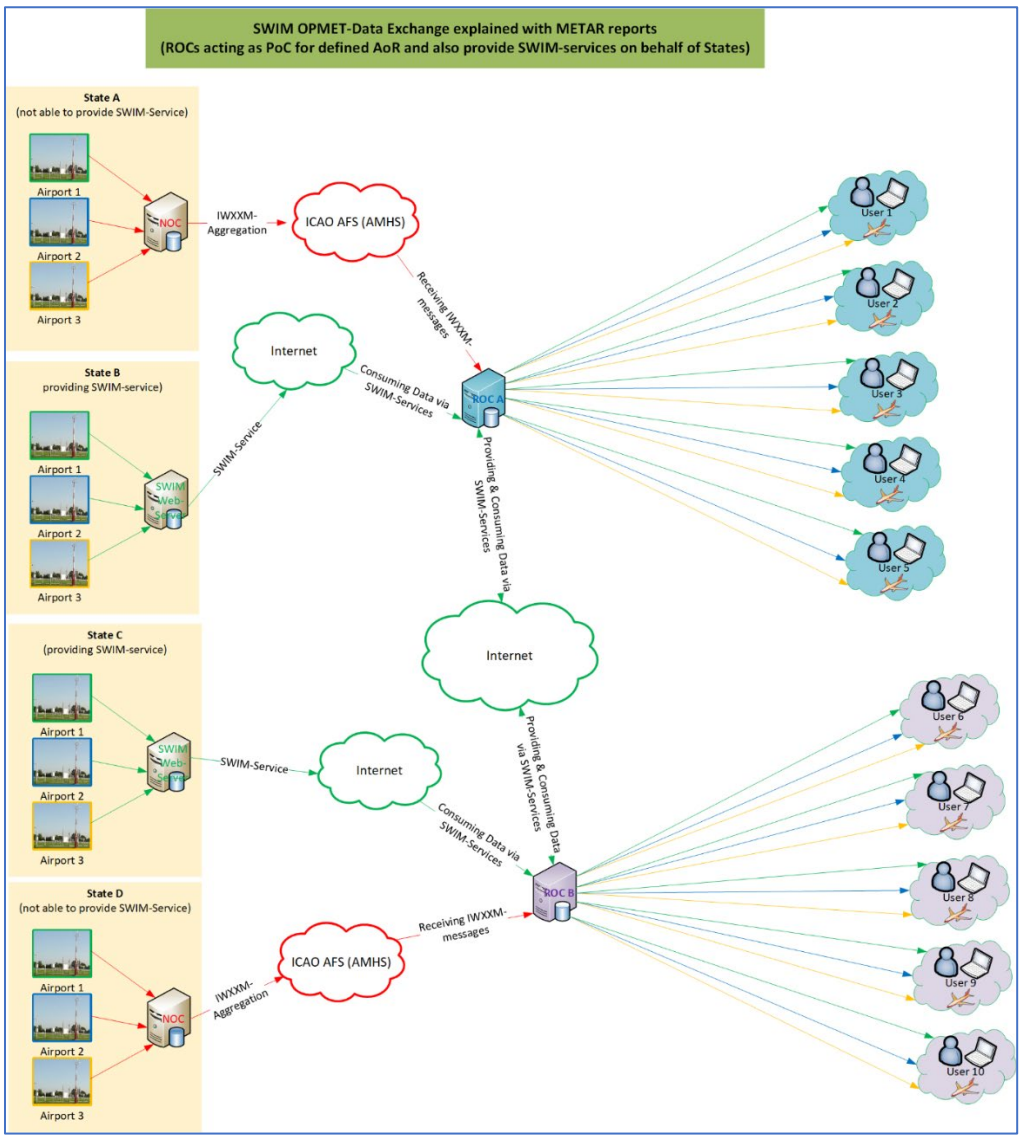
The following picture is taken from the mentioned manual.



6 Possible function of ROCs & RODBs – Basic SWIM-Services

Although there are no concrete plans available so far, ICAO is thinking about possible solutions to use the current functions of ROCs or RODBs as an intermediate solution in the transition process from the current OPMET-data exchange to SWIM.

The setup could be like suggested in the following picture. In this proposal the ROCs subscribe to the services from States in their Area of Responsibility (AoR). Data from States which are not in the position to provide SWIM-services (not mandated by the EU regulation) would send their data (in IWXXM-format) via the ICAO-AFS and the ROCs would provide the SWIM-service on behalf of that State. By that all data from the AoR would be available as SWIM-services for the users in their AoR as well as for the other ROCs and inter-regional users.



In order for a ROC to be able to act as a backup for another ROC, it would be necessary that all ROCs directly subscribe to the services of all States. As explained above, not all States might be ready to provide SWIM services or even IWXXM-formatted data. For the IWXXM-data the RODEX-backup procedure would ensure that that it is available at all ROCs. The RODEX-Backup excludes any translation service in place. Therefore, it is suggested to only focus on data provided by States as SWIM service already. Everything beyond would just be over the top and not necessary, looking also at the possible implications in regard to the costs for implementing additional functionalities. Still, the stakeholders currently providing the ROC-functionality might be reluctant to support this approach.

The development of such a structure has not been discussed or even started yet. Therefore, it will not be available soon. Also, it is not clear whether stakeholders currently hosting the ROCs are willing to offer such additional functionalities as the development, implementation and maintenance will ask for resources that might not be available currently. In view of that it is very unlikely that ROCs will offer such a service free of cost.

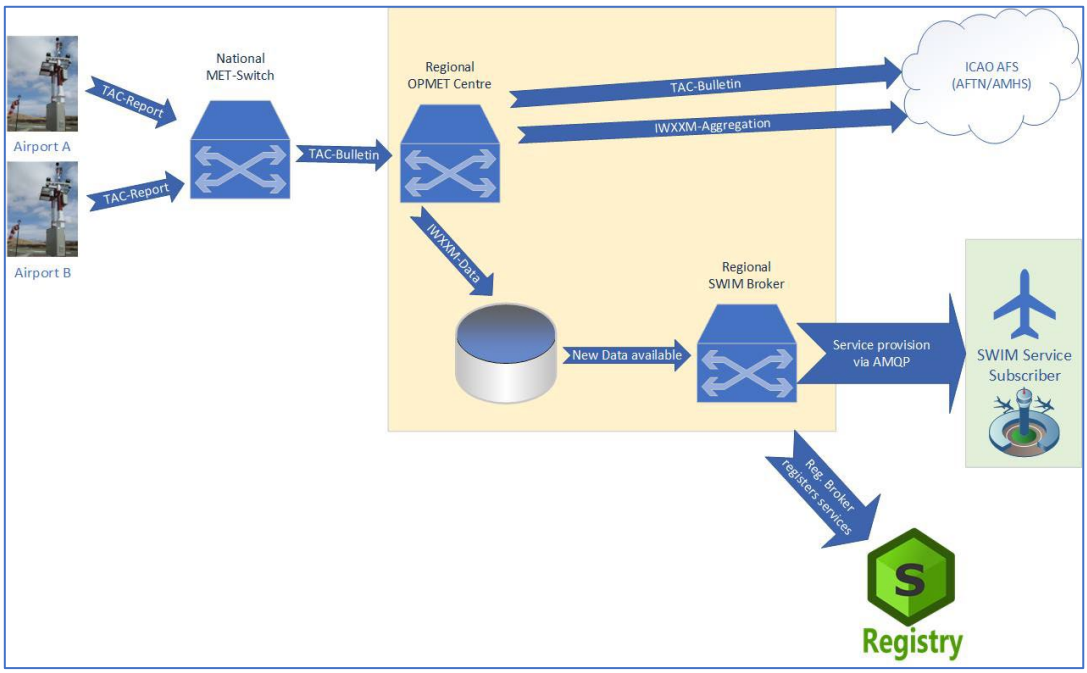
Following different scenarios, a ROC might face, are described that could apply from 2026 onwards.

6.1 Scenario 1: State only produces TAC OPMET data

When writing this paper (June 2024) still 20 out of 52 ICAO EUR States (5 out of 29 CP1 mandated States (EU + SUI & NOR)) utilize translation service provided by one of the ROCs. Although there is a good chance, that all States will produce IWXXM-formatted OPMET data by the end of 2025, it is still possible that this will not be the case for all States.

This means that a ROC will have to continue to provide a translation service. In addition to that, the ROC could offer to provide the minimum needed SWIM-services on behalf of a State. This could include the preparation of the service description and registering it on the SWIM-Registry.

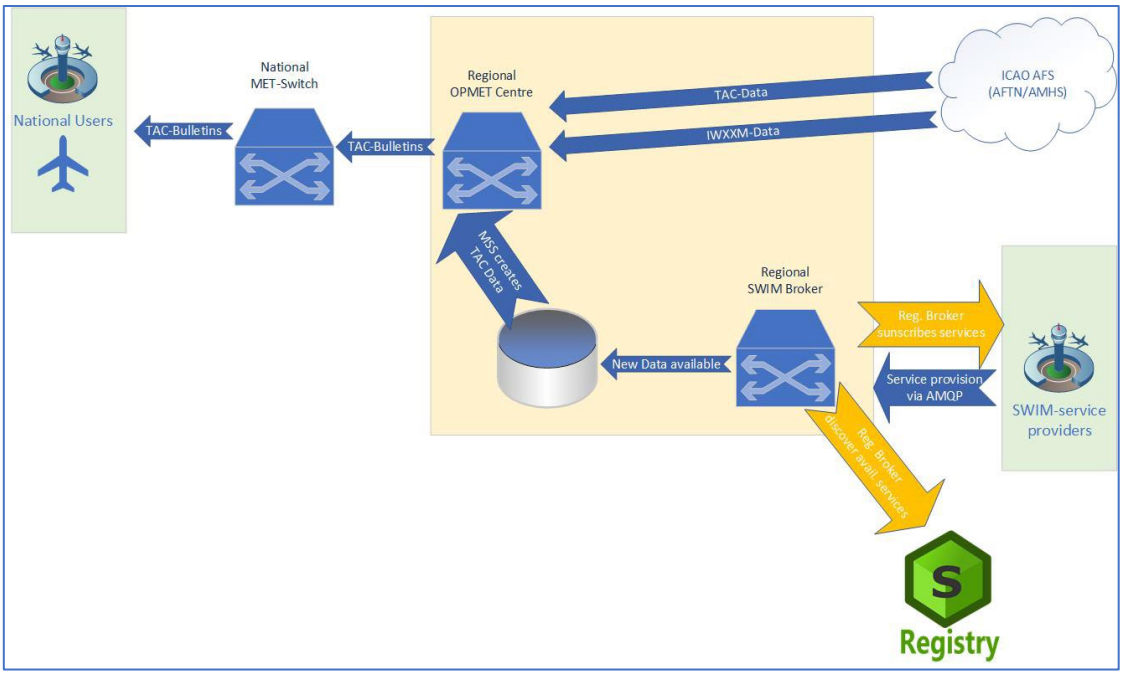
At the moment it is not possible to come up with any figures about the resources that would be needed at a ROC to fulfil such additional tasks. As stated in the introduction to chapter 6, it is unlikely that a ROC will offer such service free of cost.



As long as TAC/IWXXM OPMET data is available in parallel, there is no need for any additional service. From November 2030 onwards it is likely that TAC-format is removed from ANNEX 3 as official format to be used for OPMET-data. This would consequently mean, that States, not able to handle IWXXM-data and not being able to use MET-services, will run into problems.

In such a situation a ROC might be asked to provide a translation service in the other direction, from IWXXM to TAC. As the TAC-format is frozen and will not be changed/improved anymore, this will more and more lead to situations, where additional, enhanced meteorological data is lost in the translation process.

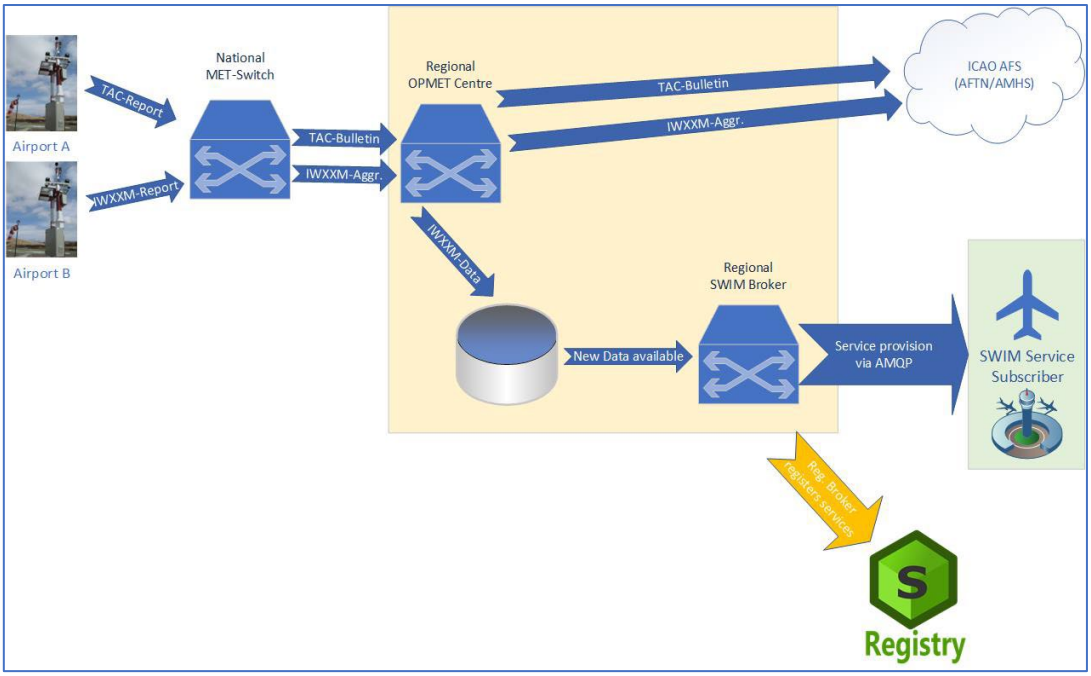
The same would apply in a scenario where there are only SWIM-services available and no more TAC or IWXXM exchanged via the ICAO AFS. Software solutions will be necessary to support such TAC-production based on the data received via SWIM-services.

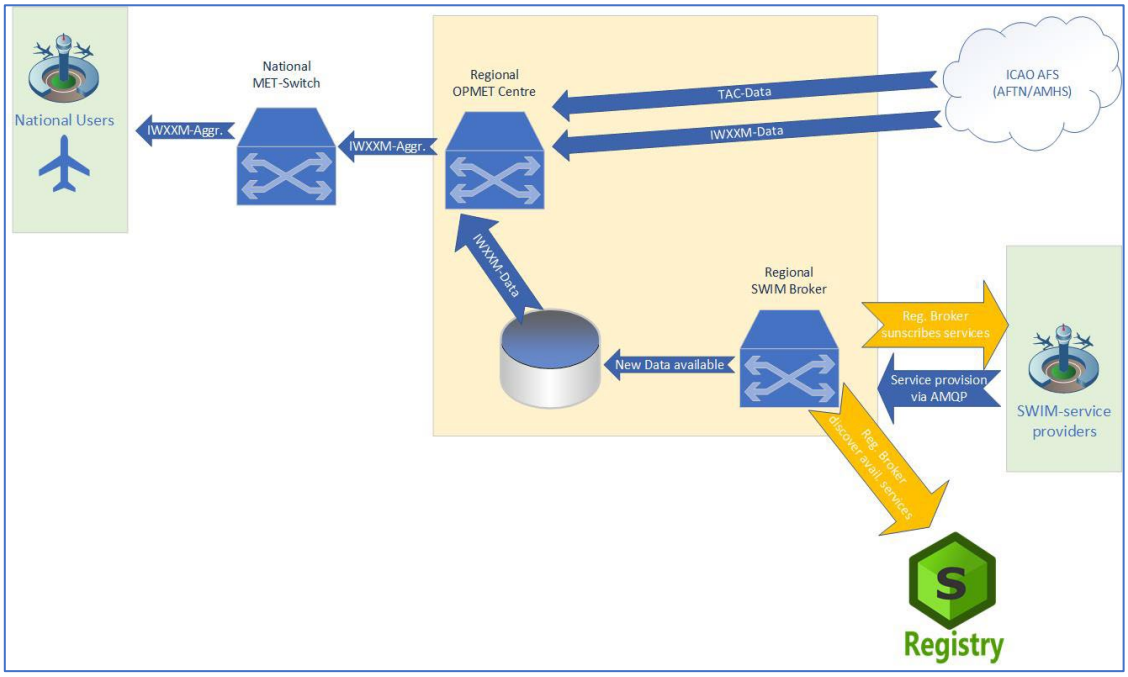


It is expected that the SWIM-Broker will constantly check the SWIM-Registry for new MET-services (maybe there will be a service by the SWIM-registry to advertise/inform about new products). The SWIM-Broker will at least subscribe to all “basic” services. This means all MET-services necessary to create the old TAC-information (METAR, TAF, SIGMET,….) to be able to supply the concerned States with the data they need and can use.

6.2 Scenario 2: State produces TAC & IWXXM OPMET data but no SWIM-services

This scenario is more or less the same as the first one. The only difference is that the ROC does not have to provide a translation service from TAC to IWXXM. All the rest, in regard to the provision of SWIM-services, stays the same.





Also, the scenario, where there are only SWIM-services available can be applied in this scenario. The only difference would be, that the data received via a SWIM-service is used to create an IWXXM-message. Like in the example for the first scenario, only those IWXXM-messages will be recreated for which a schema exists.

6.3 Scenario 3: ROC to act as a Broker for States

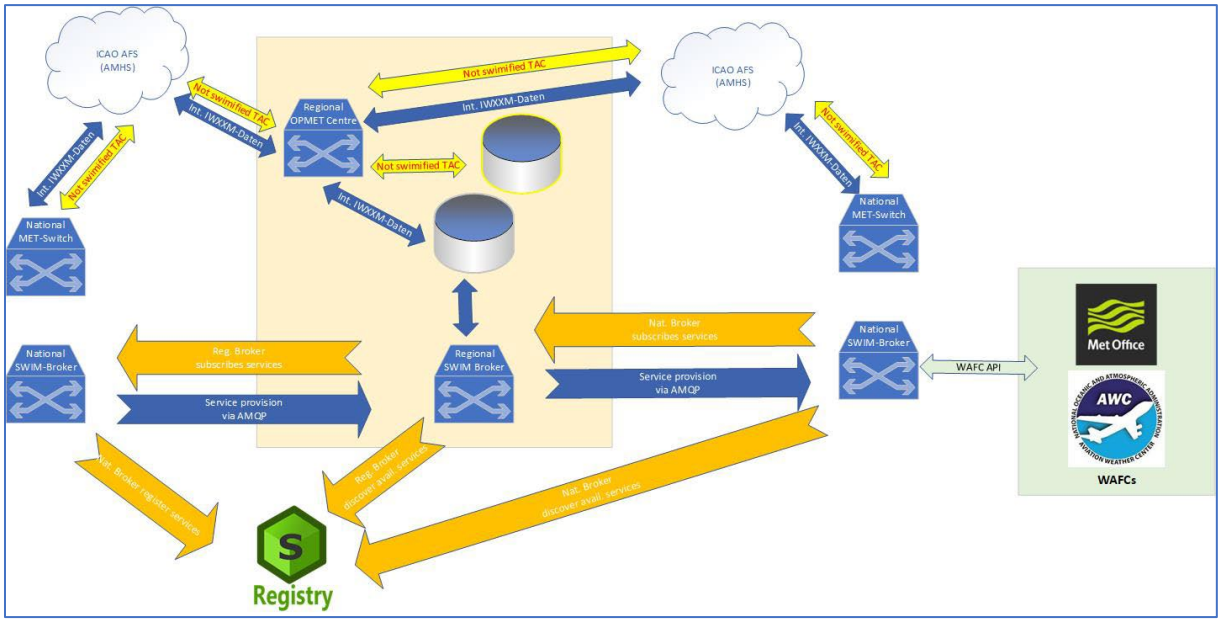
In this scenario all States provide the MET-services on their own and have those registered via the SWIM-registry.

Many stakeholders have already expressed their concerns regarding the need to subscribe to all required services for their operations individually with all providers they need data from. It was already mentioned under paragraph 2.2 that nowadays a managed system is in place, taking care of the exchange of OPMET-data. Users have a dedicated point of contact when it comes to reception of OPMET data, including requests for new data or investigations in case of problems. With SWIM, every user would have to subscribe the needed data directly from the provider. It is possible to discover data at one source (SWIM registry) but the subscriptions are done individually. This very likely will require additional resources/personnel to manage the implementation as well as provide afterwards continuous internal maintenance and monitoring.

ROCs could implement and provide a broker-service, which would take over the responsibility of subscribing at least all needed basic services necessary to fulfil CP1 requirements. Whether a ROC, providing such a service, goes even beyond and provides also other services is up to the hosting organization. Therefore, as a minimum, the following services should be provided by a ROC/Broker:

- Advisories (VA, TC & SWX)
- Aerodrome Observation Information Service (METAR)
- Aerodrome Forecast Information Service (TAF)
- SIGMET Information Service

In general, it can be said, that those regional brokers will provide the same information to centers in their AoR as they do now. This means that there will be no WAFC products provided by the brokers. These must be subscribed/retrieved directly from the WAFCs as the pure size of the available data would not be feasible to be downloaded by a regional broker to make it available in parallel.



6.4 Missing Elements and open questions

6.4.1 TAC-data without IWXXM-schema

From the above picture it can be identified that currently it is not possible to completely move towards SWIM. The reason is, that currently some data is exchanged, for which there is no information exchange model developed. Such are:

- Aerodrome Warnings
- GAMET messages
- Pilot Reports (ARS as well as other reports like e.g. top of fog)
- Notification Messages (like METNO)

As long as there are no dedicated schemas developed and implemented or replacements have been discussed (if needed), it is not possible to move to a SWIM-only system. Until then a parallel dissemination of data in two systems is very likely. This will probably also impact the whole process of implementing SWIM, as stakeholders might want to wait until all data is available via SWIM. This also depends on the offered, developed SWIM-services. The development ideally is done in close co-ordination between the MET-service providers and stakeholders like airports, airlines and of course ATM.

6.4.2 Open items for a global "managed" SWIM-structure

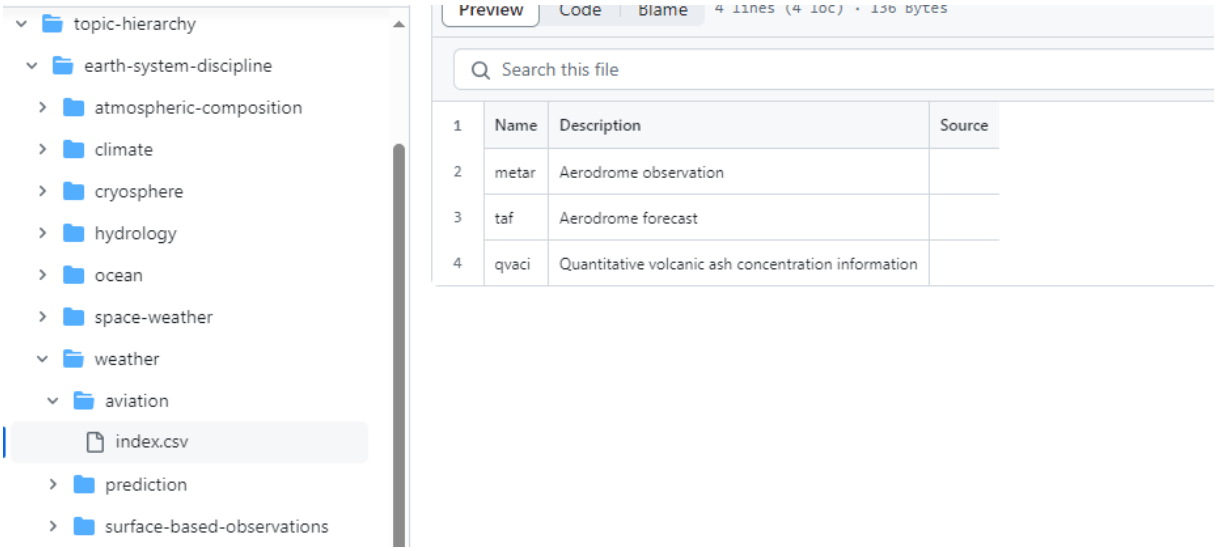
It will be important to discuss how many ROCs are needed on a global scale. WMO defined in their WIS2 project the following minimum requirement:

- At least 3 global brokers, where a user can subscribe to services
- At least 3 global caches, which have all core data available of the last 24 hours (maybe not needed)
- At least 2 global data catalogues to discover available services and also enabling harvesting of metadata
- At least 2 global monitors (could be used to replace the current approach of performing dedicated monitoring exercises)

As the SWIM-principles are slightly different to the ones for WIS2, the global broker and global cache will rather be combined in one functionality. In WIS2 an URL is sent by the broker with the information where the data can be downloaded from (global cache). In SWIM the data is directly provided as payload and therefore a global broker will send the data to the local system (database/cache) and at the same time to the consumers which subscribed to that service.

A paramount service to be provided in future will be the "Global Data Catalogue" or "SWIM Registry" where a consumer can find all information on the available services and the relevant metadata. Such a catalogue shall provide search and filter capabilities to discover relevant data of interest. The catalogue shall be provided as a human-readable web-page, enabling search engines to crawl and index the content. This is important for consumers to discover content via third party search engines and will allow to update local information on available services.

GeoServer and the Topic-Structure is another item that needs to be discussed and defined. This is necessary so that the URL to request e.g. the latest observation for a dedicated airport looks the same, no matter which service provider I use (of course apart from the address of the server itself ➔ the start of the URL-address). WMO also has defined a structure for the topics which could be used where already now aviation data is covered (see below screenshot from GitHub).



7 Enhanced SWIM-Services

For enhanced services the above-described brokers are, especially for observation services, not usable as it is planned to have data available in higher time-resolution. For such data a consumer would have to directly go to each individual provider the data is needed from.

Depending on user needs, there still might be a requirement for core-data that has to be provided in regular intervals. Such then could still be provided via global brokers. This discussion must take place between all stakeholders (MET-provider, ATM, airlines, airports,…) to define the future SWIM-services.

SWIM-services need also to be discussed concerning global requirements such as the provision of pre-flight information and the data that must be included. What is the data that should be included, will it be up to the MET-provider to still generate this package or, due to the availability of enhanced data, will it be up to users to create this on their own?

APPENDIX 5A

Deficiencies in the MET Field

BAHRAIN

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

EGYPT

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

IRAN

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

IRAQ

Item No	Identification		Deficiencies				Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination		Description	Executing Body	Date of Completion	Priority for Action
1	Annex 3; Para 2.2	QMS Implementation	Lack of Implementation of QMS	Sep 2014	-	O	Corrective Action Plan has not been formally provided by the State	Iraq	Dec 2022	A
2	Annex 3; Para 9.1.4, 9.3.1, 9.4.1 and Appendix 2, 2.1.1	WAFS forecasts required for briefing and flight documentation	SADIS FTP not available	January 2021	SADIS Provider	F	Corrective Action Plan has not been formally provided by the State	Iraq	Dec 2022	A

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

JORDAN

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

KUWAIT

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

LEBANON

Item No	Identification		Deficiencies				Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination		Description	Executing Body	Date of Completion	Priority for Action
1	Annex 3; Para 2.2	QMS Implementation	Lack of Implementation of QMS	Sep 2014	(USOAP – CMA finding)	O	Corrective Action Plan has not been formally provided by the State	Lebanon	Dec 2022	A
2	Annex 3; Para 9.1.4, 9.3.1, 9.4.1 and Appendix 2, 2.1.1	WAFS forecasts required for briefing and flight documentation	SADIS FTP not available	May 2016	-	O	Corrective Action Plan has not been formally provided by the State	Lebanon	Dec 2022	A

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

LIBYA

Item No	Identification		Deficiencies				Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination		Description	Executing Body	Date of Completion	Priority for Action
1	Annex 3; Para 2.2	QMS Implementation	Lack of Implementation of QMS	Sep 2014	(USOAP – CMA finding)	O	Corrective Action Plan has not been formally provided by the State	Libya	Dec 2022	A
2	MID eANP VOL II, MET Table II-2	HLLB and HLLT METAR and 24-hour TAF; HLLS METAR	HLLB and HLLT METAR and 24-hour TAF; HLLS METAR not available internationally	Nov 2021	ROC Jeddah monthly OPMET monitoring	S	Corrective Action Plan has not been formally provided by the State	Libya	Dec 2022	A

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

OMAN

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

QATAR

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

SAUDI ARABIA

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

SUDAN

Item No	Identification		Deficiencies				Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination		Description	Executing Body	Date of Completion	Priority for Action
1	MID eANP VOL II, MET Table II-2	HSSK and HSPN METAR and 30-hour TAF; HSOB and HSNN METAR	HSSK and HSPN METAR and 30-hour TAF; HSOB and HSNN METAR not available internationally	Oct 2021	ROC Jeddah monthly OPMET monitoring	S	Corrective Action Plan has not been formally provided by the State	Sudan	Dec 2022	A

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

SYRIA

Item No	Identification		Deficiencies				Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination		Description	Executing Body	Date of Completion	Priority for Action
1	MID eANP VOL II, MET Table II-2	OSAP METAR and 24-hour TAF	OSAP METAR and 24-hour TAF not available internationally	Nov 2013	-	O	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2022	A
2	Annex 3; Para 2.2	QMS Implementation	Lack of Implementation of QMS	Sep 2014	(USOAP – CMA finding)	O	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2022	A
3	Annex 3; Para 7.1	SIGMET Implementation	Non-Issuance of SIGMET information	Nov 2017	(USOAP – CMA finding)	O	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2022	A

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

UAE

Item No	Identification		Deficiencies			Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination	Description	Executing Body	Date of Completion	Priority for Action

No Deficiencies Reported

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Deficiencies in the MET Field

YEMEN

Item No	Identification		Deficiencies				Corrective Action			
	Requirement	Facilities/ Services	Description	Date First Reported	Remarks/ Rationale for Non-elimination		Description	Executing Body	Date of Completion	Priority for Action
1	Annex 3; Para 2.2	QMS Implementation	Lack of Implementation of QMS	Sep 2014	-	F H	A contract is being signed with an external quality consultant to assist in establishment & implementation of QMS in the provision of MET service by the end of year 2022.	Yemen	Dec 2022	A
2	Annex 3; Para 7.1	SIGMET Implementation	Non-issuance of SIGMET information	Nov 2017	-	S	All OPMET (SIGMET) information is issued internally but not transmitted internationally due to war, considering a reconnection with another MET regional centre other than Jeddah.	Yemen	Dec 2022	A
3	MID eANP VOL II, MET Table II-2	OYAA METAR and 30-hour TAF; OYHD, OYRN, OYSN, OYTZ METAR and 24-hour TAF	OYAA METAR and 30-hour TAF; OYHD, OYRN, OYSN, OYTZ METAR not available internationally	Dec 2019	Annual OPMET monitoring	S	All OPMET information is issued internally but not transmitted internationally due to war, considering a reconnection with another MET regional centre other than Jeddah. OPMET for OYAA is received at ROC Jeddah via NOC Oman as of 22 October 2023. ROC Jeddah plans to distribute this information to other ROCs for global availability via SADIS.	Yemen	Dec 2022	A

(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

Note:* Priority for action to remedy a deficiency is based on the following safety assessments:

'U' priority = Urgent requirements having a direct impact on safety and requiring immediate corrective actions.

Urgent requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is urgently required for air navigation safety.

'A' priority = Top priority requirements necessary for air navigation safety.

Top priority requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is considered necessary for air navigation safety.

'B' priority = Intermediate requirements necessary for air navigation regularity and efficiency.

Intermediate priority requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is considered necessary for air navigation regularity and efficiency.

Definition:

A deficiency is a situation where a facility, service or procedure does not comply with a regional air navigation plan approved by the Council, or with related ICAO Standards and Recommended Practices, and which situation has a negative impact on the safety, regularity and/or efficiency of international civil aviation.

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(1) Rationale for non-elimination: "F"= Financial "H"= Human Resources "S"= State (Military/political) "O"= Other unknown causes

METEOROLOGY SUB-GROUP (MET SG)

TERMS OF REFERENCE

1. Terms of Reference

1.1 The terms of reference of the MET Sub-Group are:

a) ensure that the implementation of MET in the MID Region is coherent and compatible with developments in adjacent regions, and is in line with the Global Air Navigation Plan (GANP), the Aviation System Block Upgrades (ASBU) framework and the MID Region Air Navigation Strategy;

b) monitor the status of implementation of the MID Region MET-related ASBU threads/elements included in the MID Region Air Navigation Strategy as well as other required MET facilities and services, identify the associated difficulties and deficiencies and provide progress reports, as required;

c) keep under review the MID Region MET performance objectives/priorities, develop action plans to achieve the agreed performance targets and propose changes to the MID Region MET plans/priorities, through the MIDANPIRG as appropriate;

d) seek to achieve common understanding and support from all stakeholders involved in or affected by the MET developments/activities in the MID Region;

e) provide a platform for harmonization of developments and deployments in the MET domain;

f) monitor and review the latest MET developments that support Air Navigation and provide expert inputs for the implementation of the Air Navigation Systems related to MET based on ATM operational requirements;

g) provide regular progress reports to the MIDANPIRG concerning its work programme; and

h) review periodically its Terms of Reference and propose amendments, as necessary.

1.2 In order to meet the Terms of Reference, the MET Sub Group shall:

a) monitor the status of implementation of the required MET facilities and services in the MID Region;

b) provide necessary assistance and guidance to States to ensure harmonization and interoperability in line with the GANP, the MID ANP and ASBU framework;

c) provide necessary inputs to the MID Region Air Navigation Strategy through the monitoring of the agreed Key Performance Indicators related to MET;

d) identify and review those specific deficiencies and problems that constitute major obstacles to the provision of efficient MET services, and recommend necessary remedial actions;

e) keep under review the adequacy of ICAO SARPs requirements in the area of MET, taking into account, inter alia, changes in user requirements, the evolution of operational requirements and technological developments;

f) develop proposals for the updating of relevant ICAO documentation related to MET, including the amendment of relevant parts of the MID ANP, as deemed necessary;

g) monitor and review technical and operating developments in the area of MET and foster their implementation in the MID Region in a harmonized manner;

h) foster the integrated improvement of MET services through proper training and qualification of the MET personnel;

i) coordinate with relevant MIDANPIRG and RASG-MID Subsidiary bodies for issues with common interests; and

j) liaise with other States providing services and/or serve as inter-regional exchange of meteorological information for international civil aviation (e.g. SADIS (U.K.), VAAC Toulouse (France), TCAC New Delhi (India), Regional OPMET Centre Vienna (Austria)).

k) monitor and review developments in space weather information services, foster the integration of space weather advisories into MET services, and provide guidance to States on mitigating the impact of space weather phenomena on international civil aviation in alignment with ICAO provisions and global best practices.

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2. Composition

2.1 The Sub-Group is composed of:

a) MIDANPIRG Member States;

b) World Meteorological Organization (WMO) and other concerned International and Regional Organizations as observers; and

c) other representatives from provider States and Industry may be invited on ad hoc basis, as observers, when required.

3. Working Arrangements

3.1 The Chairperson, in close co-operation with the Secretary, shall make all necessary arrangements for the most efficient working of the Subgroup. The Subgroup shall at all times conduct its activities in the most efficient manner possible with a minimum of formality and paper work (paperless meetings). Permanent contact shall be maintained between the Chairperson, Secretary and Members of the Subgroup to advance the work. Best advantage should be taken of modern communications facilities, particularly video-conferencing (Virtual Meetings) and e-mails.

3.2 Face-to-face meetings will be conducted when it is necessary to do so.

ATTACHMENT A

MET SG/12 MEETING (Virtual, 12 - 13 November 2024)

State / Organizatio	Registration Name		Job title
Bahrain	Amal	Almansoori	Head,Numerical weather prediction & Research
Bahrain	Mohamed	Sharaf	Sr. Weather Forecaster
Bahrain	Abdul Aziz Ibrahim	Al Balooshi	Meteorologist Specialist
Egypt	Lamiaa	mohammed	meteorologist
Egypt	Nadia	Abdel Fattah Elsebaey	First specialist in International Affairs
Egypt	Yasser	Elsayed	Director of egyption meteorological watch office
Egypt	Mahmoud	Abdou	Deputy of Director Cairo Airport Weather Forecast Center
IRAN	Mohammad	Enayat	Head of office of Hazardous Weather Forecast (IRIMO)
IRAN	Mohammad	Bagher Iraji	
IRAN	Alireza	adnan	ANS EXPERT
IRAN	Jaffer	Omidi	
Iraq	Arkan	Abdullah Mozan	Iraqi Meteorological Organization and seismology
Jordan	Hatem	Al-halabi	ANS-Inspector
Libya	Eshtewi	Rabha	Fotecaster
Libya	Amal		
Libya	Mabroukah	Shaqwarah	
Libya	Mohamed	Ben Husein	
Oman	Mansoor	AL-SHABIBI	CHIEF OF AVIATION FORECAST
Oman	Mohammed	Kashoob	Acting head of Meteorological operations section
Oman	Albano	Coutinho	ANS Inspector
Oman	Dakhli	Imed	CAA Inspector
Qatar	Saoud	Malhiya	Senior Weather Forecaster
Saudi arabia	sami	alwafi	directorate of aviation weather forecast
Saudi arabia	Alaa	albaghdadi	forcester
Saudi arabia	Majed	mahjoub	supervisor of met communication
Saudi arabia	Mansour	Punjabi	supervisor of met communication
Saudi Arabia	Waleed	alsulaim	Air Navigation Meteorology Section Head
Saudi Arabia	Mohammed	Alawi	ANS/MET Inspector
Saudi Arabia	Khalid	algobaisy alshehri	Air Navigation Meteorology Inspector
UAE	Sultan	Lootah	Senior Manager Air Navigation Section
UAE	Waleed	Al Riyami	Senior inspector ATS & MET
UAE	Abdulhamid	Alraeesi	senior Meteorologist
UAE	Philip	Rogers	Manager Dubai
IATA	Lindi-Lee	KIRKMAN	Regional Head FLT OPS, ATM & Infrastructure
Speakers			
Austria	Michael	Pichler	Vice Chair of DMG
United Kingdom	Karen	Shorey	SADIS and WAFS London Manager
WMO	Greg	Brock	Chief, Service for Aviation Section
ICAO HQ	Jun	Ryuza	Technical Officer, Meteorology
ICAO Paris	Nino	Gelovani	Regional Officer ANS Impl. MET
ICAO MID	Radhouan	Aissaoui	Regional Officer, IM
ICAO MID	Manal	Wissa	Programme Analysis Associate
ICAO MID	Ahmed	Shaker	Technical Assistant
ICAO MID	Ayman	Ramadan	ICT Support