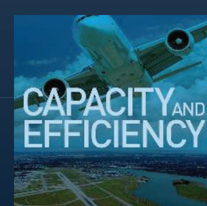
Thirteenth Meeting of the MIDANPIRG Communication, Navigation and Surveillance Sub-Group (CNS SG/13)



2024

Hosted by the Kingdom of Saudi Arabia

Held in Jeddah, 20 – 23 October 2024

MID
ICAO Middle East Regional Office

CNS SG/13 Final Report

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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

REPORT OF THE THIRTEENTH MEETING OF CNS SUB-GROUP

(CNS SG/13)

(Jeddah, Saudi Arabia, 20 – 23 October 2024)

The views expressed in this Report should be taken as those of the MIDANPIRG CNS 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

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1. PLACE AND DURATION

1.1 The Thirteenth meeting of the Communication, Navigation and Surveillance Sub-Group (CNS SG/13) and the Tenth meeting of the MIDANPIRG Air Traffic Management Sub-Group (ATM SG/10) were kindly hosted by the Saudi Air Navigation Services (SANS). The meetings were successfully held in parallel in Jeddah, Saudi Arabia, from 20 to 23 October 2024. A plenary session was organised on the first day of the meetings to discuss common subjects between both Sub-Groups.

2. OPENING

Common ATM/CNS Day (20 October 2024)

2.1 The meetings were opened by Mr. Saleh Alzahrani, Chief Operations Officer (COO), SANS, Saudi Arabia, who thanked ICAO for organizing these important meetings in Saudi Arabia, he extended a warm welcome to all participants and wished them pleasant stay in Jeddah. Mr. Alzahrani highlighted that the conduct of such important meetings in parallel will enable productive discussion between operational and technical experts to enhance the coordination and cooperation between both teams to address of the common subjects and will enhance the Safety and efficiency levels of Air Navigation Services.

2.2 In his opening remarks, Mr. Mohamed Iheb Hamdi, the Regional Officer, for Aerodromes and Grounds Aids (RO-AGA) and the MID Region Coordinator for Communication, Navigation and Surveillance (CNS) and Cybersecurity, welcomed all the participants expressed his gratitude and appreciation to SANS for hosting the meetings. Mr. Hamdi extended special thanks to the organizing team from SANS for the preparation and facilitation of these meetings and for the excellent hospitality extended to the ICAO team and all participants. He underlined the continuous support to of Saudi Arabia/GACA and SANS to the ICAO MID Office regional work programme and their active role reflecting their commitment to enhancing the overall safety and efficiency of air navigation system in the MID Region.

Dedicated CNS Days (21 - 23 October 2024)

2.3 The CNS SG Vice Chair, Mr. Yaseen Hassan AlSayed, the Director Air Navigation Systems at Bahrain Civil Aviation Authority welcomed again the participants and recalled the importance to establish and efficient interference with the ATM counterparts in order to identify the operational needs that the CNS solutions would fulfil. Mr. AlSayed wished a good deliberation to all participants.

2.4 In closing, Mr. Yaseen Hassan AlSayed, the Director Air Navigation Systems at Bahrain Civil Aviation Authority, and who chaired the meeting, thanked the participants for their presence and wished the meeting every success in its deliberations and enjoyable stay in Jeddah.

3. ATTENDANCE

3.1 The meeting was attended by a total of Forty- two (42) participants, from Eight (8) States (Bahrain, Egypt, Iraq, Libya, Oman, Qatar, Saudi Arabia and UAE) and three (3) International Organizations/Industries (GCC, IATA and PCCW Global Ltd.). The list of participants is at **Attachment A**.

4. OFFICERS AND SECRETARIAT

4.1 The meeting noted that the CNS SG Chairman, Mr. Saleh Al Harthy, was not able to participate in the meeting, consequently, the meeting was chaired by the CNS SG Vice Chair Mr. Yaseen Hassan AlSayed, the Director Air Navigation Systems at Bahrain Civil Aviation Authority.

4.2 Mr. Mohamed Iheb Hamdi, ICAO MID Regional Officer for Aerodromes and Ground Aids and CNS/Cybersecurity MID Region Coordinator, was the Secretary of the meeting supported by Mrs. Soniya Nibhani, the APAC Regional Officer for ANS Implementation.

5. LANGUAGE

5.1 The discussions were conducted in English. Documentation was issued in English.

6. AGENDA

6.1 The following Agenda was adopted:

Agenda Item 1: Adoption of the Provisional Agenda

Agenda Item 2: Review the outcome of CNS SG/13 and MIDANPIRG/21 related to CNS

Agenda Item 3: MID ATS Messaging Management Centre Steering Group (AMC STG/9) Main Matters including AMHS-AMC

Agenda Item 4: Frequency Management Working Group (FM WG/3) Main Matters

Agenda Item 5: CNS Planning and Implementation Framework in the MID Region

Focus on the main Priorities and Challenges related to:

- Communication Matters
- Navigation Matters
- Surveillance Matters
- Frequency Management Matters
- ANS Cyber Security

Agenda Item 6: ASBU Threads/ Elements related to CNS

Agenda Item 7: Review of Air Navigation Deficiencies in the CNS Field

Agenda Item 8: Future Work Programme

Agenda Item 9: 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 13/1:	*CAPACITY BUILDING ON GNSS RFI*
DRAFT CONCLUSION 13/2:	*MID REGION AIR NAVIGATION REPORT-2024*
DRAFT DECISION 13/3:	*ESTABLISHMENT OF THE MID FF-ICE TASK FORCE*
DRAFT DECISION 13/4:	*MID NAV-MON ACTION GROUP*

PART II: REPORT ON AGENDA ITEMS

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REPORT ON AGENDA ITEM 1: ADOPTION OF PROVISIONAL AGENDA

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

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

2.1 The subject was addressed in WP/2 presented by the Secretariat. The meeting recalled the Conclusions and Decisions, as at **Appendix 2A,** adopted by the MIDANPIRG/21 meeting in relation to CNS field and agreed to revise some of them notably those related to technical matters. Based on global and regional developments, the meeting agreed to propose, as deemed necessary, Draft Conclusions and Decisions to be presented to MIDANPIRG/22 meeting for endorsement.

REPORT ON AGENDA ITEM 3: MID ATS MESSAGING MANAGEMENT CENTRE STEERING GROUP (AMC STG/9) - MAIN MATTERS INCLUDING AMHS AND AMC

Early Access to the AMC Table Updates

3.1 The subject was addressed in WP/12 presented by the United Arab Emirates.

3.2 The meeting noted the importance of timely access to updates in the Aeronautical Management Console (AMC) table, which contains critical information on new or deleted aeronautical fixed telecommunication network addresses.

3.3 The meeting noted that the AMC table updates are crucial for maintaining the integrity and efficiency of aeronautical communication systems which provide stakeholders with up-to-date information on changes in fixed telecommunication network addresses, essential for smooth operations.

3.4 The meeting noted UAE concern about the current process for updating the AMC table routing addresses that may delay the implementation of necessary adjustments or revision, which could negatively impact the exchange of aeronautical information and operational efficiency.

3.5 The meeting noted UAE proposal suggesting that AMC table updates/file be provided to stakeholders a minimum of two days before the AIRAC effective date. This time buffer will facilitate and support final checks on the new or modified network addresses and give the opportunity to the Stakeholders to test the updates prior to the upload of the table/file into their systems.

3.6 The meeting agreed that ICAO MID Office convey this concern and proposal to the MID Region AMC Steering Group to address the matter and take the necessary actions accordingly.

Legacy Links

3.7 The subject was addressed in WP/18 presented by the United Arab Emirates.

3.8 The meeting was apprised of the challenges associated with the continued use of outdated "legacy links" in the Middle East region's air navigation systems and their impact on the efficiency of the services delivered by Air Navigation Service Providers (ANSPs) in the Middle East Region. The meeting highlighted that the continued use of obsolete CNS infrastructure and functional systems is becoming inefficient and poses challenges that affect safety, efficiency, and operational effectiveness, particularly in air traffic management (ATM).

3.9 The meeting underlined the numerous challenges related to the reliability of the Legacy CNS systems and Internet Service Provider (ISP) links, which can be summarized as follows:

- maintenance cost,
- incompatibility with modern technologies leads to fragmented networks and raised issues related to interoperability,
- critical data-sharing limitations negatively impact decision-making, situational awareness, and resilience,
- alignment with the goals of the ICAO Global Air Navigation Plan (GANP) and the Middle East Region Air Navigation Plan (MID ANP).

3.10 The meeting recognized that these issues impede the integration of newer, more efficient air traffic systems, especially during peak and emergency situations, which stress the importance of modernizing CNS systems to improve regional and global air traffic management.

3.11 The meeting noted with appreciation the phases proposed by UAE to develop a strategy for CNS infrastructure modernization, notably:

- Phase 1: A regional assessment to identify critical gaps in legacy CNS and ISP systems.
- Phase 2: Develop a regional modernization plan that prioritizes replacing outdated infrastructure with advanced technologies (fiber-optic networks, satellite-based communications, and MPLS).
- Phase 3: Training and capacity-building for ANSPs to ensure a smooth transition.
- Phase 4: Ongoing monitoring and evaluation of the modernization process to ensure alignment with safety and performance objectives.

3.12 The meeting agreed on these phases and noted the need to conduct a regional assessment of the current CNS infrastructure in the MID Region to plan for the transition to modern infrastructure. The meeting also agreed that in collaboration with the MID Office, coordination meetings in relation to the subject should be conducted to define the way forward and present the outcomes of this coordination to the CNS SG/14 meeting for review.

MID-Region IP Network Solution

3.13 The subject was addressed in PPT/10 and PPT/11 presented by the Secretariat.

3.14 The meeting recalled that ICAO MID Office has been approached by APAC Office to explore the possibility to re-engage the MID States in the APAC CRV project since the cost would now be much less than quoted before. The MIDANPIRG/21 meeting agreed to refer the matter to the CNS SG/13 for further study then recommend a solution to MIDANPIRG/22 Meeting.

3.15 The meeting noted that the ICAO MID Office invited the ICAO APAC Office to provide more details about the subject.

3.16 The ICAO ANS Officer from the ICAO APAC Office provided detailed information about the Asia Pacific Regional IP Network, Common aeRonautical Virtual Private Network (VPN) (CRV). The correlation of the CRV network with the ICAO Global Air Navigation Plan (GANP) and relevant ASBU threads and elements and their interdependencies were shared during the Meeting. The current CRV governance being followed in the APAC Pacific Region was noted by the Meeting.

3.17 The Meeting was also informed that the CRV Operations Group (CRV OG) is the body responsible under the Aeronautical Communication Services Implementation Co-Ordination Group (ACSICG) for the operations and management of the CRV network. The Meeting noted the benefits of implementing an IP Network for voice and Data exchange, recalled past ICAO MID meetings and related decisions relevant to CRV implementation, and discussed the roadblocks for CRV implementation efforts from MID States from 2017-2019. It was noted that the network service's price was a critical factor in the decision-making process. ICAO Secretariat shared various reasons for initiating another effort to motivate MID States to join CRV and explained potential reasons for MID States to consider joining CRV along with associated benefits.

3.18 The service provider responsible for the implementation CRV network (PCCWG) shared information about the company, CRV network topology, and service delivery points (Point of Presence) along with a description of each Package available in the CRV contract. PCCWG provided detailed information on the technical solutions proposed for CRV implementation and a price summary for various packages compared to the price quoted in 2018. The meeting noted that package A is the one recommended by the company as it offers the highest level of redundancy. Lastly, PCCWG presented a special promotion offer for MID States to join CRV for Package D and Package D+.

3.19 In response to a question about cyber security provisions in CRV, it was stated that the security of the CRV network is the responsibility of the States contracting CRV along with the CRV service provider. The CRV Service provider, PCCWG, shared the concept of GRE tunnelling utilized in CRV to make it a secure network and added that CRV is a Closed private network that is unreachable & invisible from the Internet.

3.20 The Meeting noted that PCCWG is certified by ISO 27001: Information Security Management and has demonstrated compliance with the ICAO requirements for the CRV. ICAO Secretariat shared information about previous discussions done in CRV OG meetings to mandate the firewall, conduct cyber security assessments, and request from CRV users to define minimum security requirements that must be considered. The ICAO Secretariat informed that CRV OG is waiting for global provisions for publication from the ICAO Trust Framework Panel. Once the global provisions are published, all regional communication service providers and States will be obliged to consider these provisions in the deployment of regional communication network.

3.21 The Meeting was informed that while processing the implementation of CRV, it is mandatory to verify and assess peer States' readiness so that the CRV network can be used to exchange aeronautical data immediately after signing the contract. It was suggested that individual States may initiate the process to join CRV following the steps mentioned in the PCCWG presentation; however, before signing the service order, the State should confirm their peer States' readiness.

3.22 IATA shared information about three additional regional networks used in the AFI region. It was informed that the Southern African Development Communities (SADC) VSAT, and North Eastern Africa-Indian Ocean (NAFISAT) networks are managed by Air Traffic and Navigation Services SOC Limited (ATNS), South Africa and the AFI Satellite Network (AFISNET) network is managed by The Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA). IATA shared the need for the interconnection of various regional networks and suggested conducting at least one global Meeting of all Communication Service Providers for various regional networks.

3.23 In response to a question about the amendments to ICAO APAC e-ANP to reflect the requirements related to CRV, the ICAO APAC ANS Officer explained that APANPIRG adopted a conclusion to direct APAC States/Administrations to implement CRV by 2020, which was further extended to 2023 due to severe impact of COVID 19. It was added that the "ICAO APAC ATN Infrastructure table" mentioned in ICAO APAC e-ANP Vol II has been modified to add CRV information. There is a plan to identify Air Navigation deficiencies in future if a State does not implement CRV.

3.24 ICAO APAC ANS Officer added that CRV common provisions have been modified to provide flexibility for States to upgrade/downgrade the selected packages. However, there is a penalty for downgrading the packages, which will be borne equally by the State and CRV Service Provider.

3.25 The Meeting noted that the CRV contract mandates States to join CRV for an initial term of a minimum of 5 years. However, as the current CRV contract is expiring on 31 December 2028, a special exception has been provided to MID States in the offer presented by PCCWG.

3.26 The Meeting noted that the presented price includes the rental price of a minimum number of Network Interface Devices (NIDs) required to support the selected packages and preventive and corrective maintenance costs.

3.27 The Meeting was informed that the High-level questionnaire provided in **Appendix 3A** to the Report could be used to calculate the minimum bandwidth required for a particular site in a State. The Meeting encouraged States to utilize the template and initiate working on bandwidth requirements to estimate the needs and select the appropriate Package.

REPORT ON AGENDA ITEM 4: FREQUENCY MANAGEMENT WORKING GROUP (FM WG/3) MAIN MATTERS

FREQUENCY / SPECTRUM MANAGEMENT

MIDANPIRG endorsed Conclusions

4.1 With reference to WP/2 under Agenda Item 2, the meeting recalled that MIDANPIRG/21 Meeting agreed that new set of Conclusions/Decisions be replacing and superseding the previous ones in relation with the following subjects:

MIDANPIRG DECISION 21/23: REVIEW OF THE MID REGION ALLOTMENT PLAN

*That, in order to increase the amount of spectrum that can be used for Aeronautical Services, the CNS SG should adopt the revised planning Principle for Aeronautical Frequency Bands of 117.975-137 MHz and review and update, as deem necessary, the current MID allotment plan by **Q1 2025.***

MIDANPIRG CONCLUSION 21/24: OPTIMIZATION OF FREQUENCY ASSIGNMENT IN THE MID REGION

That, in order to optimize the frequency assignment planning and mitigate VHF frequency congestion at regional level, States are urged to:

a) coordinate with ICAO MID Office before assigning frequencies for aeronautical services (VHF COM, VHF NAV);
b) perform an update/review of the data in the VHF-COM/NAV module; and
*c) submit Frequency Requirements for the Period 2023 – 2030 using the Guidance Doc. at **Appendix 5L** by **Q4 2024**.*

A Review of VHF COM Frequency Allotment Plan and Utilization in the MID Region

4.2 The subject was addressed in PPT/13, presented by Iraq and focused on improving the efficiency and management of VHF communication frequencies in the MID region, with a particular emphasis on optimizing channel utilization, reducing redundant assignments, and planning for future needs.

4.3 The meeting was informed about the VHF communication (COM) frequency allotment plan and its utilization in the Middle East (MID) region.

4.4 The meeting noted that the International Telecommunication Union (ITU) regulation related to the global allocation of radio frequencies, dividing the world into three regions and ensuring global harmonization for aeronautical services.

4.5 The meeting recalled that the aeronautical mobile service (AM(R)S) in the 118-137 MHz band is critical for VHF air-ground communications and ICAO SARPs related to radio frequencies could be found in Annex 10 and ICAO Doc 9718. These documents provide a framework for international and national frequency use.

4.6 In relation with the VHF Frequency Band (118-137 MHz), the meeting highlighted that this band is widely used for air-ground voice and some data communications. ICAO has assigned frequencies for international (ICAO) services and national services (NAT) in its allotment tables, which are reflected in both global and regional allotment plans.

4.7 The meeting recalled that the MID region follows the standard channel spacing of 25 kHz, while Europe uses 8.33 kHz, offering more available channels. The meeting agreed that the CNS Focal Points, in coordination with the ICAO MID Office, explore the potential need for the 8.33 kHz spacing channel in the MID Region.

4.8 In relation with the Frequency Utilization in the MID Region, the meeting highlighted that several frequency channels assigned to the services (e.g., ACC, APP, AOC) with no alignment with MID Frequency Spectrum Allotment Plan. However, many channels remain unused, such as 27 channels in the AOC band, 22 in the ACC band, 12 in the APP band, and others across different services. In addition, the MID region's allotment for AOC (Aircraft Operational Control) service is 3.125 MHz, offering 126 available channels, compared to Europe's with 600 KHz which offer 56 channels with 8.33 kHz spacing.

4.9 In relation with the above, the meeting identified the following issues:

- Duplicated frequency assignments for the same stations.
- Extended-range facilities listed without proper identification.
- Some frequency assignments have a larger Designated Operational Coverage (DOC) than the actual service area.

4.10 The meeting noted that the ITU's allocation of the 117.975-137 MHz frequency band to AMS(R)S (aeronautical mobile-satellite service) may require new allotments in the future.

4.11 Accordingly, the meeting suggested the following recommendations to be taken in consideration by both States and ICAO:

- AOC Band Reduction: Consider reducing the AOC band to allow more channels for other services.
- Simplification of Allotments: Simplify the VHF COM Frequency Allotment Plan by merging sub-services into main services.
- Frequency Assignment Review: Urge states to review their frequency assignments, eliminate duplicates, include the ER family name, and align DOC with actual coverage and service area.
- Future Requirements: States should submit their frequency requirements for 2025-2030.
- Use of Frequency Finder Tool: This tool should be enhanced to include service polygons and conduct a comprehensive assessment of channel availability in the MID region.

Enhancing FF Tool Functionality with MID Region Area Service Polygons Data

4.12 The subject was addressed in WP/15 presented by Iraq and aligned with the overall objective of improving frequency management and planning in the MID Region.

4.13 The meeting was apprised of the Frequency Finder (FF) tool as the ICAO platform resource used by States and Regional Offices for frequency assignment planning. The meeting recalled that one of the tasks of the Frequency Management Working Group (FM WG), currently proposed to shift into a Task Force as per the revised MIDANPIRG Structure 2024 that been endorsed by MIDANPIRG/21 Meeting, is to develop recommendations to meet future operational needs in VHF voice communications while avoiding the introduction of 8.33 kHz spacing in the MID Region for as long as possible.

4.14 The meeting noted the need to organize a coordination meeting to discuss and agree on the way forward about the Frequency Management Mechanism at the Regional Level and submit a proposal the MIDANPIRG/22 meeting, as deemed necessary.

4.15 The meeting noted that the purpose of the requested enhancement is highlighted by the following:

- Current Setup: The FF tool primarily uses line of sight illustrated with a circular Designated Operational Coverage (DOC) model around ground stations to define service volumes for VHF communications.
- Proposed Enhancement: The paper suggests adding polygon-shaped service volumes (such as those representing ACC or FIR sectors) to the FF tool, as these are more precise and flexible than the standard circular DOCs. Polygon service volumes are already used in the FF database for Europe, and the proposal is to include them for the MID Region.
- Efficiency: By using polygons instead of circular DOCs, especially for services like Flight Information Services (FIS) or ACC within smaller FIRs, the efficiency of frequency assignment planning can be significantly improved. This will also allow the implementation of extended-range stations without requiring additional frequency coordination.

4.16 The meeting is proposing the incorporating of MID Polygons and agreed on the need to add the ACC and APP polygons for the MID Region to the FF polygons database

4.17 The meeting requested the ICAO MID Office to coordinate with HQ, notably, the FF tool developer to seek the possibility to integrate the MID polygon sectors into the database. The meeting requested States to support ICAO by providing coordinates for their ACC and APP sectors and consider including FIR sector information for all current and future frequency assignments, as deemed necessary.

4.18 The Secretariat notified the meeting that by incorporating the polygons the FF Tool will be increasing the complexity of the algorithm (e.g. response time) calculating the interference between the selected station and the polygons, yet the States need/proposal will be conveyed to ICAO HQ for feedback on the subject.

Frequency Spectrum Management Office - FSMO

4.19 The subject was addressed in WP/14 presented by Saudi Arabia and highlighted the significance of effective frequency spectrum management, and the role of a dedicated CAA body/unit/mechanism could play in ensuring safe and efficient aviation operations, both nationally and globally.

4.20 The meeting was apprised of the Saudi Arabia initiative related to the establishment of the Frequency Spectrum Management Office (FSMO) within the General Authority of Civil Aviation (GACA) of Saudi Arabia. The meeting noted that the established office plays a crucial role in managing the aeronautical frequency spectrum in the country.

4.21 The meeting has been informed about the FSMO establishment in August 2023 by GACA as part of Saudi Arabia's national strategy to efficiently manage the radio spectrum frequencies used in civil aviation. The meeting highlighted that the FSMO currently is responsible for ensuring safe, efficient, and interference-free use of the aeronautical frequency spectrum and works closely with the Communication, Space and Technology Commission (CST) and the national telecommunication authority, to regulate frequency spectrum usage. In addition, the meeting noted that the FSMO manages the allocation and use of the aeronautical frequency spectrum in coordination with national telecommunications regulators and other relevant stakeholders.

4.22 The meeting indicated that the duties of the FSMO include policy development, monitoring compliance with regulations, addressing interference issues, and maintaining the accuracy of frequency data in the ICAO Frequency Finder tool (FF) to ensure regular reviews of the frequency assignments. Also, the FSMO has an active involvement with the ICAO Frequency Spectrum Management Panel (FSMP), which provides guidance on global and regional spectrum management.

4.23 The meeting noted with appreciation Saudi Arabia initiative related to the establishment of the FSMO and recognized that the establishment of such body within the CAAs Structures would play a crucial role in ensuring the safe and efficient management of the aeronautical frequency spectrum in the State.

4.24 The meeting acknowledged the establishment of the FSMO and encouraged MID States to adopt a harmonized approach to frequency spectrum management, ensuring consistency with international standards while addressing national and regional needs.

4.25 In this regard, the meeting encouraged States to establish process and procedures to ensure regular monitoring and updates of frequency assignments using the ICAO Frequency Finder tool, with a recommended quarterly review and invite ICAO MID Office to conduct/host workshops/fora on emerging technologies (e.g., 5G/6G, satellite communications) with involvement of leading experts to support capacity building in managing the Aeronautical Frequency/Spectrum.

Preparation for the ITU WRC-27

4.26 The subject was addressed in WP/26 presented by the Secretariat and highlighted the importance of preparing for the World Radiocommunication Conference 2027 (WRC-27).

4.27 The meeting was apprised of the ICAO Assembly Resolutions A41-7 and A41-8, which supersede previous resolutions and provide guidance on aviation's use of the radio frequency spectrum.

4.28 The meeting indicated that aeronautical radio services are recognized internationally as primary users of specific radio frequencies. The meeting recalled that the radio spectrum is a limited and critical resource for civil aviation. Without proper spectrum management, the meeting noted that safe, efficient, and cost-effective global air transport would not be possible.

4.29 The meeting also recalled that ICAO's position for WRC-23 was established to ensure that civil aviation's spectrum needs were considered. The meeting noted that the same level of preparation is required for the upcoming WRC-27.

4.30 With reference to ICAO's Assembly Resolutions A41-7 and A41-8 which provide strong support for the ICAO frequency spectrum strategy and outline the need for States to actively participate in regional and global spectrum management discussions, the States and stakeholders are urged to support ICAO’s frequency spectrum strategy by:

- Collaborating on spectrum-efficient systems.
- Including civil aviation interests in proposals for WRCs.
- Ensuring representation of civil aviation experts in international meetings related to spectrum management.
- Protecting aviation spectrum from harmful interference.

4.31 The meeting emphasized that States are encouraged to begin preparing their proposals for WRC-27, ensuring they align with the outcomes of upcoming ICAO Assembly which may update the current Resolutions A41-7 and A41-8 and the outcomes of the ITU relevant working parties.

4.32 The meeting recalled that States should include civil aviation experts in their delegations for ITU and WRC preparatory activities to represent aviation’s spectrum needs effectively. The meeting noted that the ICAO MID Office is considering organizing a WRC-27 Preparatory Workshop in Q4 of 2025 considering the outcome of the ICAO Assembly and to support regional preparation efforts and will update the States about the official dates after coordination with ICAO HQ.

REPORT ON AGENDA ITEM 5: CNS PLANNING AND IMPLEMENTATION FRAMEWORK IN THE MID REGION

COMMUNICATION MATTERS

Migration of the inter-regional communication links to AMHS

5.1 With reference to the WP/2 under Agenda Item 2, the meeting recalled that the MIDANPRG/21 Meeting encouraged States to uplift the capacity and resilience of the inter-regional AFTN and urged States to migrate inter-regional communication links to AMHS.

5.2 Based on the above, the meeting recalled that the MIDANPIRG endorsed the following Conclusion:

MIDANPIRG CONCLUSION 21/25: INTER-REGIONAL COMMUNICATION LINKS

That, in order to enhance the AFS Network efficiency and performance, States be urged to:

a) investigate the occurrences related to loss of AFTN Data;

b) migrate inter-regional communication links to AMHS;

c) rationalize the inter-regional connections established on bilateral basis, taking into consideration the regional requirements set in the MID ANP Vol II and operational needs; and

d) provide the ICAO MID with update the outcomes of a) and their AMHS implementation plans/progress by 30 May 2024.

Status of Implementation of Automated Data Exchange Systems (ADE) in Muscat FIR

5.3 The subject was addressed in WP/7, presented by Oman.

5.4 The meeting noted with appreciation that Oman CAA initiated the implementation of Automatic Data Exchange (ADE) System to enhance cross-FIR flight safety and efficiency, which improve coordination, flight notification, and transfer of control, by reducing ATC workload and minimize coordination errors.

5.5 The meeting noted with appreciation Oman effort in establishing the connections notably the connection between Oman and UAE was successfully established also the testing was successful between with Jeddah in the meantime testing is on-going with Mumbai, Karachi and Tehran.

ATM Operational inputs related to AIDC-OLDI Applicability Area

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

5.7 The meeting noted that the ATM SG/10 meeting recalled the discussion held during the MIDANPIRG/21 meeting related to the extension of the timeline for implementation of AIDC/OLDI Priority 1 in the MID Region to the end of December 2026. Accordingly, the list of deficiencies would be modified to eliminate the deficiencies associated with the AIDC/OLDI implementation, allowing the States additional time to fulfils this requirement within the applicability area.

5.8 The meeting noted the current AIDC/OLDI implementation Applicability Area reviewed by the ATM SG/10 which found out that a criteria should be established based on the operational needs to identify the applicability area, the meeting reviewed the proposal by the ATM SG Secretariat based on operational data at **Appendix 5A** agreed on the following criteria:

a) if the traffic exchange rate between two adjacent ACCs has exceeded 30 flights per hour; or
b) if two consecutive FIRs implemented longitudinal separation 10 NM or less at common FIR boundary point(s); or
c) if two adjacent FIRs implemented cross border Free Route Airspace (FRA); or
d) if the number of LHD recorded by MIDRMA related to adjacent ACCs has exceeded 10 reports per month and it lasts for more than 6 months; or
e) if traffic movement at the common FIR boundary significant increased during contingency situations. or
f) where decided by both concerned States.

5.9 The meeting noted that the ATM SG/10 agreed that based on the criteria above, and matrix at **Appendix 5B,** ICAO MID develop draft AIDC/OLDI applicability area to be reviewed by the ASM WG.

5.10 Based on that, the meeting encouraged the relevant States per applicability area to undertake the necessary measures to establish AIDC/OLDI connections in before end of December 2026.

Oman Experience and Challenges to AIDC-OLDI Implementation

5.11 The subject was addressed in IP/3 prepared by Oman.

5.12 The meeting was apprised of the recent testing of AIDC/OLDI (ATS Interfacility Data Communication/On-Line Data Interchange) between Oman and India, which aims to improve coordination between neighbouring Air Traffic Control Centres (ACCs). The meeting noted that the implementation of AIDC/OLDI reduced coordination failures which are the major cause of Loss of Separation (LOS) incidents.

5.13 The meeting identified the challenges related to compatibility and interoperability between different ATM systems which delineate the need for standardized data exchange formats, and the importance of upgrading ATM systems to support AIDC/OLDI.

5.14 The meeting recommended that the ICAO MID Office coordinate with the ICAO APAC Office to address these issues collaboratively and encourage further implementation of AIDC/OLDI across the MID region.

Readiness for FF-ICE Implementation

5.15 The subject was addressed in WP/8, presented by UAE.

5.16 The meeting highlighted that the critical role of the FF-ICE initiative in modernizing air traffic management (ATM). FF-ICE offers an advanced mechanism for managing flight planning and air traffic flow by enabling real-time data exchange between aviation stakeholders, including air traffic controllers, airline operators, and airport authorities.

5.17 The meeting also noted that the current flight planning mechanisms limit the efficiency of airspace management, particularly in regions with rapidly growing air traffic, such as the Middle East. The transition to FF-ICE will provide substantial benefits by offering stakeholders access to more accurate, real-time data, which will enhance decision-making and improve the efficiency of operations. The Middle East's strategic geographic location makes it imperative for the region to align with global trends in air traffic management modernization.

5.18 The meeting recalled Abu Dhabi declaration (UAE initiative to support the ANS within the MID Region) and UAE commitment to support the early planning for the FF-ICE implementation and cessation of the current Flight Planning (FPL2012) system in the early 2030s.

5.19 The meeting informed about the benefits and challenges for implementation of FF-ICE and agreed on the following:

a) Start planning of FF-ICE implementation at regional level;
b) consider the inclusion of FF-ICE implementation as a priority for implementation at regional level; and
c) encourage member states to consider the inclusion of FF-ICE on their national air navigation plans (NANPs) and ensure their readiness for the transition.

5.20 The meeting received tentative offer from UAE to host a multidisciplinary FF-ICE Workshop back-to-back with the ATFM TF during 2025, aiming to build the capacity and competencies in the region to enable adequate understanding and planning for the FF-ICE implementation. |The details will be communicated in due time in coordination with the MID Office.

NAVIGATION MATTERS

GNSS Radio Frequency Interference (GNSS RFI)

5.21 The subject was addressed in WP/2 presented by the Secretariat. The meeting noted the following MIDANPIRG/21 Conclusion related to GNSS Interference (GNSS RFI):

MIDANPIRG CONCLUSION 21/27: GNSS RFI MITIGATION

That,

*a) States affected with GNSS RFI take necessary mitigation measures and provide update to the ICAO MID Office by **30 May 2024**; and*

b) the ATM SG in coordination with AIM, CNS and PBN SGs to address the reported occurrences and review the MID RSA 014 on GNSS Vulnerabilities as deemed necessary to be presented to MIDANPIRG/22 – RASG-MID/12 for endorsement.

5.22 In addition, the meeting also noted RASG-MID/11 meeting concern about the issue of GNSS interference and spoofing and tasked the CNS SG to manage the GNSS interference and spoofing and provide an update to the RASG-MID. Accordingly, the meeting noted consequently the following RASG-MID/11 Conclusion related to GNSS Interference (GNSS RFI):

RASG-MID CONCLUSION 11/3: GNSS INTERFERENCE AND SPOOFING

That,

a) ICAO with the support of states and IATA to establish a regionally determined minimum operational network (MON) of conventional navigation aids for use in case of GNSS interference /Spoofing;

b) States be urged to develop mitigation measures to be used in case of GNSS interference;

c) States to maintain adequate infrastructure to enable aircraft operators use of conventional navigation aids as appropriate during GNSS RFI or Spoofing;

d) Original Equipment Manufacturers (OEMs) to provide further guidance and information on the effects and mitigations of GNSS RFI (including interference, jamming and spoofing) from the perspective of aircraft equipment;

e) States to foster Civil-military coordination and cooperation; and

f) ICAO with the support of States, ACAO, IATA and IFALPA to amend RASG-MID Safety Advisory – 14 including the update of the GNSS RFI statistics and to include GNSS spoofing effect and mitigation measures.

5.23 The meeting recalled the recommendations of the Air Navigation Conference Fourteen (ANC-14) notably, the ICAO ANC-14 Recommendation 2.2/1 addressing safety risks related to new and evolving aviation technologies and concepts and recommendation 2.2/2 Addressing global navigation satellite system interference and contingency planning.

5.24 The meeting agreed to request the MIDANPIRG/22 and RASG-MID/12 to amend the previous Conclusions and encourage States to implement effective GNSS radio frequency interference mitigation measures, maintain a network of conventional ground navigation aids, and adequate air traffic capacity during GNSS interference. In addition, States should collaborate with industry to provide guidance on detecting GNSS jamming or spoofing and maintaining safe aircraft operations during GNSS anomalies or unavailability.

5.25 The meeting noted the need to develop GNSS reporting mechanisms as outlined in the ICAO GNSS Manual (Doc 9849).

5.26 The meeting invited the Secretariat to submit a working paper to the RASG-MID/12 and MIDANPIRG/22 Meeting which will consolidate the GNSS RFI through a Draft Conclusion considering the ICAO ANC-14 Recommendation 2.2/1 and recommendation 2.2/2.

GNSS Vulnerabilities

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

5.28 The meeting recalled the benefits gained from implementing the Global Navigation Satellite System (GNSS) which is essential for the implementation of Performance Based Navigation (PBN) and Automatic Dependent Surveillance-Broadcast (ADS-B), and the substantial safety, capacity, and environmental benefits interested to ATM operations.

5.29 The meeting recalled the GNSS vulnerabilities related to radio frequency interference (RFI), such as jamming, and cyber-attacks (e.g. spoofing). Therefore, it is essential to mitigate GNSS vulnerabilities adequately, to ensure continued Safe and efficient operations.

5.30 The meeting noted with concern the GPS Spoofing reports within the MID Region, and recalled the RASG-MID Safety Advisory 14, which needs to be revised to include operational measures for timely response of ATC when Spoofing is detected or reports.

5.31 Based on the operational experience of ANSPs within the MID Region, the meeting received the revised RSA-14, by the ATM SG/10 Meeting, as at **Appendix 5C.** The meeting agreed that the proposed amendments will be circulated to the CNS Focal Points for their final feedback prior its presentation to the MIDANPIRG/22 and RASG-MID/12 meeting.

Capacity Building on GNSS Interference

5.32 Based on the above, and to provide an opportunity for detailed discussions on the implementation of different GNSS elements/options and associated challenges, the meeting recalled the following MIDANPIRG Conclusion:

> *MIDANPIRG CONCLUSION 21/7: WORKSHOP ON PBN/GNSS*
>
> *That, ICAO, jointly with ACAO organize a Workshop on PBN/GNSS in 2024.*

5.33 The meeting agreed to the following Draft Conclusion to replace and supersede the MIDANPIRG Conclusion 21/7:

> ***DRAFT CONCLUSION 13/1: CAPACITY BUILDING ON GNSS RFI***
>
> *That, ICAO, in collaboration with ICAO partner, organize a capacity building event on GNSS Interference during 2025.*

SURVEILLANCE MATTERS

Use of Mode S Conspicuity Code for Transit Flights

5.34 The subject was addressed in WP/9, presented by UAE and Oman.

5.35 The meeting acknowledged the importance and advantages of utilizing the conspicuity code alongside Mode S technology for identifying aircraft and the correlation of radar tracks with flight plans, particularly in contrast to the challenges and limitations associated with traditional SSR codes (Mode 3/A).

5.36 The meeting noted that the proposed solution was viable and proven but relies on consistent Mode S support across neighboring States to be effective over extensive flight segments. Accordingly, the meeting agreed on the following:

a) the use of the conspicuity code A1000 for transit flights and Mode S aircraft identification and coupling with flight plans would support addressing the challenge related to the limited number of available SSR codes within the region;

b) the use of a conspicuity code for transit flights is best addressed in a coordinated manner of states to have a joined planning to assure operational and technical readiness of all stakeholders; and

c) encourage the States interested to use conspicuity code for transit flights and Mode S aircraft identification and coupling with flight plans to initiate joint discussions to update the bilateral agreements for the implementation and trials.

Integrating ADS-B Coverage as a Complementary and Second Surveillance Layer to Radars Mode S Surveillance Systems

5.37 The subject was addressed in WP/16 presented by Saudi Arabia and focused on the key points regarding the integration and benefits of ADS-B in improving surveillance coverage and capabilities.

5.38 The meeting was appraised of the ADS-B implementation plan of Saudi Arabia to be completed by Q2 of 2025, aiming to expand the surveillance coverage in remote areas, complementing existing radar systems.

5.39 The meeting noted with appreciation the Saudi Arabia experience in integrating the ADS-B with conventional radar and Mode S systems to enhance air traffic surveillance within Jeddah FIR, including but not limited to:

- Extended Coverage: ADS-B fills gaps where radar coverage is limited.
- Improved Accuracy: ADS-B provides more frequent position updates, enhancing situational awareness for air traffic controllers.
- Cost-Effectiveness: Reduces reliance on expensive radar infrastructure.
- Safety: Enhances safety through improved monitoring and conflict resolution.

5.40 Regarding the operational use, the meeting noted that ADS-B allows cross-verification of data from Mode S, with more frequent updates (every second) aiding conflict management and improving air traffic flow.

5.41 In the meantime, the meeting recognized the risks related to ADS-B implementation notably the ADS-B's reliance on GNSS makes it vulnerable to signal loss or interference, increasing the risk of operational disruptions. Meanwhile, the meeting noted that mitigation Strategies could address those risks through the development of contingency plans for GNSS signal loss, ensuring interoperability between systems, and implementing cybersecurity measures to protect against threats.

5.42 The meeting recognized the added value of the integration of the ADS-B as a complementary layer to existing radar and Mode S systems which will significantly enhance air traffic management (ATM). Accordingly, the meeting agreed that ICAO in collaboration with ICAO Partners explore/share the available guidelines and best practices for integrating ADS-B within the ATM systems, with a focus on mitigating risks related to GNSS vulnerabilities.

The Importance of Surveillance Sharing in the MID Region

5.43 The subject was addressed in WP/17 presented by United Arab Emirates and highlighted the importance of surveillance sharing to address operational challenges and enhance safety in the MID Region.

5.44 The meeting emphasized on the need for increased surveillance data sharing among MID States to enhance air traffic management (ATM) and safety.

5.45 The meeting noted that Sharing surveillance data is essential for improving situational awareness, air traffic management efficiency, and safety in the region. The meeting recalled that the ICAO Global Air Navigation Plan (GANP) and the MID Air Navigation Plan (MID ANP) support surveillance data sharing as part of a performance-based approach to air navigation services.

5.46 The meeting highlighted that although some MID States have advanced surveillance technologies (e.g., ADS-B, radar), data sharing between States remains limited, reducing the full potential of these systems. The meeting recognized that enhanced data sharing would lead to better conflict detection, optimized traffic flows, and improved cross-border airspace management.

5.47 The meeting encouraged States to refer to the revised surveillance sharing agreement at **Appendix 5D,** specifically tailored for the MID region's operational and geopolitical requirements and based on EUROCONTROL's template. The meeting noted the Key aspects of the agreement include a clear delineation of responsibilities, data integrity, and cybersecurity measures. In addition, the agreement should be regularly reviewed and updated to incorporate technological advancements and address emerging threats, including Cybersecurity concerns.

<u>CYBERSECURITY AND INNOVATION MATTERS</u>

ANS Cybersecurity

5.48 The subject was addressed in WP/19 presented by the Secretariat.

5.49 The meeting recalled that the MIDANPIRG/21 was apprised of the outcomes of the Cybersecurity and Resilience Symposium held in Doha, Qatar, from 6 to 8 November 2023. The MIDANPIRG/21 meeting noted with appreciation the Symposium outcomes and endorsed the following Conclusion:

MIDANPIRG CONCLUSION 21/28: CYBERSECURITY SYSTEMS RESILIENCE

That, States consider the recommendations in Appendix 5M which would support the enhancement of their cybersecurity systems resilience.

5.50 The meeting was apprised of the growing importance of cybersecurity in aviation due to increasing threats. The meeting highlighted the need for continuous monitoring, effective threat intelligence, and international collaboration.

5.51 The meeting emphasized on establishing key Cybersecurity strategies, adopting multi-layered defense mechanisms, regular vulnerability assessments, and employee training. Consequently, the meeting encouraged States to explore mitigation techniques, contingency planning, and the integration of emerging technologies like AI to enhance cybersecurity resilience.

Benefits of Artificial Intelligence (AI) Application in Air Traffic Management & Innovation

5.52 The subject was addressed in WP/20 presented by Saudi Arabia and highlighted AI's role in modernizing ATM for improved efficiency and safety.

5.53 The meeting was apprised of how AI can enhance air traffic management (ATM) systems by improving conflict detection, trajectory prediction, and decision support for controllers.

5.54 The meeting identified the potential benefits of AI integration in CNS/ATM Systems, including but not limited to:

- Conflict Detection and Resolution as AI can analyse real-time data to predict and resolve conflicts between flights.
- Speech Recognition as AI can detect read-back errors in pilot-controller communications, enhancing safety.
- Trajectory Prediction as AI can improve the accuracy of flight path forecasting.
- Runway Optimization as AI can recommend optimal runway configurations, reducing delays and increasing efficiency.

5.55 The meeting noted that ICAO in collaboration with ICAO partners is exploring the development of necessary guidance for AI integration in CNS/ATM Systems and encouraged States to share information on AI applications across CNS/ATM areas.

REPORT ON AGENDA ITEM 6: ASBU THREADS/ELEMENTS RELATED TO CNS

MID Air Navigation Report-2023

6.1 The subject was addressed in WP/3, presented by the Secretariat.

6.2 The meeting was apprised with the reported level of implementation available within the MID Air Navigation Report 2023, the report is available under the ICAO MID Website at the link: https://www.icao.int/MID/ANR2023.

6.3 The meeting noted with concern the low level of implementation (less than 50%) of the following:

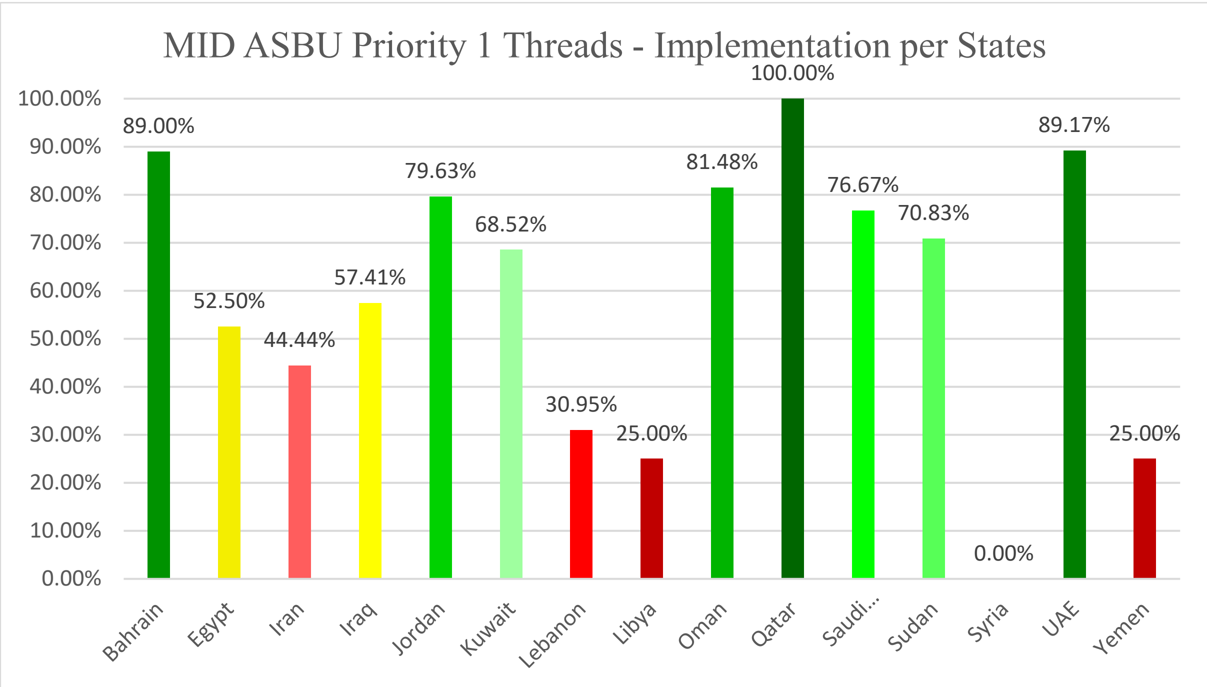
a) FICE(B0/1), the level of implementation is increased to 39.39% compared to 26.19% in 2022;

b) NOPS(B0/1), the level of implementation is 41.67%, the same as the year 2022;

c) RSEQ(B0/1), the level of implementation is 35.71%, the same as the year 2022;

d) ASUR(B0/2), the level of implementation is decreased to 37.5% compared to 75% in 2022; and

e) NAVS(B0/4), the level of implementation is decreased to 40% compared to 46.67% in 2022.



6.4 The meeting underlined that States are required to establish a multidisciplinary team of Air Navigation Services (ANS) to submit progress reports to ICAO MID in response to the inquiry from the ICAO regarding the Air Navigation Report for 2024.

6.5 Based on the above, the meeting, as coordinated with the ATM SG/10 agreed on the following Draft Conclusion:

DRAFT CONCLUSION 13/2: MID REGION AIR NAVIGATION REPORT-2024

That,

a) States be invited to provide the ICAO MID Office with the following data for the development of the MID Region Air Navigation Report-2024 by 1 February 2025:

i. update on the status of implementation of the priority 1 ASBU Threads/Elements using the Template at Attachment A;

ii. progress achieved in the implementation of the Performance Based Approach and development of your State National Air Navigation Plan (NANP), by completing the Questionnaire at Attachment B; and

iii. State's major achievement(s)/success story(ies) in the air navigation field in 2024.

b) the MID Air Navigation Report-2024 be presented to the MIDANPIRG/22 for endorsement.

Implementation of Flight and Flow Information for a Collaborative Environment (FF-ICE) in the MID Region

6.6 The subject was addressed in WP/8 presented by UAE and WP/21 presented by Saudi Arabia.

6.7 The meeting noted that FF-ICE is a significant initiative to meet the growing demands of air traffic in the MID region. The meeting highlighted the benefits of implementing the FF-ICE concept in the MID region and its potential role to enhance air traffic management (ATM). The meeting recalled that FF-ICE promotes efficient information sharing and collaborative decision-making among stakeholders, improving operational efficiency, safety, and regional partnerships.

6.8 The meeting indicated that FF-ICE is designed to modernize ATM systems by facilitating seamless information sharing and real-time coordination between air navigation service providers (ANSPs), airlines, and airport operators. In addition, the meeting emphasized on the technical Capabilities of FF-ICE which require significant investments in infrastructure and expertise to implement the systems, including advanced technology integration and improved collaboration among stakeholders.

6.9 The meeting noted that the ASM WG, under the ATM SG, is covering the operational requirements of FF-ICE and considering the systems implementation challenge, the meeting agreed to establish of the FF-ICE Implementation Taskforce comprising CNS, ATM and AIM members to comprehensively consider the infrastructure, operational and data exchange requirements , in order to foster the collaborative framework and the adoption advanced flight planning systems and technologies, and provide the necessary capacity building initiatives for the MID States.

DRAFT DECISION 13/3: *ESTABLISHMENT OF THE MID FF-ICE TASK FORCE*

That,

a) the MID Region FF-ICE Task Force be established, and

b) the terms of reference of the FF-ICE Action Group be developed during the first meeting of the Task Force.

6.10 The meeting requested the ICAO Secretariat to coordinate with the ANS SGs Secretariat for the proposal of the CNS SG to incorporate all FF-ICE related matters under one contributary body.

Transition to SWIM in the MID Region

6.11 The subject was addressed in WP/22 presented by Saudi Arabia and emphasized on the importance of regional collaboration and planning to ensure a smooth transition to the SWIM environment, improving air traffic management systems in the MID region.

6.12 The meeting noted that transitioning from the traditional Aeronautical Fixed Telecommunication Network (AFTN)/ATS Message Handling System (AMHS) to a System-wide Information Management (SWIM) environment in the MID region will require operating dual infrastructures, supporting both legacy systems and new IP-based services, during the transition phase.

6.13 The meeting recalled that SWIM is a networked information services-based concept, supporting automation, decision-making, and information sharing between stakeholders using standardized and interoperable services. The meeting emphasized on the transition management phase where the overall system will require supporting both AFTN/AMHS and SWIM, including developing gateways and ensuring seamless communication across different systems.

6.14 The meeting noted the initial objective is to include SWIM transition activities focused on technical and infrastructure enablers to satisfy the operational need.

6.15 The meeting agreed that the MID AMC STG could initially handle the management of the later transition management phase at the Regional Level. Therefore, the meeting amended the new draft of the Terms of Reference (ToRs) for the MIDAMC Steering Group, as at **Appendix 6A** to include SWIM-related implementation activities.

6.16 Finally, the meeting agreed that the MID Region Air Navigation Strategy needs to be amended to include the SWIM thread and related ASBU elements as optional (priority three) within the ASBU Block 2.

ATM Operational Inputs for the Navigation Minimal Operating Network

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

6.18 The meeting recalled that the ATM, CNS and PBN Sub-groups were tasked to review and improve the Draft NAV MON plan template presented during MIDANPIRG/21. The meeting also recalled that MIDANPIRG/21 Meeting noted that PBN SG inputs and tasked the ATM SG to submit their inputs to the CNS SG/13 Meeting for consolidation Accordingly, the MIDANPIG/21 meeting endorsed the following MIDANPIRG Conclusion:

MIDANPIRG CONCLUSION 21/26: NAV MON PLAN TEMPLATE

That, the CNS SG in coordination with ATM SG and PBN SG review and update, as deem necessary, the NAV MON Plan Template to be presented to MIDANPIRG/22 meeting for endorsement.

6.19 The meeting recalled that the ASBU element "Navigation Minimal Operating Networks" (NAVS B0/4) has been classified as Priority 1 in the revised MID Region Air Navigation Strategy (MID Doc 002). This element aims to:

- adjust conventional navaids networks through the increased deployment of satellite-based navigation systems and procedures to ensure the necessary levels of resilience for navigation.
- provide a minimum level of capabilities to accommodate aircraft operations in mixed operation mode environments (aircraft equipage).
- make a more efficient use of the frequency spectrum.

6.20 The meeting recalled that the ATM SG/10 Meeting reviewed the draft template, at **Appendix 6B**; and included the ATM operational view to ensure sufficient NAVAIDs network is available to support the enroute phase of flight, particularly to provide sufficient Navigational guidance to the regional ATS route network, available at MID ANP Vol II Table ATS – 1. The meeting noted that those requirements would be coordinated with the ATM SMEs at the national level. (Note: careful planning should be considered where RNAV5 routes are implemented without the availability of surveillance coverage.)

Development of a Regional Navigation Minimal Operating Network (NAV-MON)

6.21 The subject was addressed in WP/27 presented by Saudi Arabia and underscored the need for a collaborative effort to ensure the resilience and efficiency of ANS services across the MID region.

6.22 The meeting reviewed the consolidated NAV-MON template emanating from CNS, PBN and ATM Subgroups, at **Appendix 6B,** and agreed that there is a need to establish Regional Navigational Minimum Operational Network (MON) regional forum to ensure the continued provision of air navigation services in the MID region during both normal and contingency/reversion operations, especially in case of GNSS interference.

6.23 The meeting recalled that the NAV-MON aims to rationalize the ground-based conventional navigation infrastructure, reducing unnecessary facilities while maintaining critical navigation services. The meeting emphasized the importance of Ground-Based Aids considering the GNSS vulnerability (interference or spoofing) being a concern. The meeting reiterated that having a robust network of conventional aids (e.g. VOR, DME, and ILS) ensures safety and airspace capacity during disruptions.

6.24 The meeting agreed that a NAV-MON Action Group should be established to collect data on existing navaids infrastructure, assess operational needs, and identify facilities that can be relocated or decommissioned. The role of the NAV-MON Action Group is to develop a proposal for the Regional Navigational Minimum Operational Network.

6.25 The meeting agreed that all MID States should be invited to assign CNS and ATM subject matter experts and share data to support the establishment of the NAV-MON Action Group and the development of MID Region NAV-MON Network. Therefore, the meeting agreed that a mechanism needs to be set through the establishment of the MID NAV-MON Action Group and adopted the following Decision:

DRAFT DECISION 13/4: MID NAV-MON ACTION GROUP

That,

a) MON Action Group be established to develop a proposal for a Regional Navigational Minimum Operational Network supporting the ANS operations;

b) the terms of reference of the MON Action Group be developed during the first meeting of the Action Group; and

c) States support the MON Action Group through:

i. assignment of CNS and ANS Subject matter experts to contribute to the work of the Action Group; and

ii. sharing states' experience and provision of required data for developing the MID NAV-MON Network.

Outcomes of the RANP-NANP TF/1 Meeting

6.26 The subject was addressed in WP/23 presented by the Secretariat.

6.27 The meeting recalled that MIDANPIR/21 reviewed and agreed to the Terms of Reference (ToRs) of the RANP/NANP Task Force. The MIDANPIRG/21 Meeting reviewed and endorsed the new edition of the MID Air Navigation Strategy (ICAO MID Doc 002).

6.28 The meeting noted that the MIDANPIRG/21 underlined the need for the MIDANPIRG Subgroups to allocate enough time in their agenda for the detailed discussion of the ASBU Threads relevant to their technical areas, including the identification of priorities, definition of applicability areas, performance indicators, metrics, targets, etc.

6.29 In this regard, the meeting reviewed the new edition of the MID Air Navigation Strategy (ICAO MID Doc 002) and agreed to present the revised version based on the initial inputs submitted by Saudi Arabia, as at **Appendix 6C** to the RANP/NANP TF/2 Meeting for discussion.

REPORT ON AGENDA ITEM 7: AIR NAVIGATION DEFICIENCIES IN RELATION WITH CNS, ATM AND SAR

7.1 The subject was addressed in WP/24 presented by the Secretariat. The meeting reviewed and updated the list of deficiencies in the CNS field as reflected in the MID Air Navigation Deficiency Database (MANDD) at: https://mandd.icao.int.

7.2 The meeting reviewed, commonly with the ATM SG/10 Meeting, the list of deficiencies in the MANDD under the ATM/SAR and CNS fields respectively as at **Appendices 7A, 7B** and **7C** respectively, and urged States to take necessary measures to implement the provisions of the MIDANPIRG/15 Conclusion 15/35, in particular the submission of a specific Corrective Action Plan (CAP) for each deficiency and update the status accordingly.

7.3 The meeting noted that the list of deficiencies in the CNS, ATM, and SAR fields are reflected in the MID Air Navigation Deficiency Database (MANDD) at: https://www.mandd.icao.int. The current number of Air Navigation Deficiencies in MANDD reported to MIDANPIRG/21 meeting was 98 deficiencies compared to 116 deficiencies reported to MIDANPIRG/20 meeting.

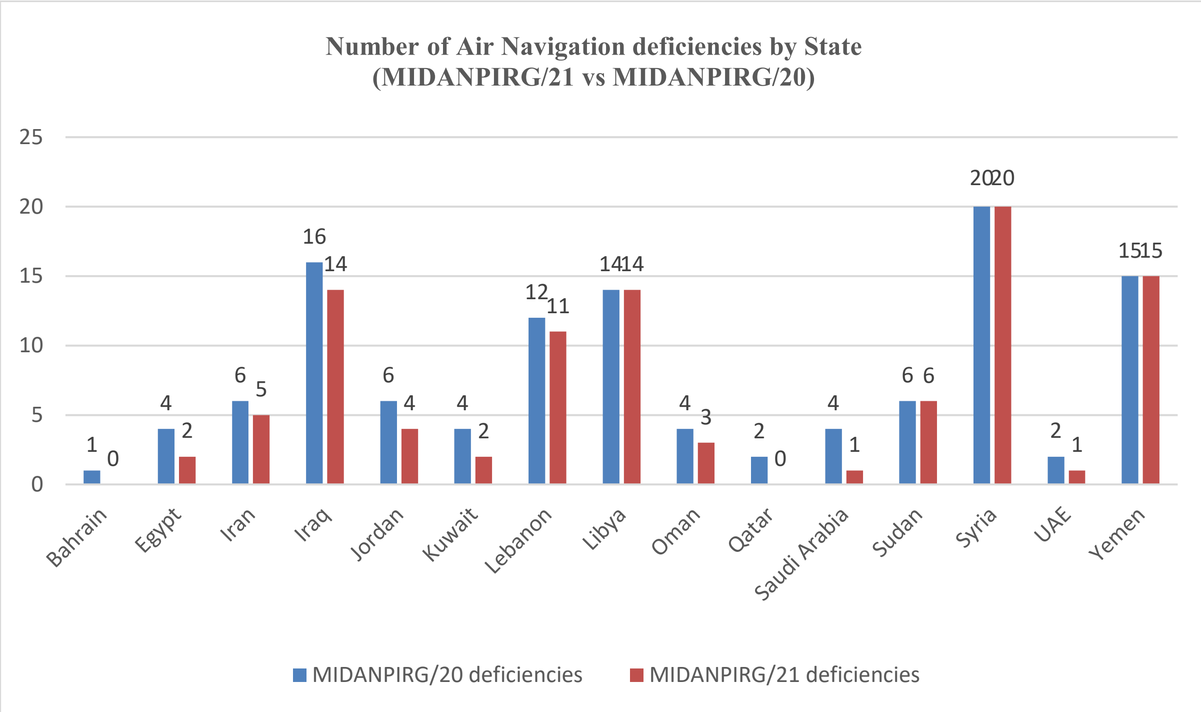
a) *In the ATM field:* as reported by Qatar, the MIDANPIRG 21 meeting agreed to remove the deficiency reported against Qatar related to contingency agreement. Also as reported by MIDRMA SMR 2023, new deficiency added against Sudan related to lack of provision of required data to MIDRMA; the total number of deficiencies is seventeen (17); ten (10) priority "A" and seven (7) priority "B". Seven (7) related to the uncompleted signature of contingency agreements; seven (7) related to the non-implementation of planned regional ATS Routes, and three (3) related to unsatisfactory reporting of large Height deviation (LHD) and Traffic Data Sample (TDS) to the MIDRMA.

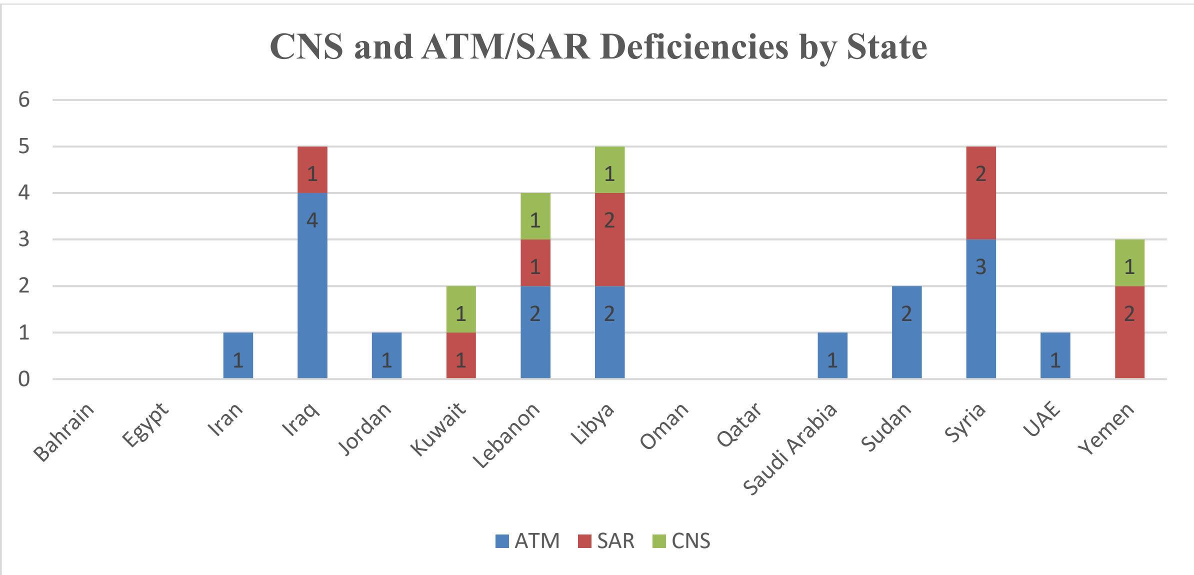
b) *In the SAR field:* the total number of deficiencies is nine (9) priority "A". Five (5) related to the lack of implementation of SAR provisions; and four (4) related to non-compliance with the carriage of Emergency Locator Transmitter (ELT) requirements.

c) *In the CNS field:* as reported by ATM SG/9, the meeting agreed to remove the deficiencies reported against Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Sudan and UAE related to implementation of the Priority 1 AIDC/OLDI connection; the total number of CNS deficiencies is four (4); two (2) priority "A" and two (2) priority "B". Two (2) deficiencies are related to ATS Direct speech circuits, one (1) related to Inter-Regional Communication link with ICAO EUR/NAT Region and one (1) for HF service.

7.4 The meeting noted that the MIDANPIRG/21 meeting highlighted lack of implementation of priority 1 interconnection will result in additional ANS deficiency to the MID Air Navigation Deficiency Database (MANDD). Therefore, it was agreed that deficiencies related to the lack of implementation of Priority 1 AIDC/OLDI connections will be added by end of December 2026.

7.5 The meeting noted that certain deficiencies have been rectified by the States, which are required to formally notify the ICAO MID Office in order to initiate the process for the removal of the associated deficiencies from MANDD, following the MIDANPIRG/22 meeting agreement.


Number of Air Navigation deficiencies by State
(MIDANPIRG/21 vs MIDANPIRG/20)
25
20
15
10
5
0
Bahrain
Egypt
Iran
Iraq
Jordan
Kuwait
Lebanon
Libya
Oman
Qatar
Saudi Arabia
Sudan
Syria
UAE
Yemen
MIDANPIRG/20 deficiencies
MIDANPIRG/21 deficiencies


CNS and ATM/SAR Deficiencies by State
6
5
4
3
2
1
0
Bahrain
Egypt
Iran
Iraq
Jordan
Kuwait
Lebanon
Libya
Oman
Qatar
Saudi Arabia
Sudan
Syria
UAE
Yemen
ATM
SAR
CNS

REPORT ON AGENDA ITEM 8: FUTURE WORK PROGRAMME

8.1 The subject was addressed in WP/25 presented by the Secretariat.

8.2 The meeting reviewed the and amended the CNS SG Terms of References (TORs) as at **Appendix 8A**, to be submitted to the MIDANPITG/22 Meeting for endorsement.

8.3 The meeting agreed that the CNS/14 meeting will be tentatively held in October 2025. The meeting noted with appreciation UAE's generous offer to host the CNS/14 and ATM SG/11 meetings in parallel.

8.4 The meeting noted the following Tentative CNS related Activities planned in 2025:

- FF-ICE Regional Workshop (back-to-back with the ATFM TF meeting);
- CNS SG/14 Meeting;
- WRC-27 Preparatory Workshop; and
- Capacity Building event on GNSS Interference.

8.5 Furthermore, the meeting invited the States and Organizations to review and support the conduct of the ICAO MID Tentative Working Programme for 2025, which will be posted under the ICAO MID website, by the end of 2024; and which comprise all regional activities including the CNS ones.

REPORT ON AGENDA ITEM 9: ANY OTHER BUSINESS

9.1 Nothing has been discussed under this Agenda Item.

APPENDICES

FOLLOW-UP ON MIDANPIRG/21 CONCLUSIONS & DECISIONS

PART - ANS: MATTERS

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.21/16	**MID ADS-B HEIGHT MONITORING SYSTEM (MID AHMS)** *That,* *a) States implementing ADS-B to share the archived data with the MIDRMA for evaluation and analysis;* *b) MIDRMA to coordinate with MAAR for:* *i. sharing their experience in evaluating and analyzing samples of the received ADS-B data; and* *ii. providing required training related to AHMS implementation for MIDRMA Staff.*	introduced ADS-B height monitoring within the services provided by the MIDRMA	MID-AHMS	MIDRMA	2025	**On-going**

No.	CONCLUSIONS AND DECISIONS	CONCERNS/ CHALLENGES (RATIONALE)	DELIVERABLE/ TO BE INITIATED BY		TARGET DATE	STATUS/REMARKS
	c) MIDRMA to develop a mechanism and tools for submitting the ADS-B data by States; *d) MIDRMA provides the required training for CNS engineers from member states responsible for extracting ADS-B data from their systems and submitting it to MIDRMA at regular, mutually agreed intervals;* *e) MIDRMA to develop and document all required processes and procedures to be reflected in the training Manuals for the AHMS implementation, to be incorporated in the MIDRMA Tasks and responsibilities;* *f) MIDRMA shall continue to provide GMU monitoring service until the AHMS is fully operational, and for the Aircraft not included in the MID-AHMS; and* *g) the funding mechanism (including services charges) might be revised accordingly (based on cost -recovery basis). In accordance with ICAO Policies on charges for Airports and Air Navigation Services (Doc 9082), in coordination with IATA.*					
C.21/19	**DEVELOPMENT OF MID STATES ATFM PLAN** *That,* *a) based on the guidelines provided in ICAO MID Doc 014: ATFM Plan (V2.0), MID States develop their respective ATFM implementation plan and agreements with adjacent FIRs and share them with ICAO MID;* *b) by organizing individual workshops, ICAO MID supports the development of States National ATFM Plans and implementation of ICAO Doc 014 requirements for Phase I (including Phase IA & IB), where requested; and*	Enhance the level of ATFM implementation within the Region	National ATFM Plan	MID States	2025	**On-going**

No.	CONCLUSIONS AND DECISIONS	CONCERNS/ CHALLENGES (RATIONALE)	DELIVERABLE/ TO BE INITIATED BY		TARGET DATE	STATUS/REMARKS
	c) the MID ATFM Task Force is tasked with the identification of Priority ATFM Implementation Areas within the MID Region, to enable further implementation support activities.					
C.21/20	**MID FF-ICEWORKSHOPS 2024-2025** *That the FF-ICE Workshops be conducted in 2025, with the support of the ATFM TF and the relevant Subgroups to address the FF-ICE planning and implementation in the MID Region.*	Regional plan to ensure the readiness of ANSPs and operators for a smooth transition to FF-ICE	FF-ICE implementation plan/roadmap	MID States	2025	**On-going**
C.21/26	**NAV MON PLAN TEMPLATE** *That, the CNS SG in coordination with ATM SG and PBN SG review and update, as deem necessary, the NAV MON Plan Template to be presented to MIDANPIRG/22 for endorsement.*	Consultation for the implementation methodology and criteria related to the regional Navigation MON.	Updated MON NAV plan template	States	2025	**On-going**
C.21/27	**GNSS RFI Mitigation** *That,* *a) States affected with GNSS RFI take necessary mitigation measures and provide update to the ICAO MID Office by **30 May 2024**; and* b) *the ATM SG in coordination with AIM, CNS and PBN SGs to address the reported occurrences and review the MID RSA 014 on GNSS Vulnerabilities as deemed necessary to be presented to MIDANPIRG/22 – RASG-MID/12 for endorsement*	Safety risk associated with GNSS interference	Revise MID RSA014	States	2025	**On-going**

No.	CONCLUSIONS AND DECISIONS	CONCERNS/ CHALLENGES (RATIONALE)	DELIVERABLE/ TO BE INITIATED BY		TARGET DATE	STATUS/REMARKS
D.20/33	**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**

PART B: CNS Technical Matters

No.	CONCLUSIONS AND DECISIONS	CONCERNS/ CHALLENGES (RATIONALE)	DELIVERABLE/ TO BE INITIATED BY		TARGET DATE	STATUS/REMARKS
MIDANPIRG C. 21/7	**WORKSHOP ON PBN/GNSS** That, ICAO, jointly with ACAO organize a Workshop on GNSS/PBN in 2024.	Enhance awareness about the GNSS Interference	Workshop	ICAO/ACAO	Q4 2024	**On-going**
MIDANPIRG D. 21/23	**REVIEW OF THE MID REGION ALLOTMENT PLAN** That, in order to increase the amount of spectrum that can be used for Aeronautical Services, the CNS SG should adopt the revised planning Principle for Aeronautical Frequency Bands of 117.975-137 MHz and review and update, as deem necessary, the current MID allotment plan by **Q1 2025**.	Increase the amount of spectrum that can be used for ATC Services	Updated MID Region allotment plan	Frequency Management Working Group (FM WG)	31 March 2024	**On-going**
MIDANPIRG C. 21/24	**OPTIMIZATION OF FREQUENCY ASSIGNMENT IN THE MID REGION** That, in order to optimize the frequency assignment planning and mitigate VHF frequency congestion at regional level, States are urged to: a) coordinate with ICAO MID Office before assigning frequencies for aeronautical services (VHF COM, VHF NAV); b) perform an update/review of the data in the VHF-COM/NAV module; and c) Submit Frequency Requirements for the Period 2023 – 2030 using the Guidance Doc. at **Appendix 5L** by **Q4 2024.**	optimize the frequency assignment planning and mitigate VHF frequency congestion at regional level	States Feedback a per the MINADPIRG Conclusion Outcomes	MID States	31 August 2024	**On-going** SL Ref.: AN 7/5.7-23/170 dated 15 Aug. 2023 Reminder email on 31 Oct. 2023 3 replies received from UAE, Saudi Arabia and Egypt

No.	CONCLUSIONS AND DECISIONS	CONCERNS/ CHALLENGES (RATIONALE)	DELIVERABLE/ TO BE INITIATED BY		TARGET DATE	STATUS/REMARKS
MIDANPIRG C. 21/25	**INTER-REGIONAL COMMUNICATION LINKS** That, in order to enhance the AFS Network efficiency and performance, States be urged to: a) investigate the occurrences related to loss of AFTN Data, b) migrate inter-regional communication links to AMHS; c) rationalize the inter-regional connections established on bilateral basis, taking into consideration the regional requirements set in the MID ANP Vol II and operational needs; and d) provide the ICAO MID with update the outcomes of a) and their AMHS implementation plans/progress by **30 May 2024**.	Enhance the AFS Network efficiency and performance	AMHS Migration and rationalized inter-regional connections	MID States	30 May 2024	**On-going** SL Ref.: AN 7/5 & ME 3-23/240 dated 19 Oct. 2023
MIDANPIRG C.21/27	**GNSS RFI MITIGATION** That, c) States affected with GNSS RFI take necessary mitigation measures and provide update to the ICAO MID Office by **30 May 2024**; and d) the ATM SG in coordination with AIM, CNS and PBN SGs to address the reported occurrences and review the MID RSA 014 on GNSS Vulnerabilities as deemed necessary to be presented to MIDANPIRG/22 – RASG-MID/12 for endorsement.	To mitigate GNSS RFI	States	States Feedback on GNSS RFI within theirs FIRs Updated RSA 014	30 May 2024 Q4 2024	**On-going** SL Ref.: ME 4 – 24/150 dated Oct. 2024
MIDANPIRG C. 21/28	**CYBERSECURITY SYSTEMS RESILIENCE** That, States consider the recommendations in **Appendix 5M** which would support the enhancement of their cybersecurity systems resilience.	Reinforce Cybersecurity in the MID Region	MID Cybersecurity recommendations	ICAO/States	March 2024	**Completed**

No.	CONCLUSIONS AND DECISIONS	CONCERNS/ CHALLENGES (RATIONALE)	DELIVERABLE/ TO BE INITIATED BY		TARGET DATE	STATUS/REMARKS
RASG C.11/3	**GNSS INTERFERENCE AND SPOOFING** That,					**On-going**
	a) ICAO with the support of states and IATA to establish a regionally determined minimum operational network (MON) of conventional navigation aids for use in case of GNSS interference /Spoofing;	Definition of the minimum operational network (MON) of conventional navigation aids for use in case of GNSS interference/Spoofing.	minimum operational network (MON) of conventional navigation aids for use in case of GNSS interference/Spoofing.	ICAO, IATA and States	Tentatively Q4 2024	SL Ref.: ME 4 – 24/150 dated Oct. 2024
	b) States be urged to develop mitigation measures to be used in case of GNSS interference;	Lack of mitigation measures to be used in case of GNSS interference.	Proposed mitigation measures to be used in case of GNSS interference.	States		
	c) States to maintain adequate infrastructure to enable aircraft operators use of conventional navigation aids as appropriate during GNSS RFI or Spoofing;	Operations Continuity dung GNSS RFI or Spoofing	Alternatives ensuring Operations Continuity dung GNSS RFI or Spoofing	States		
	d) Original Equipment Manufacturers (OEMs) to provide further guidance and information on the effects and mitigations of GNSS RFI (including interference, jamming and spoofing) from the perspective of aircraft equipment;	Lack of coordination with Original Equipment Manufacturers (OEMs)	Establishment of coordination with OEMs	States		
	e) States to foster Civil-military coordination and cooperation; and	Lack of coordination with the Military	Establishment of coordination with the Military side	States		
	ICAO with the support of States, ACAO, IATA and IFALPA to amend RASG-MID Safety Advisory – 14 including the update of the GNSS RFI statistics and to include GNSS spoofing effect and mitigation measures.	Amendment of the current RSA 14	Amended RSA 14	States		

High Level Individual State Questionnaire v2.2

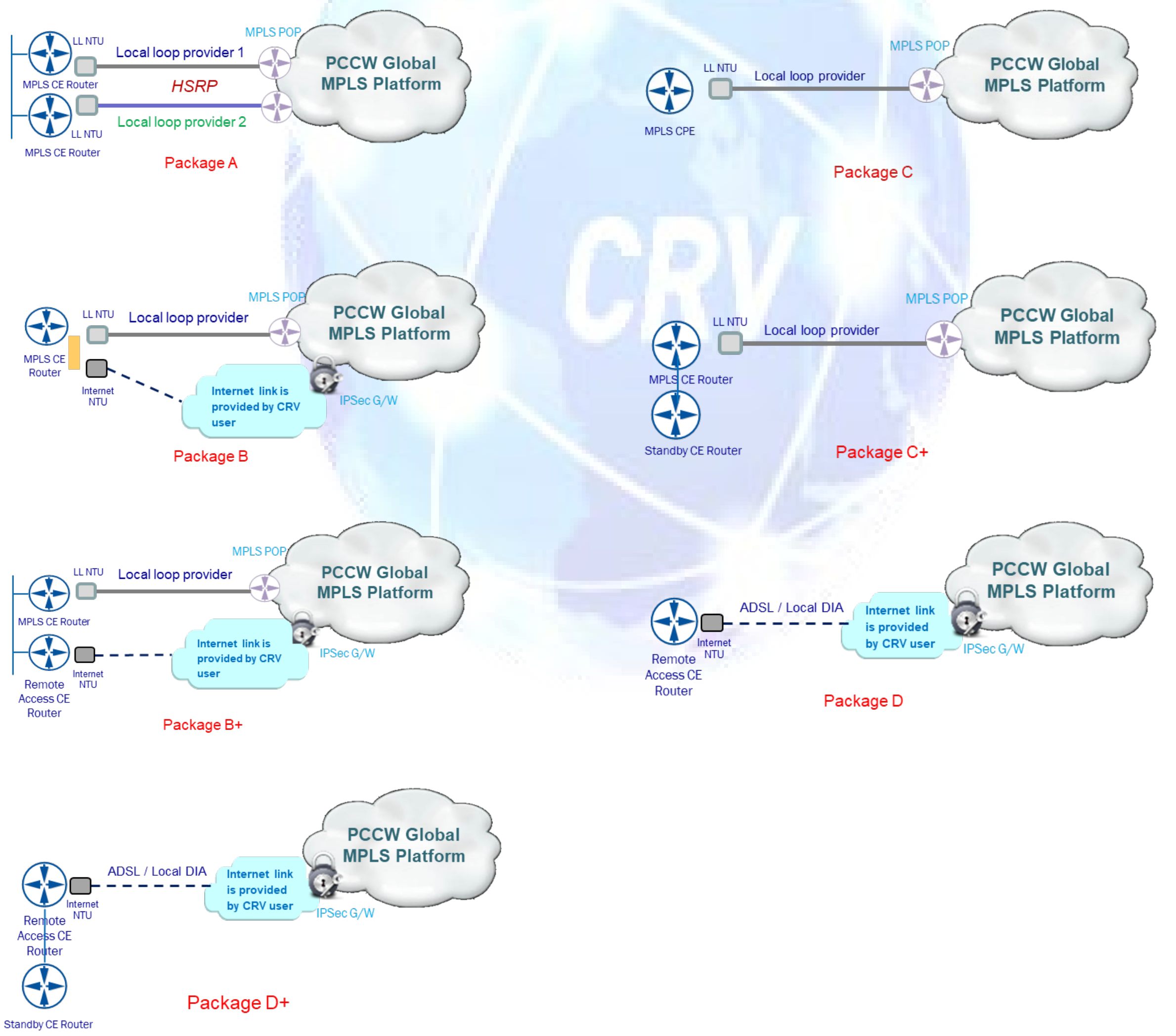
Thanks for your interests on CRV service.
Please fill in the questionnaire to let us know more your high level requirements.

- **Core services (Site 1)**

Company Name:	**Local Contact Name:**
Contact Name:	**Local Contact Tel:**
Contact Tel:	**Local Contact Email Address:**
Email Address:	**Detailed Installation address:**

Target Service Date: _______ ASAP, before 31/12/24___________________
Please "X" the package required and fill in the bandwidth requirement.

Package A ☐ Package B+ ☐ Package B ☐ Package C+ ☐ Package C ☐ Package D ☑ Package D+ ☐



Voice bandwidth :

Reference bandwidth for EF(G.711) Voice is 112Kbps per voice call
Number of Concurrent Voice Call is required: _________ Call(s) x 112Kbps
= _______Kbps

Data Bandwidth :
Reference bandwidth for AF21(E.g. AFTN, ATN or AMHS system) is 64K per channel
Number of AF21 is required: _________ Channel(s) x 64Kbps
= _______Kbps

Bandwidth for CS4 (ADS-B), DF/CS0 (all traffic not otherwise defined) - ANSP needs to check the existing bandwidth requirement, each ANSP may have different bandwidth requirement
Number of CS4 is required: _________ Channel(s) x _____Kbps
= _______Kbps

DF (CS0) bandwidth is required (e.g. the remaining bandwidth):
= _______Kbps

Total bandwidth : (Voice bandwidth + Data bandwidth)

☐64 Kbps ☐ 128 Kbps ☐256 Kbps ☐ 512 Kbps ☐1024 Kbps ☐2048 Kbps
☐4096 Kbps ☐8192 Kbps ☐Other ________

Any special requirements on your local loop vendors if any : *if yes, please provide their contacts*
____

- **Additional services (for each NID)**

In coordination with other ANSP(s), I procure a managed voice and data router with the following interfaces: (Remarks: There is ONE LAN Ethernet port bundled with each NID)

(1) E1: ______unit(s)

(2) 4-wire E&M Type I/II/III/V (6 wires): _____ unit(s)

(3) 2-wire FXS: ______ unit(s)

(4) 2-wire FXO: ______ unit(s)

(5) Ethernet: ______ unit(s)

Remarks:

(1) How many sites/airports in the state in total? ________1________

(2) How many sites/airports will be connected to CRV? ______________

(3) Which neighbor countries (sites/airports) will be connected to?

____

____

(4) Are you using VOIP for support voice traffic? Yes/No

Please fill in your existing setup or requirements which you would like to share with us.

____

____

Or you may share your existing network diagram or planned new diagram with us.

For example: Any Multicast application? If yes, please specify your required bandwidth.

End

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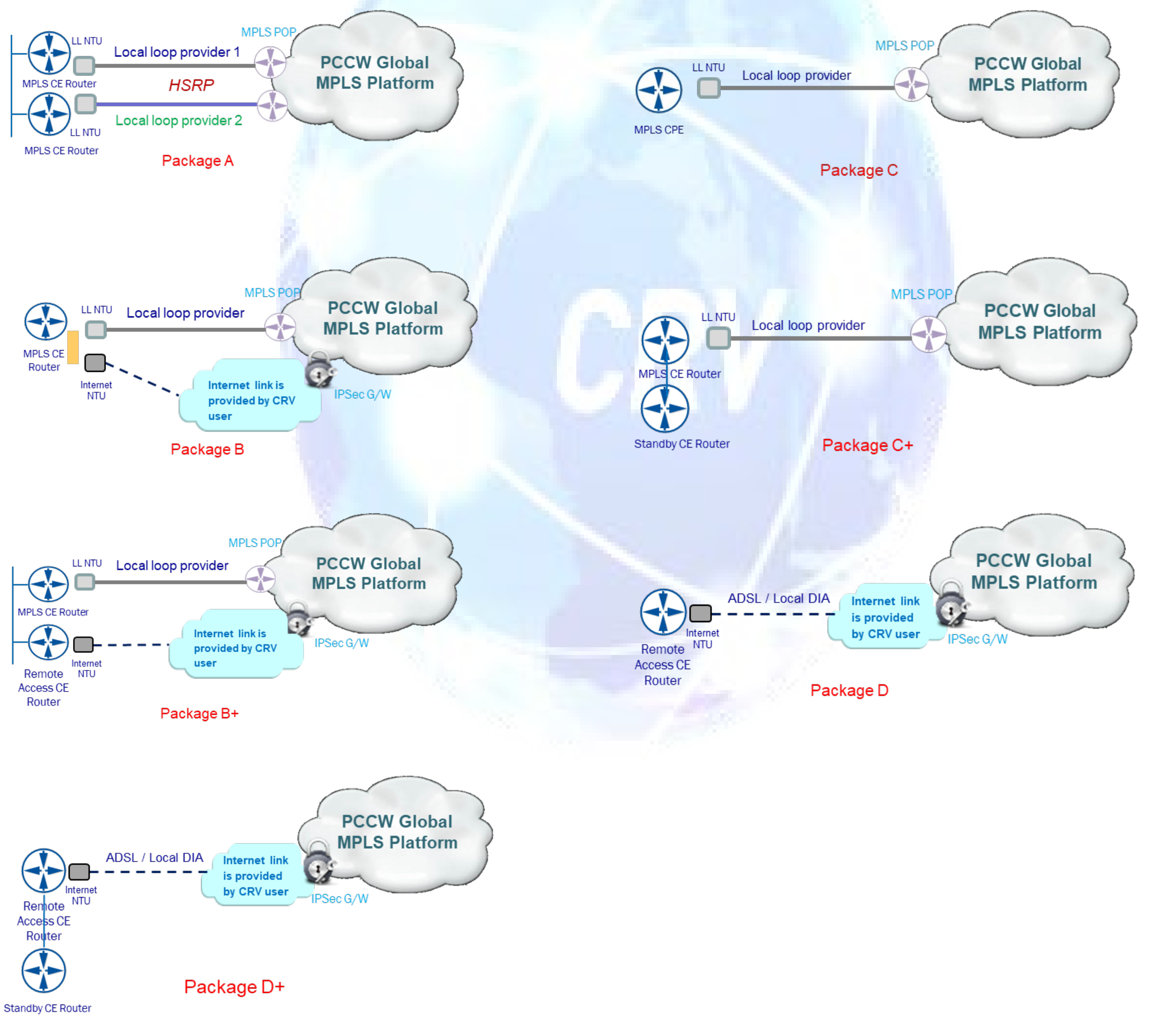
Core services (Site 2, if any)

Company Name:	**Local Contact Name:**
Contact Name:	**Local Contact Tel:**
Contact Tel:	**Local Contact Email Address:**
Email Address:	**Detailed Installation address:**

Target Service Date: ____________________________

Please “X” the package required and fill in the bandwidth requirement.

Package A ☐ Package B+ ☐ Package B ☐ Package C+ ☐ Package C ☐ Package D ☐ Package D+ ☐



Voice bandwidth :
Reference bandwidth for EF(G.711) Voice is 112Kbps per voice call
Number of Concurrent Voice Call is required: _________ Call(s) x 112Kbps
= _______Kbps

Data Bandwidth :
Reference bandwidth for AF21(E.g. AFTN, ATN or AMHS system) is 64K per channel
Number of AF21 is required: _________ Channel(s) x 64Kbps
= _______Kbps

Bandwidth for CS4 (ADS-B), DF/CS0 (all traffic not otherwise defined) - ANSP needs to check the existing bandwidth requirement, each ANSP may have different bandwidth requirement
Number of CS4 is required: _________ Channel(s) x _____Kbps
= _______Kbps

DF (CS0) bandwidth is required (e.g. the remaining bandwidth):
= _______Kbps

Total bandwidth : (Voice bandwidth + Data bandwidth)

□64 Kbps □ 128 Kbps □256 Kbps □ 512 Kbps □1024 Kbps □2048 Kbps
□4096 Kbps □8192 Kbps □Other _________

Any special requirements on your local loop vendors if any : *if yes, please provide their contacts*
____

- **Additional services (for each NID)**

In coordination with other ANSP(s), I procure a managed voice and data router with the following interfaces: (Remarks: There is ONE LAN Ethernet port bundled with each NID)

(1) E1: ______unit(s)

(2) 4-wire E&M Type I/II/III/V (6 wires): _____ unit(s)

(3) 2-wire FXS: ______ unit(s)

(4) 2-wire FXO: ______ unit(s)

(5) Ethernet: ______ unit(s)

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Remarks:

(1) How many sites/airports in the state in total? ______________________________

(2) How many sites/airports will be connected to CRV? ____________

(3) Which neighbor countries (sites/airports) will be connected to?

____

____

(4) Are you using VOIP for support voice traffic? Yes/No

Please fill in your existing setup or requirements which you would like to share with us.

____

____

Or you may share your existing network diagram or planned new diagram with us.

For example: Any Multicast application? If yes, please specify your required bandwidth.

End

OPTIONAL

Q1) What types of data, formats and protocols do you intend to utilize the CRV Data Bandwidth for? Please specify in the table below:

Data Type	Format	Protocol

Q2) Do you have an existing SWIM capability or a future implementation plan for SWIM. If so, please describe below:

____

____

____

____

____

Q3) If the CRV were to provide value-added SWIM Services. What services would be of interest to you (please select one or more):

a) Data transformation of legacy formats (e.g. ATS messages) into SWIM format (e.g. AIXM, IWXXM, FIXM)
b) Data validation and data quality
c) Data fusion and aggregation (e.g. merging data for long range flow)
d) Enterprise Messaging Services (e.g. routing messages between stakeholders)
e) Other (Please specify)

____

____

Q4) Would the organization and its team be interested in attending a free webinar showcasing the benefits and uses of SWIM?

____

____

____

____

UTC	IRQ-TUR	TUR-IRQ	Total	KWT-IRQ	IRQ-KWT	Total	KSA-IRQ	IRQ-KSA	Total	JRD-IRQ	IRQ-JRD	Total	IRQ-IRN	IRN-IRQ	Total	SYR-IRQ	IRQ-SYR	Total
0000-0100	31	7	38	32	4	36	0	0	0	1	0	1	0	0	0	0	0	0
0100-0200	36	8	44	16	8	24	0	0	0	0	0	0	0	0	0	0	0	0
0200-0300	15	2	17	12	12	24	0	0	0	3	0	3	1	1	2	1	0	1
0300-0400	11	5	16	3	2	5	1	0	1	0	1	1	0	2	2	1	1	2
0400-0500	5	4	9	7	1	8	0	0	0	1	0	1	0	5	5	0	1	1
0500-0600	6	2	8	25	2	27	0	1	1	0	4	4	3	1	4	0	0	0
0600-0700	26	1	27	43	2	45	0	0	0	1	0	1	4	1	5	1	0	1
0700-0800	49	2	51	36	4	40	0	0	0	1	3	4	3	3	6	1	1	2
0800-0900	31	2	33	17	6	23	0	1	1	0	1	1	1	2	3	0	0	0
0900-1000	20	2	22	8	4	12	0	2	2	0	0	0	2	0	2	0	1	1
1000-1100	8	6	14	8	3	11	0	0	0	2	0	2	1	0	1	0	1	1
1100-1200	8	17	25	21	5	26	0	0	0	0	0	0	1	1	2	0	1	1
1200-1300	15	18	33	17	19	36	0	0	0	1	0	1	0	1	1	0	3	3
1300-1400	21	25	46	16	18	34	1	0	1	0	0	0	1	1	2	0	1	1
1400-1500	15	12	27	8	27	35	0	0	0	2	1	3	1	1	2	2	1	3
1500-1600	12	5	17	6	14	20	0	1	1	1	1	2	1	0	1	0	0	0
1600-1700	7	14	21	5	3	8	0	0	0	2	1	3	1	1	2	0	3	3
1700-1800	5	22	27	4	13	17	0	0	0	1	1	2	0	3	3	1	1	2
1800-1900	1	17	18	1	23	24	1	0	1	0	0	0	3	2	5	0	1	1
1900-2000	0	11	11	3	18	21	0	1	1	0	1	1	1	1	2	0	1	1
2000-2100	3	11	14	0	13	13	0	0	0	0	0	0	2	2	4	0	0	0
2100-2200	1	9	10	0	9	9	0	0	0	0	0	0	2	0	2	0	1	1
2200-2300	0	7	7	9	5	14	0	1	1	0	0	0	1	0	1	1	0	1
2300-2400	9	6	15	34	9	43	1	0	1	1	0	1	0	0	0	0	0	0
	335	215	550	331	224	555	4	7	11	17	14	31	29	28	57	8	18	26

UTC	IRN-IRQ	IRQ-IRN	Total	IRN-TUR	TUR-IRN	Total	IRN-AZR	AZR-IRN	Total	IRN-ARM	ARM-IRN	Total	IRN-TRM	TRM-IRN	Total	IRN-AFG	AFG-IRN	Total
0000-0100	0	0	0	9	22	31	4	7	11	1	3	4	3	7	10	2	0	2
0100-0200	0	0	0	10	10	20	2	8	10	0	2	2	0	4	4	3	0	3
0200-0300	1	1	2	5	3	8	1	1	2	0	0	0	1	2	3	6	0	6
0300-0400	0	2	2	4	1	5	0	1	1	1	0	1	0	3	3	4	1	5
0400-0500	0	5	5	6	0	6	3	1	4	0	1	1	1	2	3	0	0	0
0500-0600	3	1	4	2	2	4	2	3	5	4	1	5	0	4	4	1	0	1
0600-0700	4	1	5	13	2	15	6	1	7	0	0	0	3	3	6	1	1	2
0700-0800	3	3	6	3	1	4	8	2	10	3	1	4	3	3	6	1	0	1
0800-0900	1	2	3	10	3	13	3	3	6	2	3	5	1	2	3	0	1	1
0900-1000	2	0	2	3	2	5	0	3	3	1	2	3	1	0	1	0	0	0
1000-1100	1	0	1	2	2	4	1	3	4	1	3	4	3	2	5	2	1	3
1100-1200	1	1	2	0	3	3	3	2	5	1	1	2	6	1	7	0	3	3
1200-1300	0	1	1	6	2	8	3	1	4	1	0	1	6	1	7	1	3	4
1300-1400	1	1	2	5	5	10	3	1	4	0	2	2	3	2	5	1	0	1
1400-1500	1	1	2	1	6	7	6	3	9	1	1	2	0	1	1	1	1	2
1500-1600	1	0	1	3	15	18	3	2	5	0	0	0	1	2	3	1	2	3
1600-1700	1	1	2	9	6	15	3	4	7	2	0	2	2	1	3	3	1	4
1700-1800	0	3	3	1	9	10	3	5	8	1	1	2	1	4	5	1	1	2
1800-1900	3	2	5	0	8	8	2	2	4	1	0	1	2	3	5	2	0	2
1900-2000	1	1	2	4	4	8	2	1	3	1	4	5	5	0	5	0	0	0
2000-2100	2	2	4	2	4	6	3	2	5	1	2	3	3	1	4	3	0	3
2100-2200	2	0	2	0	10	10	1	1	2	1	0	1	3	0	3	0	0	0
2200-2300	1	0	1	2	8	10	1	1	2	1	0	1	2	0	2	0	0	0
2300-2400	0	0	0	6	16	22	2	5	7	1	1	2	4	2	6	0	0	0
	29	28	57	106	144	250	65	63	128	25	28	53	54	50	104	33	15	48

UTC	IRN-PAK	PAK-IRN	Total	IRN-OMN	OMN-IRN	Total	IRN-UAE	UAE-IRN	Total	IRN-QTR	QTR-IRN	Total	IRN-BAH	BAH-IRN	Total	IRN-KWT	KWT-IRN	Total
0000-0100	15	10	25	4	7	11	4	13	17	0	6	6	1	9	10	4	0	4
0100-0200	13	11	24	5	6	11	18	4	22	3	1	4	3	1	4	3	1	4
0200-0300	11	5	16	1	3	4	22	9	31	4	1	5	4	1	5	1	0	1
0300-0400	7	6	13	2	2	4	14	5	19	0	0	0	0	0	0	2	0	2
0400-0500	2	11	13	2	0	2	14	19	33	0	2	2	0	2	2	2	1	3
0500-0600	6	7	13	4	4	8	6	12	18	3	5	8	3	5	8	1	3	4
0600-0700	6	7	13	3	1	4	6	14	20	0	4	4	0	5	5	3	1	4
0700-0800	8	12	20	7	7	14	3	8	11	0	1	1	0	1	1	0	1	1
0800-0900	7	5	12	0	3	3	5	8	13	3	0	3	3	0	3	1	1	2
0900-1000	4	4	8	1	1	2	4	15	19	1	2	3	2	3	5	1	0	1
1000-1100	6	7	13	2	3	5	5	8	13	1	1	2	1	1	2	5	1	6
1100-1200	1	7	8	0	2	2	4	9	13	2	2	4	3	3	6	0	0	0
1200-1300	9	3	12	0	4	4	3	5	8	2	2	4	2	2	4	1	1	2
1300-1400	0	3	3	1	1	2	8	6	14	2	4	6	2	4	6	1	0	1
1400-1500	4	3	7	1	2	3	13	7	20	1	2	3	1	3	4	0	3	3
1500-1600	4	3	7	0	1	1	14	7	21	0	2	2	0	2	2	0	1	1
1600-1700	6	2	8	0	4	4	14	4	18	0	3	3	0	4	4	0	1	1
1700-1800	7	6	13	3	3	6	7	7	14	2	5	7	2	6	8	0	1	1
1800-1900	12	4	16	0	6	6	10	15	25	2	1	3	2	1	3	0	3	3
1900-2000	15	4	19	0	15	15	13	9	22	3	3	6	5	3	8	0	0	0
2000-2100	8	6	14	1	3	4	3	7	10	3	1	4	3	1	4	0	2	2
2100-2200	13	7	20	0	7	7	3	5	8	3	0	3	3	1	4	0	1	1
2200-2300	6	8	14	0	6	6	6	6	12	0	1	1	0	1	1	0	1	1
2300-2400	13	6	19	1	8	9	5	18	23	0	9	9	0	9	9	0	1	1
	183	147	330	38	99	137	204	220	424	35	58	93	40	68	108	25	24	49

MID Region AIDC/OLDI Applicability Area

(Priority 1 and 2 for Implementation)

<u>MID Region AIDC/OLDI Applicability Area (Priority 1 and 2 for Implementation)</u>

ACC	Adjacent ACCs						
Amman	Cairo (1)	Baghdad (2)	Damascus (2)	Jeddah (1)	Tel Aviv (2)		
Baghdad	Amman (2)	Ankara (1)	Damascus (2)	Jeddah (2)	Tehran (2)	Kuwait (1)	
Bahrain	Doha (1)	Emirates (1)	Jeddah (1)	Kuwait (1)	Riyadh (1)	Tehran (2) AFTN MSG	Dammam (2)
Beirut	Damascus (2)		Nicosia (1)				
Cairo	Amman (1)	Athena (2)	Jeddah (1)	Khartoum (1)	Nicosia (1)	Tel Aviv (2)	Tripoli (2)
Damascus	Amman (2)	Ankara (2)	Baghdad (2)	Beirut (2)	Nicosia (2)		
Doha*	Bahrain (1)	Emirates (1)	Jeddah (2)	Riyadh (2)			
Emiratis	Bahrain (1)	Doha (1)	Jeddah (1)	Muscat (1)	Tehran (2) AFTN MSG		
Jeddah	Amman (1)	Asmara (2)	Baghdad (2)	Bahrain (1) Riyadh (1)	Cairo (1)	Doha (2)	Emirates (1)
	Khartoum (1)	Kuwait (2)	Muscat (1)			Sana'a (2)	
Riyadh	Bahrain (1)	Doha (2)	Kuwait (2)	Jeddah (1)			
Khartoum	Addis (1)	Asmara (2)	Brazzaville (2)	Cairo (1)	Entebbe (2)	Jeddah (1)	Juba (1)
	Kinshasa (2)	N'Djamena (2)	Nairobi (2)	Tripoli (2)			
Kuwait	Baghdad (1)	Bahrain (1)	Jeddah (2)	Tehran (2)			
Muscat	Emirates (1)	Jeddah (1)	Karachi (2)	Mumbai (1)	Sana'a (2)	Tehran (1)	
Sana'a	Addis Ababa (2)	Asmara (2)	Jeddah (2)	Mogadishu (2)	Mumbai (2)	Muscat (2)	
Tehran	Ankara (1)	Ashgabat (2)	Baghdad (2)	Bahrain (1)	Baku (2)	Emirates (2) AFTN MSG	Kabul (2)
	Karachi (1)	Kuwait (2)	Muscat (1)	Yerevan (2)			
Tripoli	Algiers (2)	Cairo (2)	Khartoum (2)	Malta (2)	N'Djamena (2)	Niamey (2)	Tunis (2)

(1) = Priority 1 for implementation based on the number of traffic movements and/or operational needs (green color means already implemented)

(2) = Priority 2 for implementation based on the number of traffic movements or if other solution is in place such as exchange of information via AFTN

RASG-MID SAFETY ADVISORY – 14

(RSA-14)

~~April 2019~~October 2024

MID-Region

GUIDANCE MATERIAL REALTED TO

GNSS ~~VULNERABILTIES~~VULNERABILITIES

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Disclaimer

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TABLE OF CONTENTS

ACRONYMS

ABAS	AIRCRAFT BASED AUGMENTATION SYSTEM
ADS-B	AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST
AHRS	ATTITUDE AND HEADING REFERENCE SYSTEMS
ANS	AIR NAVIGATION SERVICES
ATC	AIR TRAFFIC CONTROLLER
DME	DISTANCE MEASURING EQUIPMENT
EGPWS	ENHANCED GROUND PROXIMITY WARNING SYSTEM
FIR	FLIGHT INFORMATION REGION
FMS	FLIGHT MANAGEMENT SYSTEM
GBAS	GROUND BASED AUGMENTATION SYSTEM
GLONASS	GLOBAL NAVIGATION SATELLITE SYSTEM
GNSS	GLOBAL NAVOGATION SATELLITE SYSTEM
GPS	GLOBAL POSITION SYSTEM
HAL	HORIZONTAL ALERT LIMIT
ILS	INSTRUMENT LANDING SYSTEM
IRS	INERTIAL REFERENCE SYSTEM
ITU	INTERATIONAL TELECOMMUNICATION UNION
MIDANPIRG	MID AIR NAVIGATION PLANNING AND IMPLEMENTATION GROUP
NAV	NAVIGATION
NOTAM	NOTICE TO AIRMEN
PBN	PERFORMANCE BASED NAVIGATION
POS	POSITION
RAIM	RECEIVER AUTONOMOUS INTEGRITY MONITORING
RF	RADIO FREQUENCY
RNAV	AREA NAVIGATION
RNP	REQUIRED NAVIGATION PERFORMANCE
SBAS	SPACE BASED AUGMENTATION SYSTEM
TAWS	TERRAIN AVOIDANCE WARNING SYSTEM
TSO	TECHNICAL STANDARD ORDER
VHF	VERY HIGH FREQYENCY
VNAV	VERTICAL NAVIGATION
VOR	VERY HIGH OMNI DIRECTIONAL RADIO RANGE
WAAS	WIDE AREA AUGMENTATION SYSTEM

GNSS VULNERABILITIES

1. INTRODUCTION

GNSS supports positioning, navigation and timing (PNT) applications. GNSS is the foundation of Performance Based Navigation (PBN), ~~a~~Automatic ~~dependent~~ Dependent ~~surveillance~~ Surveillance – ~~broadcast~~ Broadcast (ADS-B) and ~~automatic~~ Automatic ~~dependent~~ Dependent ~~surveillance~~ Surveillance – ~~contract~~ Contract (ADS-C). GNSS also provides a common time reference used to synchronize systems, avionics, communication networks and operations, and supports a wide range of non-aviation applications.

GNSS Vulnerability has been identified as a safety issue and one of the main challenges impeding the implementation of PBN in the MID Region. The sixteenth meeting of the MID Air Navigation planning and Implementation Regional Group (MIDANPIRG/16 Kuwait, 13-16 February 2017) recognized the impact of the GNSS signal interference and vulnerabilities and agreed that the subject should be addressed by the Regional Aviation Safety Group-Middle East (RASG-MID) in order to agree on measures to ensure effective reporting of GNSS interferences, which could be mandated by the States' regulatory authorities. The meeting invited the RASG-MID to consider the development of a RASG-MID Safety Advisory (RSA) related to GNSS vulnerabilities, highlighting the Standard Operating Procedures (SOP) for pilots, including the reporting procedures.

The RASG-MID/6 (Bahrain, 26 – 28 September 2017) agreed that IATA and ICAO MID Office should develop ~~a~~ RSA on GNSS vulnerabilities.

With the increasing dependence on GNSS, it is important that GNSS vulnerabilities be properly addressed. This Safety Advisory provides guidance on ~~set of~~ mitigation measures that States would deploy to minimize the GNSS vulnerabilities impact on safety and air operation. The RSA also includes the regional reporting and monitoring procedures of GNSS anomaly with the aim to analyze the threat and its impact on performance, and assess the effectiveness of the mitigation measures in place.

2. DESCRIPTION

Dependence on GNSS is increasing, as GNSS is used for an ever-expanding range of safety, security, business and policy critical applications. GNSS functionality is being embedded into many parts of critical infrastructures. Aviation is now dependent on uninterrupted access to GNSS positioning, navigation and timing (PNT) services.

Aviation relies heavily on GNSS for area navigation and precision approach. Aircraft avionics such as the Flight Management Systems (FMS) require GNSS timing for a large number of onboard functions including Terrain Avoidance Warning System (TAWS) or Enhanced Ground Proximity Warning Systems (EGPWS). Onboard avionics are highly integrated ~~on~~into commercial aircraft and are very dependent on GNSS timing data. At the same time, GNSS vulnerabilities are being exposed and threats to denial of GNSS services are increasing.

There are several types of threat that can interfere with a GNSS receiver's ability to receive and process GNSS signals, giving rise to inaccurate readings, or no reading at all, such as radio frequency interference, space weather induced ionospheric interference, solar storm, jamming and spoofing. The disruption of GNSS, either performance degradation in terms of accuracy, availability and integrity or a complete shutdown of the system, has a big consequence in critical infrastructure. For example, local interference in an airport could degrade position accuracy or lead to a total loss of the GNSS based services, which could put safety of passengers in jeopardy.

There are two types of GNSS Interference Sources; Intentional and Unintentional sources, the latter is not considered a significant threat provided that States exercise proper control and protection over the electromagnetic spectrum for both existing and new frequency allocations. Solar Effect, Radio Frequency Interference and On-board systems are examples of Unintentional GNSS interference sources. However, the Intentional sources such as Jamming and spoofing are considered as serious threats to the continued safety of air transport.

GNSS Jamming occurs when broadcasting a strong signal that overrides or obscures the signal being jammed. The GNSS jamming might occur deliberately by a military activity or by Personal Privacy Devices (PPDs). GNSS jamming has caused several GNSS outages in the MID Region.

In some States, military authorities test the capabilities of their equipment and systems occasionally by transmitting jamming signals that deny GNSS service in a specific area. This activity should be coordinated with State spectrum offices, Civil Aviation Authorities and ANS providers. Military and other authorities operating jamming devices should coordinate with State/ANS providers to enable them to determine the airspace affected, advise aircraft operators and develop any required procedures.

Spoofing is another source of intentional ~~GNSS Interference~~interference, which is a deliberate interference that aims to mislead ~~GNSS~~ receivers into general false positioning solution.

Detailed information about the GNSS Implementation and Vulnerabilities can be found in MID DOC ~~010~~ 011 – The Guidance on GNSS implementation in the MID Region.

3. RISK ASSESSMENT

The risk assessment covers affected operations during en-routre, terminal, and approach phase of flights. In addition, the aircraft impact at table (1), which presents an overview of different potential impacts from GNSS interference, needs to be considered for risk assessment.

Understanding the different types of threat and how likely they are to occur is key to conducting an accurate risk assessment. Broadly, the threat types break down as follows:

Threat Source	Threat Type	Description	Impact on the User
Solar Storms	Unintentional	Electromagnetic interference from solar flares and other solar activity “drowns out” the satellite signals in space.	Loss of signal, or range errors affecting the accuracy of the location or timing information.
Jamming	Intentional	Locally-generated RF interference is used to “drown out” satellite signals.	Loss of signal (if the jammer is blocking out all satellite signals) or range errors affecting the accuracy of the location or timing information

Spoofing	Intentional	Fake ~~satellite~~ signals are broadcast to the device to fool it into believing it is somewhere else, or at a different point in time.	False location and time readings, with potentially severe impacts on automated and autonomous devices and devices that rely on precise GNSS timing.
RF Interference	Unintentional	Noise from nearby RF transmitters (inside or outside the device) obscures the satellite signals.	Loss of signal (if the transmitter is blocking out all satellite signals) or range errors affecting the accuracy of the location reading (if the receiver is at the edge of the transmitter's range).
Signal Reflection	Unintentional	Reflection due objects such as buildings	GNSS signals can reflect off relatively due to distant objects, such as buildings, which would cause gross errors in position accuracy if the receiver falsely locks onto the reflected signal instead of the direct signal
User Error	Unintentional	Users over-rely on the GNSS data they are presented with, ignoring evidence from other systems or what they can see.	Can lead to poor decision-making in a range of scenarios

Table 1: Threats types

Depending on the nature of the interference and the nature of the application, a user may be affected in several ways; the impact may range from a small nuisance to an economic, operational or a safety impact. The detailed risk assessment methodology is addressed at **Appendix B**.

4. MITIGATION STRATEGIES

To minimize the risks associated with GNSS vulnerabilities, several mitigation strategies can be deployed to reduce the likelihood and impact of the threat.

Operational / ATC mitigation procedures:

1. Provide familiarization for ATCo about the spoofing and jamming; including awareness of the possible impact,
2. If navigation performance degradation reported by pilot, ATCOs shall acknowledge and verify the aircraft position, if required, correlation with other ground NAVAIDS,
3. Monitor the traffic lateral adherence to the route centerline, and inform pilots in case they observed any significant deviation from the intended route,
4. Ensure adequate separation implemented and maintained with other traffic,
5. If deviation is significant, inform the flight crew to verify aircraft position,
6. Offer alternate navigation assistance (RADAR Vector, conventional navigation),
7. Inform adjacent ACCs/ATS Units, and relevant ATS supervisor to coordinate with relevant internal and external authorities,
8. Promulgate the information, advise other pilots, announce on ATS/ATIS Frequency, and if extended period consider issuing NOTAM,

9. Inform pilots of nearby ground NAVAIDs,
10. Coordinate with military authority to eliminate the possibility of interception and miss-identification of stray aircraft,
11. Coordinate with adjacent ACCs to apply longer separation and inform them regarding possibility of deviation, miss identification and strayed aircraft at common border;
12. Fill in incident report and provide brief to operations supervisor,
13. Sharing the information with Airspace users and operators.

4.1 REDUCING THE LIKELIHOOD OF GNSS INTERFERENCES

The likelihood of interference depends on many factors such as population density and the motivation of individuals or groups in an area to disrupt aviation and non-aviation services. To reduce the likelihood of GNSS interference, the following measures may be applied:

a) Effective spectrum management; this comprises creating and enforcing regulations/laws that control the use of spectrum and carefully assessing applications for new spectrum allocations.

b) The introduction of GNSS signals on new frequencies will ensure that unintentional interference does not cause the complete loss of GNSS service (outage) although enhanced services depending upon the availability of both frequencies might be degraded by such interference.

c) State should forbid the use of jamming and spoofing devices and regulate their importation, exportation, manufacture, sale, purchase, ownership and use; they should develop and enforce a strong regulatory framework governing the use of intentional radiators, including GNSS repeaters, pseudolites, spoofers and jammers. The enforcement measures include:

- detection and removal of jammers / interference sources; and
- direct or indirect detection (e.g. use of dedicated interference detection equipment).

d) Education activities to raise awareness about legislation and to point out that 'personal' jammers can have unintended consequences.

e) Multi-constellation GNSS would allow the receiver to track more satellites, reducing the likelihood of service disruption.

4.2 REDUCING THE IMPACT OF THE GNSS VULNERABILITIES

The GNSS signal disruption cannot be ruled out completely and States/ANSPs must be prepared to deal with loss of GNSS signals, and that States conduct risk assessment and implement mitigation strategies. The risk and impacts from these threats can be managed by evaluating the growing threat of GNSS interference, jamming and spoofing.

The disruption of GNSS signals will require the application of realistic and effective mitigation strategies to both ensure the safety and regularity of air services and discourage those who would consider disrupting aircraft operations. There are three principal methods, which can be applied in combination:

a) taking advantage of on-board equipment, such as Inertial Reference System (IRS);

IRS provides a short-term area navigation capability after the loss of GNSS updating. Many air transport aircraft are equipped with IRS and these systems are becoming more affordable and accessible to operators with smaller, regional aircraft. Most of these systems are also updated by DME.

b) Development of contingency procedures and processes to enable operations in a fallback mode in case of loss of GNSS (aircrew and/or ATC), using alternate NAVAIDS (ground-based).

Procedural (aircrew or ATC) methods can provide effective mitigation in combination with those described above, taking due consideration of:

- ~~the airspace classification;~~
- ~~the available ATC services (radar or procedural);~~
- the avionics onboard
- aircrew and air traffic controller workload implications (consideration to ATC damand/capacity);
- the impact that the loss of GNSS will have on other functions, such as ADS-B based surveillance; and
- the potential for providing the necessary increase in separation between aircraft in the affected airspace.

c) taking advantage of conventional navigation aids and radar, conventional aids can provide alternative sources of guidance.

The regulator should conduct safety oversight of the service provider's GNSS based Services and validate the safety aspects of mitigation strategies, considering the impact on ATM operations. Details on Risk assessment process including some examples are at **Appendix B.**

The data analysis of the reported GNSS vulnerabilities for the period January 2015to June 2018 showed that the impact of the GNSS interference on Aircraft Operations in the MID Region were as follows:

1. Loss of GPS1 (fault)/ Loss of GPS2 (fault)
2. Observation of "Map shift" on Navigation display
3. Switching to an alternative navigation mode (IRS displayed, VOR/DME)
4. Degraded PBN Capability (NAV Unable RNP)
5. GPS POS Disagree
6. EGPWS warning
7. ADS-B Traffic triggered

5. MONITORING

The success of many of countermeasures is dependent on having a detailed understanding of the threats. In order to establish this understanding and to maintain an up-to-date knowledge of the threats - in terms of both types and number of threats – it is necessary to States to monitor the threat environment and the impact on performance.

Monitoring and reporting is required to inform stakeholders of the threats that exist. This would help directly with enforcement (detecting and removing sources of interference) as well as monitoring the response to changes in legislation or education activities.

Receiver autonomous integrity Monitoring (RAIM) provides integrity monitoring by detecting the failure of a GNSS satellite. It is a software function incorporated into GNSS receivers.

In the event of GNSS performance degrading to the point where an alert is raised, or other cause to doubt the integrity of GNSS information exists, the pilot in command must discontinue its use and carry out appropriate navigation aid failure procedures. Should RAIM detect an out-of-tolerance situation, an immediate warning will be provided. When data integrity or RAIM is lost, aircraft tracking must be closely monitored against other available navigation systems.

States may consider the deployment of GNSS threat monitoring system, which allows monitoring of local GNSS interference environment; signal recording and monitoring for situational awareness of any drop in signal quality or signal outage and ground validation of GNSS-based flight procedures. The detection equipment may include localization utilities.

With reference to ICAO Doc 9849:

Given the variety of avionics designs, one service status model cannot meet all operators' requirements. A conservative model would produce false alarms for some aircraft. A less conservative model would lead to missed detection of a service outage for some and false alarms for others. Regardless, only the aircrew, not ATC, is in a position to determine whether, for example, it is possible to continue an ABAS-based instrument approach. In contrast, ATC has access to ILS monitor data and can deny an ILS approach clearance based

on a failure indication. The real time monitor concept is neither practical nor required for GNSS ABAS operations. It may be practical for SBAS and GBAS, but implementation would depend on a valid operational requirement.
Aircraft operators with access to prediction software specific to their particular ABAS/RAIM avionics will find it advantageous to employ that software rather than use the general notification service. In the case of SBAS and GBAS, operators will rely on service status notifications.

6. REPORTING

ANSP must be prepared to act when anomaly reports from aircraft or ground-based units suggest signal interference. If an analysis concludes that interference is present, ANS providers must identify the area affected and issue an appropriate NOTAM.

From the perspective of the aircrew, a GNSS anomaly occurs when navigation guidance is lost or when it is not possible to trust GNSS guidance. In this respect, an anomaly is similar to a service outage. An anomaly may be associated with a receiver or antenna malfunction, insufficient satellites in view, poor satellite geometry or masking of signals by the airframe. The perceived anomaly may also be due to signal interference, but such a determination requires detailed analysis based on all available information.

In case of GNSS anomaly detected by aircrew, **Pilot** action(s) should include:

a) reporting the situation to ATC as soon as practicable and requesting special handling as required;
b) filing a GNSS Interference Report using the Template at **Appendix A**, and forwarding information to the IATA MENA (sfomena@iata.org) and ICAO MID Office (icaomid@icao.int) as soon as possible, including a description of the event (e.g. how the avionics failed/reacted during the anomaly).

Air Traffic Controller action(s) should include:

a) recording minimum information, including aircraft call sign, type, location, altitude and date/time of the occurrence;
b) cross check with other aircraft in the vicinity;
~~c)~~ broadcasting the anomaly report to other aircraft and adjacent ATS units, as necessary;
~~d) notify the AIS Office in case NOTAM issuance is required; and enable the fallback mode and implement related procedure and process (contingency measures).~~

ANSP action(s) should include:

a) ensuring the issuance of appropriate advisories and NOTAM, as necessary;
b) attempting to locate/determine the source of the interference, if possible;
c) notifying the agency responsible for frequency management (the Telecommunication Regulatory Authority);
d) locate and eliminate source in cooperation with local regulatory & enforcement Authorities;
e) tracking and reporting all activities relating to the anomaly until it is resolved; and
f) review the effectiveness of the mitigation measures for improvement.

ICAO MID Office action(s) should include:

a) collect anomaly related information and determine the course of action required to resolve reported anomalies;
b) follow-up with State having interference incident to ensure implementation of required corrective actions;
c) coordinate with concerned adjacent ICAO Regional Office(s) to follow-up with States under their accreditation areas, when needed; and
d) Communicate with ITU Arab Office and Arab Spectrum Management Group to resolve frequent interference incidents, when needed.

7. References:

- Annex 10 Aeronautical Telecommunications, Volume I — Radio Navigation Aids
- Annex 11 Air Traffic Services
- ICAO Doc 4444 PANS-ATM, ~~ICAO doc 4444~~
- ICAO Doc 9613 PBN Manual
- ICAO Electronic Bulletin 2011/56, Interference to Global Navigation Satellite System (GNSS) Signals.
- GNSS Manual, ICAO Doc 9849
- Standardization of GNSS Threat reporting and Receiver testing through International Knowledge Exchange, Experimentation and Exploitation, STRIKE3 EUROPEAN Initiative, Paper 74
- The report of Vulnerabilities Assessment of the Transportation Infrastructure relying on the Global Position System, US Department of Transportation.
- Operational Impacts of Intentional GPS Interference. (A Report of the Tactical Operations Committee in Response to Tasking from the Federal Aviation Administration. March 2018.
- CANSO Cyber security and Risk Assessment guide.
- ICAO GNSS RFI Mitigation Plan and associated EUROCONTROL Efforts, 8 Nov 2016
- European Global Satellite Agency System, GNSS Market Report issue 4, March 2015
- MID Doc 007 (MID Region PBN Implementation Plan
- MID Doc ~~010~~ 011 (The Guidance on GNSS implementation in the MID Region)

Appendix A

1. **GNSS interference reporting form to be used by pilots**
   ** Mandatory field*

Originator of this Report:	
Organisation:	
Department:	
Street / No.:	
Zip-Code / Town:	
Name / Surname:	
Phone No.:	
E-Mail:	
Date and time of report	
Description of Interference	
*Affected GNSS Element	[ ] GPS [ ] GLONASS [ ] other constellation [ ] EGNOS [ ] WAAS [ ] other SBAS [ ] GBAS (VHF data-link for GBAS)
Aircraft Type and Registration:	
Flight Number:	
*Airway/route flown:	

Coordinates of the first point of occurrence / Time (UTC):	UTC: Lat: Long:
Coordinates of the last point of occurrence / Time (UTC):	UTC: Lat: Long:
*Flight level or Altitude at which it was detected and phase of flight:	
Affected ground station (if applicable)	Name/Indicator; [e.g. GBAS]
*Degradation of GNSS performance:	[ ] Large position errors (details): [ ] Loss of integrity (RAIM warning/alert): [ ] Complete outage (Both GPSs), [ ] Loss of GPS1 or Loss of GPS 2 [ ] Loss of satellites in view/details: [ ] Lateral indicated performance level changed from:___to ___ [ ]Vertical indicated performance level changed from: __ to __ [ ] Indicated Dilution of Precision changed from __ to__ [ ] information on PRN of affected satellites (if applicable) [ ] Low Signal-to-Noise (Density) ratio [ ] Others
*Problem duration:	[ ] continuous for 20 minutes [ ] intermittent

Note: Only applicable fields need to be filled!

Appendix B
Risk Assessment

Threats and vulnerabilities
A threat assessment should be performed to determine the best approaches to securing a GNSS against a particular threat. Penetration testing exercises should be conducted to assess threat profiles and help develop effective countermeasures.

Table (B1) presents an overview of different potential impacts from GNSS interference. This is a snapshot of impacts based on input from two manufacturers and not intended to be a comprehensive list of all impacts:

Effect	**Affected Operation**	**Impact**
Loss of GNSS-based navigation	Enroute/ Terminal/ Approach	Aircraft with Inertial Reference Unit (IRU) or Distance Measuring Equipment (DME)/DME may have degraded RNP/RNAV. Aircraft may deviate from the nominal track May increase workload on aircrew and ATC May result in missed approach or diverting to other runway in case the aerodrome operating minima cannot be met through conventional precision or visual approaches. Conventional ATS routes, SIDs and STARs would be used.
Larger than normal GNSS position errors prior to loss of GNSS	Enroute/ Terminal/ Approach	Interference could cause the GNSS position to be pulled off but not exceed the HAL (2NM , 1NM, 0.3NM for enroute, terminal and approach phases, respectively).
Loss of EGPWS/ TAWS	Enroute/ Terminal/ Approach	Reduced situational awareness and safety for equipped aircraft. Terrain Awareness and Warning System (TAWS) is required equipment for turbine-powered airplanes > 6 passengers. Loss of GPS results in loss of terrain/obstacle alerting. Position errors as GPS degrades can result in false or missed alerts.
Loss of GPS aiding to AHRS	Flight Control	Can result in degradation of AHRS pitch and roll accuracy with potential downstream effects such as was experienced by a Phenom 300 flight.

Loss of GNSS to PFD/MFD	All flight phases	Can result in: -Loss of synthetic vision display and flight path marker on PFD -Loss of airplane icon on lateral and vertical electronic map displays, georeferenced charts, and airport surface maps without DME-DME or IRU -Loss of airspace alerting and nearest waypoint information without DME-DME or IRU Overall loss of situational awareness to flight crew and increased workload.
No GNSS position for ELT	Search and Rescue	Loss of GNSS signal could result in larger search areas for the Emergency Locator Transmitters (ELTs)

Table B1: Potential Impact from GNSS

Consequence/Impact of risk occurring

Category	Effect on Aircrew and Passengers	Overall ATM System effect
Catastrophic 1	Multiple fatalities due to collision with other aircraft, obstacles or terrain	Sustained inability to provide any service.
Major 2	Large reduction in safety margin; serious or fatal injury to small number; serious physical distress to air crew.	Inability to provide any degree of service (including contingency measures) within one or more airspace sectors for a significant time.
Moderate 3	Significant reduction in safety margin.	The ability to provide a service is severely compromised within one or more airspace sectors without warning for a significant time.
Minor 4	Slight reduction in safety margin.	The ability to provide a service is impaired within one or more airspace sectors without warning for a significant time
Negligible 5	Potential for some inconvenience.	No effect on the ability to provide a service in the short term, but the situation needs to be monitored and reviewed for the need to apply some form of contingency measures if the condition prevails.

Table B2: Impact of Risk Occurring

Likelihood of risk occurring

The definitions in the table (B3) were adopted for estimating the likelihood of an identified risk occurring, for this purpose, five situations are considered:

Event is expected to occur	
1	More frequently than hourly
2	Between hourly and daily
3	Between daily and yearly
4	Between yearly and 5 yearly
5	Between 5 and 50 years
6	Less frequently than once every 50 years

Table B3: Likelihood of risk occurring

Assessment of the level of risk and risk tolerance

All identified risks were reviewed and provided for each an overall risk ranking which is a combination of the two characteristics of consequence and likelihood. For example, a risk with a major consequence but a "5" likelihood would be described as having an "A" or "unacceptable" risk rating. The conversion of the combination of consequence and likelihood into a risk rating has been achieved by use of the following matrix.

Likelihood Criteria		**Consequence Criteria**				
Event expected to occur:		**Catastrophic 1**	**Major 2**	**Moderate 3**	**Minor 4**	**Insignificant 5**
1	**More frequently than hourly**	**A**	**A**	**A**	**A**	**C**
2	**Between hourly and daily**	**A**	**A**	**A**	**B**	**D**
3	**Between daily and yearly**	**A**	**A**	**B**	**C**	**D**
4	**Between yearly and 5 yearly**	**A**	**B**	**C**	**C**	**D**
5	**Between 5 and 50 years**	**A**	**B**	**C**	**D**	**D**
6	**Less frequently than once every 50 years**	**B**	**C**	**D**	**D**	**D**

Table B4: Risk Assessment Table

The previous matrix provides a guide to determine which risks are the highest priorities from the perspective of the timeliness of the corrective action required. The following table outlines the position in more definitive terms.

Safety tolerability risk matrix

Risk Index Range	Description	Recommended Action
A	Unacceptable	Stop or cut back operation promptly if necessary. Perform priority/immediate risk mitigation to ensure that additional or enhanced preventive controls are put in place to bring down the risk index to the moderate or low range
B	High Risk	Urgent action. Perform priority/immediate risk mitigation to ensure that additional or enhanced preventive controls are put in place to bring down the risk index to the moderate or low range
C	Moderate Risk	Countermeasures actions to mitigate these risks should be implemented.
D	Low Risk	Acceptable as is. No further risk mitigation required

Table B5: Risk Tolerability Matrix

Sample risk assessment

The risk assessment table (B6) could be used to identify and capture the threats, select the risk rating based on the risk matrix above considering the existing controls. In addition, recommended actions could be selected to minimize the risk.

L = Likelihood
C = Consequence
R = Risk

Threat	Initial Risk			Existing controls	Accept/Reduce	Recommended controls	Residual Risk		
	L	C	R				L	C	R

Table B6: Sample Risk Assessment tables

The table (B7) below is an example of risk assessment for approach phase of flight, the detailed Risk assessment process is at Appendix B

L = Likelihood
C = Consequence
R = Risk

Threat	Initial Risk			Existing controls	Accept/ Reduce	Recommended controls	Residual Risk		
	L	C	R				L	C	R
Between daily and yearly	**3**	**2**	A	-Error message notification by avionic	Reduce	1)using of on-board equipment (IRS); 2)Interference detector by ANSPs 3) executing miss-approach	3	4	C

Table B7: Example Risk Assessment for Approach phase of flight

Another example risk assessment for en-route phase of flight at table (B8)

L = Likelihood
C = Consequence
R = Risk

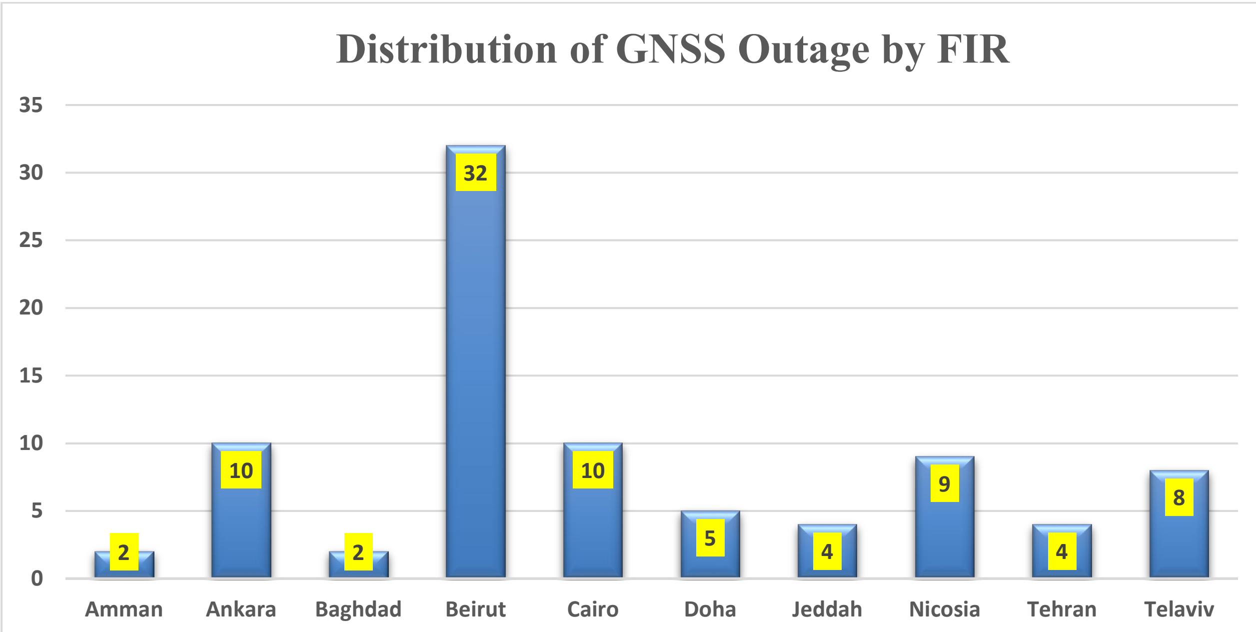
Threat	Initial Risk			Existing controls	Accept/Reduce	Recommended controls	Residual Risk		
	L	C	R				L	C	R
Between 5 and 50 years (short time GNSS Outage)	5	5	D	-Error message notification by avionic -Regulations/ law to protect the GNSS signal	Accept	-			

Table B8: Example risk assessment for enroute phase of flight

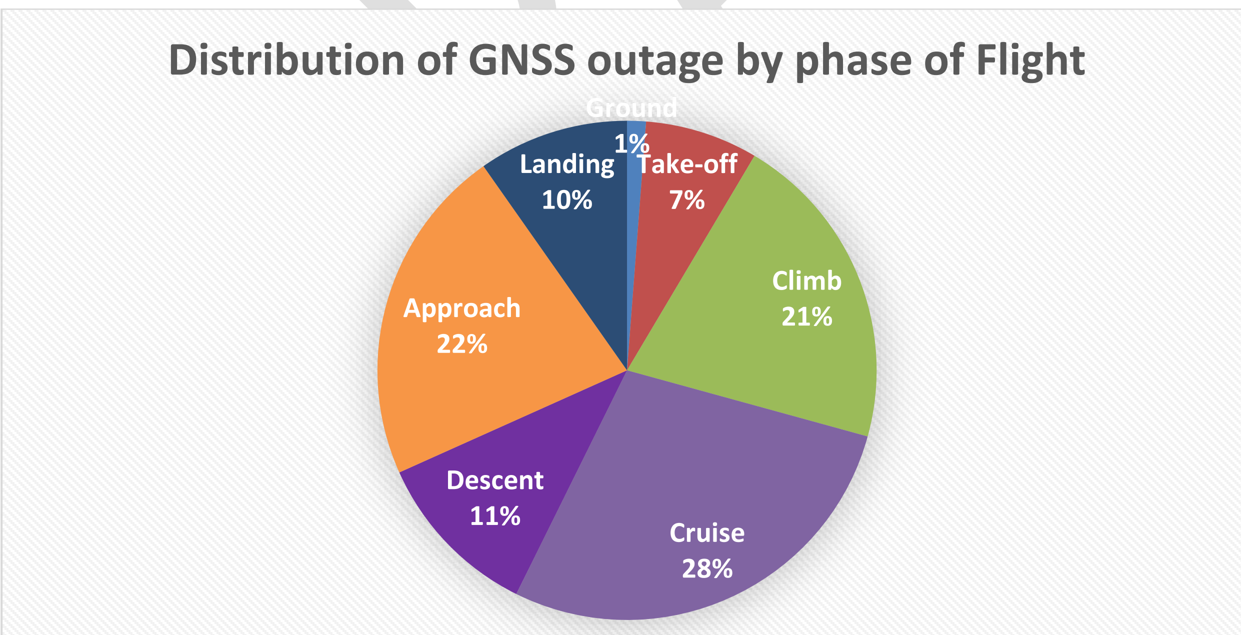
Appendix C

GNSS Anomaly for the Period January 2015- June2018

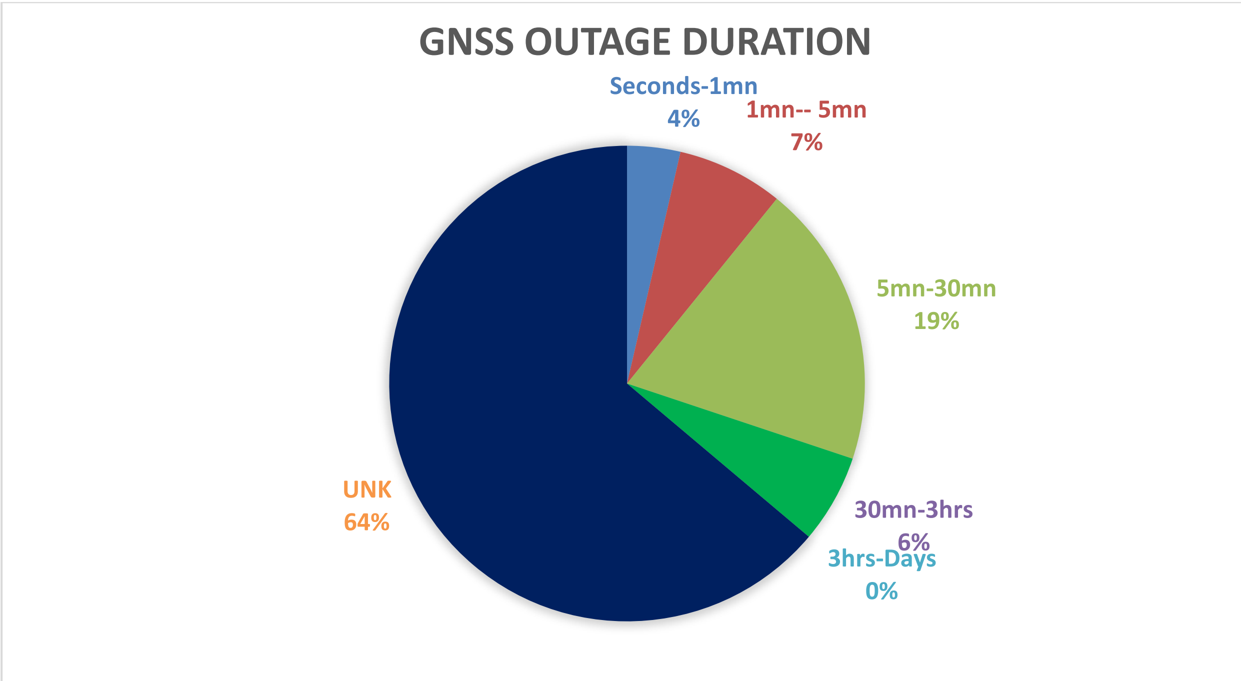
Brief data analysis of the incidents reported during Brief data analysis of the incidents reported by Air Operator is as follows:



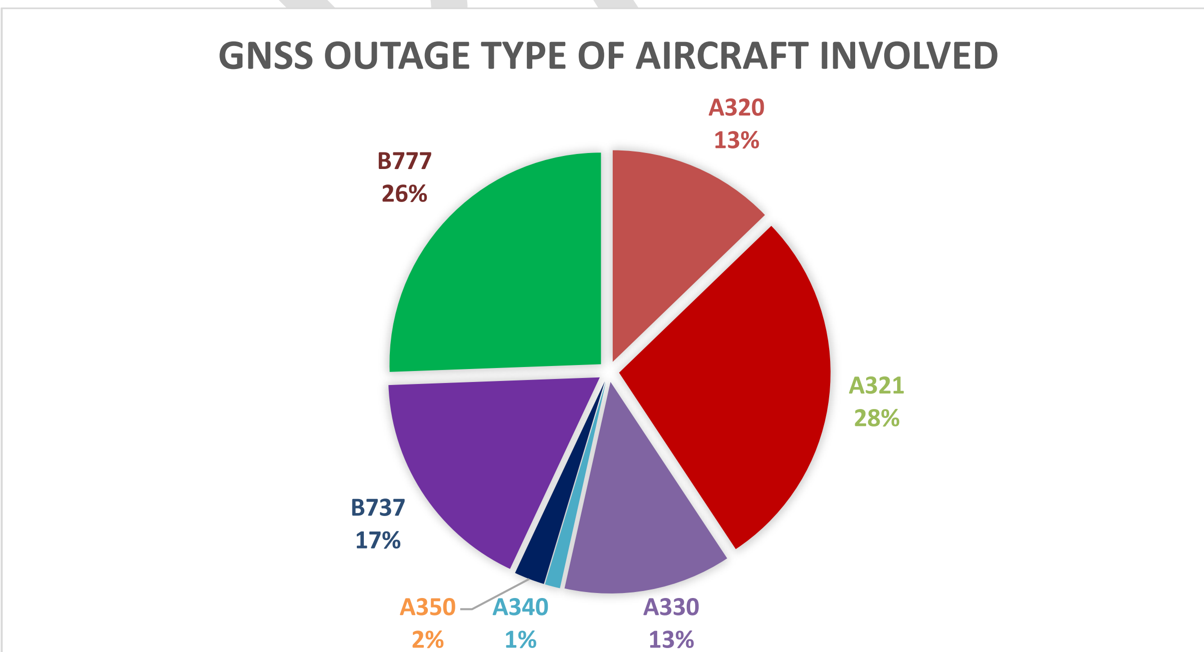
The data revealed that the most significant Flight Information Regions (FIRs) affected Beirut, followed by Cairo, Ankara, and Nicosia.



The data shows that the highest GNSS Outage occurred during the phase of flights cruise, approach, climb, and descent.



The data shows the highest GNSS outage duration was between 5 minutes- 30 minutes. Regarding the Unknown (UNK) it could not be determined as the data was not provided.



The A321, B777, and B737 were most flown aircraft type in areas most affected.

Proposed MID Region Guidelines on
Agreement about the Shared Use of Radar Sensor Data

A. Foreword

A.1. This document is a direct response to the need for a specialized framework that addresses the complexities of air traffic management and radar data sharing across the diverse and rapidly evolving airspace of the Middle East.

A.2. The original version of this document has been drafted in English, ensuring clarity and consistency in communication across all nations within the Middle East region. It is intended as a foundational guideline to enhance cooperation and ensure the safe, efficient, and sovereign use of radar data among Middle Eastern countries and aviation authorities.

B. Scope

B.1. This document serves as a guideline for drafting agreements on the shared use of radar data among Air Traffic Services (ATS) Organizations within the Middle East. It is designed to facilitate the creation of bilateral and, where applicable, multilateral agreements for radar data sharing, incorporating the Middle Eastern aviation sector's unique operational requirements, geopolitical, and technical landscape.

B.2. The guidelines provided herein offer the versatility to either stand as a separate agreement or to be seamlessly incorporated into existing Communication, Navigation, and Surveillance (CNS) agreements. This adaptability ensures that stakeholders can effectively align with the evolving needs of air traffic management in the Middle East, facilitating enhanced cooperation without necessitating the overhaul of current frameworks. Whether augmenting current agreements or establishing new dedicated arrangements for radar data sharing, this document aims to provide a comprehensive foundation that respects and responds to the specific operational and regulatory contexts of the region.

C. Reference Documents

C.1. This document incorporates provisions from the documents and standards mentioned herein. By referencing these materials within the text, their provisions become an integral part of this document. In the event of any inconsistencies between the guidance provided in this document and the content of the referenced materials, the policies and regulations shall prevail. Notably, this document draws significantly from "**Guidelines For An Agreement For The Shared Use Of Radar Sensor Data SUR.ET1.ST05.3000-GUI-01-00**," which is the primary guideline document referenced.

D. Abbreviations and Acronyms

D.1. For these guidelines, the following are used:

Abbreviation	Full Form
ASTERIX	All Purpose Structured Eurocontrol Radar Information Exchange
ATC	Air Traffic Control
ATS	Air Traffic Services
CAA	Civil Aviation Authorities
NM	Nautical Mile(s)

E. Proposed Text for the Agreement

Note: *Modifications to the standard text of the agreement and its annex may be necessitated by variations in legal statutes, organizational structures, or technological advancements specific to the Middle East.*
Sections enclosed in brackets ([]) are placeholders meant to be filled with details pertinent to the specificities of the agreement, ensuring flexibility and relevance to the unique conditions of each arrangement.

This agreement ("**Agreement**") is entered in to on [insert date] between:

The [name of the State's responsible Organisation or the name of the (privatised) Air Traffic Control (ATC) Organisation] represented by [function/title of representative],

herein referred to as "the **Provider**,"

and

The [name of the State's responsible Organisation or the name of the (privatised) Air Traffic Control (ATC) Organisation] represented by [function/title of representative],

herein referred to as "the **User**";

(individually, referred to as "**Party**" and jointly as "**Parties**")
Note:*If there are multiple Providers or Users, the aforementioned designations should be replicated for each Provider or User. In scenarios where the Providers also serve as Users (for instance, when each entity supplies radar information to the other), the terms Provider and User may be replaced with the actual names of the Organisations.*

- Acknowledging the objectives of enhancing air traffic management through the strategic enhancement of radar surveillance capabilities, whether by the establishment of new installations or the mutual sharing of radar data;
- Aiming to enhance the continuity, precision, and reliability of radar tracking across multiple radar systems, to refine trajectory predictions and conflict detection, and to achieve the goal of establishing the required nautical mile separation standard across the airspace governed by the signatories of this agreement;

Note*: Additional motivations and justifications for this agreement may be included here.*

The Parties hereby agree as follows:

ARTICLE 1 - Objective of the Agreement

1. The primary objective of this Agreement is to enhance radar coverage and the availability of radar data within the Flight Information Regions (FIRs) under the User's jurisdiction.
2. To achieve this objective, the Provider agrees to supply radar data to the User.

ARTICLE 2 - Usage Restrictions

3. The User is authorised to utilise the provided radar data exclusively for maintaining the safety, efficiency, and uninterrupted operation of their Air Traffic Services or related support activities, as well as for technical demonstrations, evaluations, and testing pertinent to their operational duties, except as detailed otherwise in Annex A.
4. The User is prohibited from disclosing any information obtained through this Agreement to any third party not mentioned herein, in any form or context. Such information must not be employed for purposes other than those outlined in Article 1 above, without the explicit written approval of the Provider.

ARTICLE 3 - Equipment and Installation

1. The User is responsible for acquiring at their own cost all necessary equipment and spare parts, for the reception and utilization of radar data both at the Provider's and the User's locations.
2. Unless otherwise specified, the Provider agrees to install the requisite equipment at their premises without charge, while the User will bear the costs of equipment installation at their premises.
3. The User must oversee the arrangement for procurement, setup, and activation of dedicated lines, essential for the radar data's transmission from the Provider to the User.
4. Initial tests to assess the functionality of the equipment and dedicated lines for radar data transmission are to be conducted jointly by the Provider and the User.
5. The stipulations of this article also extend to any future modifications of the equipment or dedicated lines.

ARTICLE 4 - Equipment Maintenance

1. Routine upkeep, repair, and replacement of the equipment used for radar data provision under this Agreement will be performed by the technical personnel at both the Provider's and the User's locations.
2. Routine maintenance, repairs, and replacements at the Provider's facilities, as mentioned in Article 1, will be conducted at no extra charge by the Provider according to the Provider's standard maintenance practices.
3. The User is responsible for the maintenance, repair, and replacement of equipment on their premises, incurring all related costs, and must adhere to their usual standards of maintenance.

ARTICLE 5 - Equipment and System Modifications

1. Any required modifications will be formally communicated by the Provider to the User at least six months before their scheduled implementation date.

ARTICLE 6 - Financial Obligations

1. The inception of this Agreement assumes that the User will cover all initial and recurring expenses related to equipment and private services necessitated by this Agreement.
2. The access to and usage of radar data, will be provided at no cost.

3. Expenses related to the setup and routine inspection of private circuits, taxes, customs duties, and any other initial or ongoing charges for line rentals or additional equipment must be paid by the User.

ARTICLE 7 - Data Integrity

1. The Provider is committed to employing all feasible measures, following the standards it typically upholds, to ensure the quality and uninterrupted supply of radar data.
2. Whenever feasible, the Provider will notify the User in advance about any scheduled service interruptions, providing such information as soon as it becomes available and ensuring at least 24 hours' notice for any planned disruptions.
3. The Provider is obliged to promptly communicate any disruptions in radar data delivery to the User's technical supervision center, or at the first reasonable opportunity.

ARTICLE 8 - Exemption from Liability

1. The Provider shall not be held responsible for any interruptions in radar data delivery caused by failures or defects in the surveillance systems or private circuits.
2. The Provider is exempt from liability for any direct or indirect costs, losses, or damages that result from interruptions or degradations in the quality of the provided radar data.

ARTICLE 9 - Legal Framework

1. This Agreement acknowledges that it will not compromise the essential duty of the relevant Authorities, under law or otherwise, to ensure the safe, effective, and uninterrupted provision of Air Traffic Services.
2. The Provider will not be deemed to have breached this agreement if its inability to fulfill obligations or to provide radar data is due to unforeseeable circumstances beyond its control, including force majeure events.
3. This document represents the complete and exclusive agreement between the Parties.

ARTICLE 10 - Communication

1. All correspondence related to this Agreement should follow the guidelines outlined below.
    - [Provider State's Organisation or name of ATC Organisation, mail address,telephone and fax number]
    - [User State's Organisation or name of ATC Organisation, mail address, telephone and fax number]

ARTICLE 11 - Term of Agreement

1. This Agreement becomes effective on the date it is signed by the last of the Parties involved and will remain in effect for five years (the "**Initial Term**").
2. After this initial term, the Agreement will automatically renew, unless one of the Parties decides to terminate by providing written notice three months before the end of the Initial Term.
3. The Agreement may be terminated early if the radar data is to be permanently discontinued. In such cases, the Provider must provide at least six months written notice to the User.

4. The User may also request early termination of the Agreement due to necessary modifications, with at least three months' written notification to the Provider.

The signing of this Agreement by duly authorised representatives is a testament to its acceptance.

Executed in [place] on [date], in English, with [number] original copies made.

ANNEX A-1. INVOLVEMENT OF ADDITIONAL PARTIES (IF APPLICABLE)

A.1 In the framework of This Agreement

- In alignment with Article 2: Limitations,

the Provider grants permission for the User to share the radar data with the entities listed below:

- o [Name of the party]
- o [Name of the party]

A.2 For this Purpose The User under this Agreement is tasked with establishing equivalent Radar Sharing Agreements, taking on the role of provider, with the parties named above.

***Note**: The annexure is structured to contain dynamic information, subject to periodic updates to reflect operational or environmental changes within the region.*
Should the User intend to distribute the radar data, or any derivative thereof, to a third entity, that entity's name must be incorporated into entities list in this annex. Any sharing arrangement formed between the User and such third entity requires the Provider's written consent. The Provider retains the right to determine the necessity of revising the primary agreement between the Provider and User(s) based on these new arrangements.

Appendix A - Proposal for Amendment to MIDAMC Steering Group (MIDAMC STG) Terms of Reference

1. TERMS OF REFERENCE (TOR)

1.1 The Terms of Reference of the MIDAMC Steering are:

a) to promote the efficiency and safety of aeronautical fixed services in the MID Region through the operation and management, on a sound and efficient basis, of a permanent MID Regional ATS Messaging Management Center (MIDAMC);

b) foster the implementation of the Air traffic service Message handling service in the MID Region through provision of the guidance materials and running facilitation tools, utilizing the MIDAMC;

c) MIDAMC Steering Group will consist of a focal point from each Participating MID State who would represent the State and acts as the Steering Group Member;

d) MIDAMC Steering Group will be responsible for overall supervision, direction, evaluation of the MIDAMC project and will review/update the MIDAMC work plan whenever required;

e) the MID Region is considering the establishment of a Regional MID IP Network; the MIDAMC STG will drive the project which is called Common aeRonautical Virtual Private Network (CRV), until the Operation Group is established;

f) Develop and maintain a regional plan for the transition from AFS to SWIM services; and

g) provide regular progress reports to the CNS SG, and MIDANPIRG concerning its work programme.

1.2 In order to meet the Terms of Reference, the MIDAMC Steering Group shall:

a) develop/update the accreditation procedure for all users on the MIDAMC;

b) develop and maintain guidance materials for MIDAMC users;

c) discuss and identify solution for operational problems that may be arising;

d) provide support/guidance to States for AMHS Implementation, and monitor the AMHS activities;

e) assist and encourage States to conduct trial on the Implementation of the ATS extended services, and identify operational requirements;

f) provide guidance/support to States on implementation of XML-based data models (IWXXM, FIXM, AIXM, …etc) over AMHS;

g) monitor States' readiness to implement XML based data models over extended AMHS;

h) identify the need for any enhancement for the MIDAMC and prepare functional and technical specifications, and define its financial implications;

i) follow-up on ICAO standards and recommendations on the ATS messaging management and SWIM;

j) define future liabilities and new participating States and ANSPs in the progressive introduction of SWIM services;

k) follow-up and review the work of similar groups in other ICAO Regions including successful implementations of SWIM services to identify and adopt best practices;

l) Identify SWIM prerequisites in terms of infrastructure, including IP-based network; and monitor the status of implementation of those elements in the MID Region;

m) follow-up the implementation of IP Network in the MID Region supporting SWIM services, through joining relevant projects, like CRV and act as project manager; and

n) proposes appropriate actions for the early implementation also support the IP Network supporting the progressive introduction of SWIM services until the Operational Group is establish.

o) Develop and amend the relevant ICAO MID Regional documentation considering the progress made in SWIM implementation and considering the need for harmonization with the adjacent Regions in compliance with the GANP;

p) Coordinate with the relevant ICAO MID Regional Groups to ensure a gradual transition of AFS services to SWIM in the MID Region ensuring operational continuity and develop guidance material accordingly;

q) Provide guidance and training to MID States and stakeholders involved in SWIM implementation.

2. COMPOSITION

a) ICAO MID Regional Office;

b) Members appointed by the MIDANPIRG member States; and

c) Other representatives, who could contribute to the activity of the Steering Group, could be invited to participate 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 Study Group. The Study Group shall at all times conduct its activities in the most efficient manner possible with a minimum of formality and paperwork (paperless meetings). Permanent contact shall be maintained between the Chairperson, Secretary and Members of the Study Group 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.

Navigation Minimal Operating Networks

(NAV MON) Template

State Name

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TBA

Executive Summary

The shift from facility-referenced navigation to coordinate-based navigation enabled by performance-based navigation (PBN) provides significant benefits, in particular by supplying the flexibility required to design airspace and associated routes and procedures according to operational needs. The most suitable navigation infrastructure to support PBN is GNSS. Consequently, the role of conventional navigation aids is currently evolving towards that of a reversionary terrestrial infrastructure capable of maintaining safety and an adequate level of operations in case of unavailability of GNSS (for example due to outages). During this evolution, terrestrial aids may also enable PBN operations for users not yet equipped with GNSS.

Until a solution to ensure adequate GNSS resilience is available, it is essential that a terrestrial navigation infrastructure, suitably dimensioned to be capable of maintaining safety and continuity of aircraft operations, be provided.

In line with the ASBU elements NAVS-B0/4 element, this plan encompasses the definition of the Minimum Operating Network (MON) of legacy Navaids to sustain the system in case of PBN disruption or degraded operations and addresses the PBN contingency modes.

This plan, developed in partnership with the national authorities (ANSP, Operators and Airspace users), should be revisited with the introduction of new navigation capabilities and frequently updated and considered as a living document.

1. Introduction

The implementation of Performance-Based Navigation (PBN) on a wide scale in all phases of flight is well under way and is itself a prerequisite for ground-based navigation aids (navaids) rationalization. This is because PBN procedures are enabled by GNSS as the primary navigation means. While some of the ground systems can also support PBN operations (e.g. DME), the role of the ground based navigation infrastructure will evolve towards providing a reversion capability for GNSS and supporting contingency operations in the case of GNSS becoming unusable. This offers the opportunity to rationalize some of the terrestrial infrastructure while retaining a Minimal Operational Network to maintain ATM operations using only ground-based Navaids.

This plan supports the evolution of PBN as the preferred means of navigation by sustaining and expanding the use of GNSS, providing a PBN-capable backup with the DME, and a minimum operational network of VORs to ensure aircraft can navigate safely during GNSS outages.

2. NAVS-B0/4 Navigation Minimal Operating Networks (Nav. MON):

The new element "Navigation Minimal Operating Networks" (NAVS B0/4) has been classified as priority 1 in the MID Region Air Navigation Strategy (MID Doc 002). The main purposes of the NAV MON Element (NAVS B0/4) are:

- To adjust conventional navaids networks through the increased deployment of satellite based navigation systems and procedures to ensure the necessary levels of resilience for navigation.
- To provide a minimum level of capabilities to accommodate State aircraft operations where there is a mismatch in terms of aircraft equipage.
- To make a more efficient use of the frequency spectrum

3. ICAO Strategy

The role of the ground-based Navaids will evolve towards providing a reversion for GNSS and supporting contingency operations in case of GNSS becoming unusable. This evolution offers the opportunity for the rationalization of some of the terrestrial infrastructure and retaining only a Minimum Operational Network (MON) which is designed to efficiently provide reversion service.

However, each Navaid can fulfil different operational roles irrespective of the availability of ATS Surveillance:

- During normal ATM operations, ground-based Navaids support

  - PBN applications as a primary positioning source;
  - PBN applications as a secondary positioning source to GNSS

- Conventional procedures (e.g. either in an environment where there are no PBN procedures; or to accommodate non-PBN capable aircraft.)

  - During ATM contingency operations, ground-based Navaids support

- PBN applications as a back up positioning source due to GNSS outage;
- Conventional procedures as a means of reversion during a GNSS outage;

In order to plan the evolution of the navigation infrastructure in MID Region, it is important to have a thorough picture of the type of operations that can be supported by each type of terrestrial Navaid as per MID PBN Implementation Plan. This understanding will enable States to develop both an optimization and decommissioning plan of Navaids as well as a coordinated evolution to a reversionary terrestrial infrastructure. Table below identifies which ground-based Navaid support which PBN specification.

MID Navigation Specifications and (**R**equired or **O**ptional) Navaid Infrastructure

	GNSS	IRU	DME/DME	DME/DME/ IRU	VOR/DME
RNAV 10[1]	O	O			
RNAV 5[1]	O	O	O	O	O
RNAV 1[1]	O		O	O	
RNP 1	R		TBD[2]	TBD[2]	
RNP APCH	R				
RNP AR	R	O			

Note 1: For this navigation specification without required navaid infrastructure at least one navaid is requested for the associated navigation application.

Note 2: the use of DME/DME for this navigation specification requires a specific State authorization.

Note 3: IRU may be integrated with the GNSS sensor to improve performance and continuity of the operation.

3.1 ICAO reversion strategy

Annex 10 Attachment H defines a global "Strategy for rationalization of conventional radio navigation aids and evolution toward supporting performance based navigation". The objective of Attachment H is to provide guidance to the States for both the rationalization and reversion of the terrestrial Navaid infrastructure. The recommendations included in this high-level strategy are based on the residual roles foreseen for each type of Navaid to support PBN operations and/or conventional procedures.

Furthermore, consideration of this strategy should be given when deciding investments into new facilities or on facility renewals. As this strategy is highly relevant to the objectives of this plan, key points of this strategy are included below, customized for the MID region.

Operational Considerations for terrestrial Navaids and reversion strategy

		Operational Roles	Navigation Performance	Specific Limitations	Opportunities And Solutions (Residual roles – PBN/conventional)
NDB	**PBN**	Exceptionally, can be used for extraction on the missed approach for RNP APCH. This operation is not encouraged.	None	N/A	Rationalize NDB and associated conventional procedures and if NDBs are used to define PBN ATS Routes they should be replaced by RNAV waypoints. Non—Precision Approaches based on NDB should be replaced by RNP APCH. Similarly, if NDBs are used as ILS locators associated with an RNAV procedure intercept, RNAV Waypoints should replace these.
	CONV	Can support en route operations and ATS Routes, SIDS/STARs and NPAs. This is not encouraged. NDB may be paired with a DME.	Can enable homing to a beacon. When co-located with a DME, ranging information is also available.	Ref Annex 10, Chapter3	
VOR	**PBN**	Can be used in the en-route phase of flight and arrival segment of an IFP. On the missed approach it can be used for extraction of an RNP APCH.	Can support a position estimation for RNAV 5. This enables operations in FRA and on RNAV 5 ATS Routes.	(*) Maximum range of conventional VOR typically 60 NM; Doppler VOR, typically 75 NM.	The opportunity arises to rationalize some VORs providing cost savings. Introduction of new VORs is not encouraged, but existing ones may be needed to support reversion operations; enhance situational; provide limited inertial updating if DME/DME not available; exceptionally to be used for NPAs if no other option is available; to support aircraft only able to navigate conventionally (this may include state aircraft) and support procedural separation. The use of VOR(/DME) to support RNAV 5 should be considered only in exceptional cases:
	CONV	Paired (or not) with a DME can support en route operations and SIDS/STARs and NPA	Can provide bearing information and enable homing to a beacon. When co-located with a DME,	Ref Annex 10, Chapter3	

		and intercept to the ILS or missed approach.	range and bearing information is available.		• in areas where DME/DME coverage is not possible (e.g. islands environment) • in areas where DME/DME coverage is achievable only with high investment and operational cost (e.g. near the bottom of enroute airspace in terrain rich environment)
DME	**PBN**	Can be used in all phases of flight except final approach. On the missed approach it can be used for extraction.	Can support a position estimation for RNAV 5 and RNAV 1 operations. This enables operations in FRA, RNAV 5 ATS Routes and RNAV 1 SIDS/STARs.	Minimum range of 3NM and maximum range of 160 NM for RNAV 1; Below 40° above the horizon as viewed from the DME facility; geometric limitations between DME pairs of 30° to 150°;	DME/DME provides a fully redundant capability to GNSS for RNAV applications, and a suitable reversionary capability to RNAV 1 for RNP applications requiring a lateral accuracy performance of ±1 NM (95%), providing there is an adequate DME infrastructure. Many DMEs are co-located with VORs which creates certain limitations. When VORs are decommissioned, this can be an opportunity to optimise the DME network. In such instances, to save costs or to improve DME/DME performance, DME's can be re-located (ideally with other CNS assets) if a co-located VOR is withdrawn. To be operationally robust, efficient DME network design should fill gaps and provide DME/DME coverage as low as possible without requiring more investment unless needed for safety reasons. (Other solutions such as requiring on-board IRU, reliance on ATS surveillance and/or military TACANS may be viable alternatives). Cross-border use of DME facilities is encouraged supported by the necessary authorisations and/or agreements. Deployment of new DME stations should avoid that part of the
	CONV	Paired with a VOR, ILS or NDB, it can support conventional operations. Stand-alone it can enable the flying of DME arcs.	Can provide range when co-located with a VOR, NDB or ILS.	Ref Annex 10, Chapter3	

					frequency spectrum close to the GNSS L5/E5 band (1164 – 1 215 MHz). CONCLUSION: The application of the above principles should enable uniformity of DME deployment across the MID region; It is recognized that in some areas, the provision of D/D navigation is not possible or practical, such as at very low altitudes, in terrain-constrained environments, or on small islands, remote areas and airspace over the water. Finally, it is possible that in some countries there could be an increase in the number of DMEs to support A-PNT. Note: Some FMS may exclude the use of ILS-associated DMEs. Consequently, it is not possible to ensure consistent D/D service is available to all D/D-equipped users based on ILS-associated DMEs. Therefore, those facilities should not be planned in the provision of such D/D service (regardless of whether they are published in the en-route section of the AIP), without an appropriate fleet assessment.

(*) If a State wished to use a VOR in excess of the typical ranges stated, then an implementation safety assessment based on a flight inspection demonstration may enable such non-standard use, subject to approval by the competent authority.

Due consideration should be given to evaluate the dependency of conventional ATS route network on Ground NAVAIDs particularly the Regional ATS Route network available at MID ANP Vol II table ATS – 1, coordination with ATM personnel (on national level) would support the evaluation.

3.2 Evolution Strategy

There is a need to consult aircraft operators and international organizations, and to ensure safety, efficiency and cost-effectiveness of the proposed infrastructure solutions. Based on the above, the global strategy is to:

a) Rationalize NDB and VOR and associated conventional procedures;

b) Align rationalization planning with equipment life cycles and PBN implementation planning;

c) Replace conventional approaches without vertical guidance with vertically guided approaches;

d) Where a terrestrial navigation reversion capability is required, evolve the existing DME infrastructure towards providing a PBN infrastructure complementary to GNSS; and

e) Provide a residual capability based on VOR (or VOR/DME, if possible) to cater to airspace users not equipped with suitable DME/DME avionics, where required.

4. National Navigation Minimal Operating Networks

4.1 Main operations supported by VORs in the GNSS contingency concept

VOR ID	Location	Main operations supported in the GNSS contingency concept								
		IAP	TMA			EN-ROUTE				
		IAP - intercept - Final - Missed	Conventional SIDs/STARs	cross-checking and situational awareness	Conventional Holding	RNAV 5 and FRA	Conventional Routes and procedural separation	Situational Awareness & Reach Alternate A/D	RNAV Holding	Conventional Holding

Description to be

4.2 Evolution of the ground infrastructure towards MON configuration

Type of NAV facility	**Location**	**ID**	**Facility life cycle**		**Rationalization plan**		**relocation of existing facilities or installation of new facilities**
			Start	**End**	Decommissioning	Replacement	

4.3 Future components of the National Navigation Minimal Operating Networks

Description to be added

Type of NAV facility	Location	ID	Phase of flight (enroute, terminal, approach)	Range	Purpose of operation	
					Normal operation	Contingency operation

Appendix B - Proposal for Amendment to MID-Region Air Navigation Strategy

MID DOC 002

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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

MID REGION

AIR NAVIGATION STRATEGY

EDITION ...., 2024

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AIR NAVIGATION PRIORITIES AND MONITORING OF THE STATUS OF IMPLEMENTATION

AIR NAVIGATION PRIORITIES AND MONITORING OF THE STATUS OF IMPLEMENTATION

1. Introduction

1.1 As traffic volume increases throughout the world, the demands on air navigation service providers in a given airspace increase, and air traffic management becomes more complex.

1.2 It is foreseen that the implementation of the components of the ATM operational concept will provide sufficient capacity to meet the growing demand, generating additional benefits in terms of more efficient flights and higher levels of safety. Nevertheless, the potential of new technologies to significantly reduce the cost of services will require the establishment of clear operational requirements.

1.3 Taking into account the benefits of the ATM operational concept, it is necessary to make many timely decisions for its implementation. An unprecedented cooperation and harmonization will be required at both global and regional level.

1.4 ICAO introduced the Aviation System Block Upgrades (ASBU) framework as a systemic manner to achieve a harmonized implementation of the air navigation services. An ASBU designates a set of improvements that can be implemented globally from a defined point in time to enhance the performance of the ATM system.

1.5 In accordance, with the Resolutions of the 40th Session of the ICAO Assembly, particularly Resolution A40-1 "ICAO global planning for safety and air navigation", the ICAO Assembly urged States and PIRGs to utilize the guidance provided in the GANP for planning and implementation activities which establish priorities, targets and indicators consistent with globally-harmonized objectives, taking into account operational needs. In response to this, the MID Region developed the MID Region Air Navigation Strategy – Part 1, which is aligned with the GANP and ASBU Framework.

1.6 Stakeholders including service providers, regulators, airspace users and manufacturers are facing increased levels of interaction as new, modernized ATM operations are implemented. The highly integrated nature of capabilities covered by the block upgrades requires a significant level of coordination and cooperation among all stakeholders. Working together is essential for achieving global harmonization and interoperability.

2. Strategic Air Navigation Capacity and Efficiency Objective

2.1 The Strategic Objective related to Air Navigation Capacity and Efficiency is to realize sound and economically-viable civil aviation system in the MID Region that continuously increases in capacity and improves in efficiency with enhanced safety while minimizing the adverse environmental effects of civil aviation activities.

3. MID Air Navigation Objectives

3.1 The MID Region air navigation objectives are set in line with the global air navigation objectives and address specific air navigation operational improvements identified within the framework of the Middle East Regional Planning and Implementation Group (MIDANPIRG).

3.2 ASBU Blocks ‘0’, “1”, “2”, and “3” feature elements are characterized by operational improvements, which have already been developed, implemented, and planned in many parts of the world. The MID Region priorities for the planning and implementation of ASBU elements are described in **Table 1** with the following priorities:

- Priorities 1 and 2 for ASBU elements in Blocks 0 & 1; and
- Priority 3 for ASBU elements in Blocks 2 and 3.

3.3 The MID Region Air Navigation Strategy aims to maintain regional harmonization and service interoperability. The States should develop their National Air Navigation Plan (NANP), including action plans for implementing ASBU Elements and other ASBU elements or non-ASBU solutions based on their operational requirements, cost-benefit analysis, and the established priorities.

3.4 The implementation of ASBU Block 0 Elements in the MID Region started before 2013 and is continuing. For the short and medium terms, the MID Region priorities include identified ASBU Elements from Blocks 0 and 1.

3.5 For the long term, the MID Region priorities include identified ASBU Elements from Blocks 2 and 3.

4. MID Region ASBU Threads/Elements Prioritization and Monitoring

4.1 Based on operational requirements and technical enablers and taking into consideration the associated benefits, **Table 1** below shows the priority associated with each ASBU element from Blocks 0, 1, 2, and 3, as well as the MIDANPIRG subsidiary bodies that will be monitoring and supporting the implementation of these Threads/Elements:

- ***Priority 1 Thread and ASBU Elements***: *Any Thread with at least one priority 1 ASBU Element.* Priority 1 ASBU Elements make the highest contribution to improving *air navigation safety and/or efficiency in the MID Region. These Elements should be implemented where applicable and will be used for regional air navigation monitoring and reporting.*

- ***Priority 2 Thread and ASBU Elements***: *Any Thread with at least one priority 2 ASBU Element.* Priority 2 ASBU *Elements recommended for implementation based on identified operational needs and benefits by States.*

- ***Priority 3 Thread and ASBU Elements:*** *Optional Thread with at least one priority 3 ASBU Element. Optional thread and elements that are recommended for implementation based on identified technical, and operational needs.*

Table 1. MID REGION ASBU THREADS & ELEMENTS (BLOCKS 0, 1, 2 & 3) PRIORITIZATION AND MONITORING

Thread	Element code	Title	Priority	Start Date	Monitoring		Remarks
					Main	Supporting	
Information Threads							
DAIM							
DAIM	**B1/1**	Provision of quality-assured aeronautical data and information	**1**	2021	AIM SG	RANP/ NANP TF	
	B1/2	Provision of digital Aeronautical Information Publication (AIP) data sets	2				
	B1/3	Provision of digital terrain data sets	**1**	2021	AIM SG	RANP/ NANP TF	
	B1/4	Provision of digital obstacle data sets	**1**	2021	AIM SG	RANP/ NANP TF	

	B1/5	Provision of digital aerodrome mapping data sets	2				
	B1/6	Provision of digital instrument flight procedure data sets	2				
	B1/7	NOTAM improvements	2				
	B2/1	Dissemination of aeronautical	3				
	B2/2	Daily Airspace Management	3				
	B2/3	Aeronautical information to support higher airspace operations	3				
	B2/4	Aeronautical information requirements tailored to UTM	3				
	B2/5	NOTAM replacement	3				
AMET							
AMET	**B0/1**	Meteorological observations products	**1**	2014	MET SG	RANP/ NANP TF	
	B0/2	Meteorological forecast and warning products	**1**	2014	MET SG	RANP/ NANP TF	
	B0/3	Climatological and historical meteorological products	**1**	2014	MET SG	RANP/ NANP TF	
	B0/4	Dissemination of meteorological products	**1**	2014	MET SG	CNS SG RANP/ NANP TF	
	B1/1	Meteorological observations information	2				
	B1/2	Meteorological forecast and warning information	2				
	B1/3	Climatological and historical meteorological **information**	2				
	B1/4	Dissemination of meteorological information	2				

	B2/1	Meteorological observations information	3				
	B2/2	Meteorological forecast and warning information	3				
	B2/3	Climatological and historical meteorological information	3				
	B2/4	Meteorological information service in SWIM	3				
	B3/1	Meteorological observations information	3				
	B3/2	Meteorological forecast and warning information	3				
	B3/3	Climatological and historical meteorological information	3				
	B3/4	Meteorological information service in SWIM	3				

FICE								
	B2/1	Planning Service	3					
	B2/2	Filing Service	3					
	B2/3	Trial Service	3					
	B2/4	Flight Data Request Service	3					
	B2/5	Notification Service	3					
	B2/6	Publication Service	3					
	B2/7	Flight information management service for higher airspace operations	3					
	B2/8	Flight information management service for low-altitude operations	3					
	B2/9	Flight information management support for inflight re-	3					
	B3/1	Flight information management services for enhanced trajectory operations	3					
SWIM								
	B2/1	Information service provision	3					
	B2/2	Information service consumption	3					
	B2/3	SWIM registry	3					

	B2/4	Air/Ground SWIM for non-safety critical information	3				
	B2/5	Global SWIM processes	3				
Operational Threads							
APTA							
APTA	**B0/1**	PBN Approaches (with basic capabilities)	**1**	2014	PBN SG	ATM SG AIM SG CNS SG RANP/ NANP TF	
	B0/2	PBN SID and STAR procedures (with basic capabilities)	**1**	2014	PBN SG	ATM SG AIM SG RANP/ NANP TF	
	B0/3	SBAS/GBAS CAT I precision approach procedures	2				
	B0/4	CDO (Basic)	**1**	2014	PBN SG	ATM SG RANP/ NANP TF	
	B0/5	CCO (Basic)	**1**	2014	PBN SG	ATM SG RANP/ NANP TF	
	B0/6	PBN Helicopter Point in Space (PinS) Operations	2				
	B0/7	Performance based aerodrome operating minima – Advanced aircraft	**1**	2021	PBN SG	AIM SG CNS SG ASPIG RANP/	
	B0/8	Performance based aerodrome operating minima – Basic aircraft	2				
	B1/1	PBN Approaches (with advanced capabilities)	3				
	B1/2	PBN SID and STAR procedures (with advanced capabilities)	3				
	B1/4	CDO (Advanced)	3				
	B1/5	CCO (Advanced)	3				
	B2/1	GBAS CAT II/III precision approach procedures	3				
	B2/2	Simultaneous operations to parallel runways	3				

Thread	Element code	Title	Priority	Start Date	Monitoring		Remarks
					Main	Supporting	
	B2/3	PBN Helicopter Steep Approach Operations	3				
	B2/4	Performance based aerodrome operating minima – Advanced aircraft with SVGS	3				
	B3/1	Parallel approaches without vertical guidance	3				
	B3/2	Implementation of A-RNP to support non-complex simultaneous independent parallel approaches	3				

Thread	Element code	Title	Priority	Start Date	Monitoring		Remarks
					Main	Supporting	
	B1/1	PBN Approaches (with advanced capabilities)	2				
	B1/2	PBN SID and STAR procedures (with advanced capabilities)	2				
	B1/4	CDO (Advanced)	2				
	B1/5	CCO (Advanced)	2				
FRTO							
FRTO	**B0/1**	Direct routing (DCT)	2				
	B0/2	Airspace planning and Flexible Use of Airspace (FUA)	**1**	2014	ATM SG	RANP/ NANP TF	
	B0/3	Pre-validated and coordinated ATS routes to support flight and flow	2				
	B0/4	Basic conflict detection and conformance monitoring	**1**	2014	ATM SG	CNS SG RANP/ NANP TF	
	B1/1	Free Route Airspace (FRA)	2				
	B1/2	Required Navigation Performance (RNP) routes	2				
	B1/3	Advanced Flexible Use of Airspace (FUA) and management of real time airspace data	2				
	B1/4	Dynamic sectorization	2				

	B1/5	Enhanced Conflict Detection Tools and Conformance Monitoring	2				
	B1/6	Multi-Sector Planning	2				
	B1/7	Trajectory Options Set (TOS)	2				
	B2/1	Local components of integrated ATFM and ATC Planning function (INAP)	3				
	B2/2	Local components of Dynamic Airspace Configurations (DAC)	3				
	B2/3	Large Scale Cross Border Free Route Airspace (FRA)	3				
	B2/4	Enhanced Conflict Resolution Tools	3				
NOPS							
NOPS	**B0/1**	Initial integration of collaborative airspace management with air traffic flow management	**1**	2015	ATM SG	RANP/ NANP TF	
	B0/2	Collaborative Network Flight Updates	2				
	B0/3	Network Operation Planning basic features	2				
	B0/4	Initial Airport/ATFM slots and A-CDM Network Interface	3				
	B0/5	Dynamic ATFM slot allocation	3				
	B1/1	Short Term ATFM measures	3				
	B1/10	Collaborative Trajectory Options Program (CTOP)	3				
	B1/2	Enhanced Network Operations Planning	3				
	B1/3	Enhanced integration of Airport operations planning with network operations planning	3				

	B1/4	Dynamic Traffic Complexity Management	3				
	B1/5	Full integration of airspace management with air traffic flow management	3				
	B1/6	Initial Dynamic Airspace configurations	3				
	B1/7	Enhanced ATFM slot swapping	3				
	B1/8	Extended Arrival Management supported by the ATM Network function	3				
	B1/9	Target Times for ATFM purposes	3				
	B2/1	Optimised ATM Network Services in the initial TBO context	3				
	B2/2	Enhanced dynamic airspace configuration	3				
	B2/3	Collaborative Network Operation Planning	3				
	B2/4	Multi ATFM slot swapping and Airspace Users priorities	3				
	B2/5	Further airport integration within Network Operation Planning	3				
	B2/6	ATFM adapted for cross-border Free Route Airspace (FRA)	3				
	B2/7	UTM Network operations	3				
	B2/8	High upper airspace network operations	3				
	B3/1	ATM Network Services in full TBO context	3				
	B3/2	Cooperative Network Operations Planning	3				
	B3/3	Innovative airspace architecture	3				

Thread	Element code	Title	Priority	Start Date	Monitoring		Remarks
					Main	Supporting	
	B0/4	Initial Airport/ATFM slots and A-CDM Network Interface	2				
	B0/5	Dynamic ATFM slot allocation	2				
	B1/1	Short Term ATFM measures	2				
	B1/2	Enhanced Network Operations Planning	2				
	B1/3	Enhanced integration of Airport operations planning with network operations planning	2				
	B1/4	Dynamic Traffic Complexity Management	2				
	B1/5	Full integration of airspace management with air traffic flow management	2				
	B1/6	Initial Dynamic Airspace configurations	2				
	B1/7	Enhanced ATFM slot swapping	2				
	B1/8	Extended Arrival Management supported by the ATM Network function	2				
	B1/9	Target Times for ATFM purposes	2				
	B1/10	Collaborative Trajectory Options Program (CTOP)	2				
ACAS							
ACAS	**B1/1**	ACAS Improvements	**1**	2014	ATM SG CNS SG	RANP/ NANP TF	
	B2/1	New collision avoidance system	3				
	B2/2	New collision avoidance capability as part of an overall detect and avoid system for RPAS	3				
SNET							
	B0/1	Short Term Conflict Alert (STCA)	**1**	2017	ATM SG	CNS SG RANP/ NANP TF	

SNET	**B0/2**	Minimum Safe Altitude Warning (MSAW)	**1**	2017	ATM SG	CNS SG RANP/ NANP TF	
	B0/3	Area Proximity Warning (APW)	**1**	2020	ATM SG	CNS SG RANP/ NANP TF	
	B0/4	Approach Path Monitoring (APM)	2				
	B1/1	Enhanced STCA with aircraft parameters	2				
	B1/2	Enhanced STCA in complex TMA	2				
GADS							

Thread	Element code	Title	Priority	Start Date	Monitoring		Remarks
					Main	Supporting	
GADS	**B1/1**	Aircraft Tracking	2				
	B1/2	Operational Control Directory	**1**	2021	ATM SG	RANP/ NANP TF	
	B2/1	Location of an aircraft in Dist...	3				
	B2/2	Distress tracking information management	3				
	B2/3	Post Flight Localization	3				
	B2/4	Flight Data Recovery	3				
RSEQ							
RSEQ	**B0/1**	Arrival Management	**1**	2021	ATM SG	CNS SG ASPIG RANP/ NANP TF	
	B0/2	Departure Manageme	2				
	B0/3	Point merge	2				
	B1/1	Extended arrival	2				
	B2/1	Integration of arrival and departure management	3				
	B3/2	Arrival management in terminal airspace with multiple	3				
	B3/3	Increased utilization of runway capacity by improved real-time runway scheduling	3				
	B3/4	Improved operator fleet management in runway sequencing	3				
SURF							

SURF	**B0/1**	Basic ATCO tools to manage traffic during ground operations	**1**	2014	ASPIG	ATM SG CNS SG RANP/ NANP TF	
	B0/2	Comprehensive situational awareness of surface operations	**1**	2014	ASPIG	ATM SG CNS SG RANP/ NANP TF	
	B0/3	Initial ATCO alerting service for surface operations	**1**	2021	ASPIG	ATM SG CNS SG RANP/ NANP TF	
	B1/1	Advanced features using visual aids to support traffic management	2				
	B1/2	Comprehensive pilot situational awareness on the	2				
	B1/3	Enhanced ATCO alerting service for surface	2				
	B1/4	Routing service to support ATCO surface operations	2				
	B1/5	Enhanced vision systems for taxi	2				
	B2/1	Enhanced surface guidance for pilots and vehicle drivers	3				
	B2/2	Comprehensive vehicle driver situational awareness on the airport	3				
	B2/3	Conflict alerting for pilots for runway operations	3				
	B3/1	Optimization of surface traffic management in complex situations	3				
ACDM							
	B0/1	Airport CDM Information Sharing (ACIS)	**1**	2014	ASPIG	CNS SG, AIM SG, ATM SG, RANP/ NANP TF	

ACDM	**B0/2**	Integration with ATM Network function	**1**	2014	ASPIG	CNS SG, AIM SG, ATM SG, RANP/ NANP TF	
	B2/1	Airport Operations Plan (AOP)	3				
	B2/2	Airport Operations Centre (APOC)	3				
	B2/3	Total Airport Management (TAM)	3				
	B3/1	Full integration of ACDM and TAM in TBO	3				

Thread	**Element code**	**Title**	**Priority**	**Start Date**	**Monitoring**		**Remarks**
					Main	**Supporting**	
CSEP	**B1/1**	Basic airborne situational awareness during flight operations	**2**				
	B1/2	Visual Separation on Approach	**2**				
	B1/3	Performance Based Longitudinal	**2**				
	B1/4	Performance Based Lateral Separation	**2**				
	B2/1	Interval Management (IM) Procedure	3				
	B2/2	Cooperative separation at low altitudes	3				
	B2/3	Cooperative separation at higher airspace	3				
	B3/1	Interval Management (IM) Procedure	3				
	B3/2	Remain Well Clear (RWC) functionality for UAS/RPAS	3				
DATS	**B1/1**	Remotely Operated Aerodrome Air	**2**				
OPFL	**B0/1**	In Trail Procedure (ITP)	**2**				
	B1/1	Climb and Descend	**2**				

	B2/1	Separation minima using ATS surveillance systems where VHF voice communications are not available	3				
	B3/1	Helicopter RNP 0.3 Terminal and En-Route	3				
	B3/2	Expansion of upper limit of the Reduced Vertical Separation Minima (RVSM) band of flight	3				
	B3/3	Target-to-target separations using Space-based ADS-B data	3				
TBO	**B0/1**	Introduction of time- based management within a flow	**2**				
	B1/1	Initial Integration of time-based decision making	**2**				
	B2/1	Pre-departure trajectory synchronization within a flight centric and network performance	3				
	B2/2	Extended time-based management across multiple FIRs for active flight	3				
	B3/1	Network based on-demand synchronization of trajectory based operations	3				
Technology Threads							
ASUR							
	B0/1	Automatic Dependent Surveillance – Broadcast (ADS-	**1**	2021	CNS SG	ATM SG, ASPIG, RANP/ NANP TF	
	B0/2	Multilateration cooperative surveillance systems (MLAT)	**1**	2021	CNS SG	ATM SG, ASPIG, RANP/NA NP TF	

ASUR	**B0/3**	Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-	**1**	2021	CNS SG	ATM SG, ASPIG, RANP/ NANP TF	
	B1/1	Reception of aircraft ADS-B signals from space	2				
	B2/1	Evolution of ADS-B and Mode S	3				
	B2/2	New community based surveillance system for airborne aircraft (low and higher	3				
	B3/1	New non-cooperative surveillance system for airborne aircraft	3				
NAVS							
	B0/1	Ground Based Augmentation Systems	2				
	B0/2	Satellite Based Augmentation Systems	2				
	B0/3	Aircraft Based Augmentation Systems	**1**	2021	CNS SG	PBN SG, ATM SG, AIM SG,	
	B0/4	Navigation Minimal Operating Networks (Nav. MON)	٢				
NAVS	**B1/1**	Extended GBAS	3				
	B2/1	Dual Frequency Multi Constellation	3				
	B2/2	Dual Frequency Multi Constellation	3				
	B2/3	Dual Frequency Multi Constellation	3				

Thread	Element code	Title	Priority	Start Date	Monitoring		Remarks
					Main	Supporting	
						RANP/ NANP TF	
	B0/4	Navigation Minimal Operating Networks (Nav. MON)	**1**	2021	CNS SG	PBN SG, RANP/ NANP TF	
	B1/1	Extended GBAS	2				
COMI							
COMI	**B0/1**	Aircraft Communication Addressing and Reporting System (ACARS)	2				
	B0/2	Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI)	2				
	B0/3	VHF Data Link (VDL) Mode 0/A	2				
	B0/4	VHF Data Link (VDL) Mode 2 Basic	2				
	B0/5	Satellite communications (SATCOM) Class C Data	2				
	B0/6	High Frequency Data Link (HFDL)	2				
	B0/7	AMHS	**1**	2014	CNS SG	RANP/ NANP TF	
	B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)	**1**	2021	CNS SG	RANP/ NANP TF	
	B1/2	VHF Data Link (VDL) Mode 2 Multi-Frequency	2				
	B1/3	SATCOM Class B Voice and Data	2				
	B1/4	Aeronautical Mobile Airport Communication System (AeroMACS) Ground-Ground	2				
	B2/1	Air-Ground ATN/IPS	3				

	B2/2	Aeronautical Mobile Airport Communication System (AeroMACS) aircraft mobile connection	3				
	B2/3	Links meeting requirements for non-safety critical communication	3				
	B3/1	VHF Data Link (VDL) Mode-2 Connectionless	3				
	B3/2	SATCOM Class A voice and data	3				
	B3/3	L-band Digital Aeronautical Communication System (LDACS)	3				
	B3/4	Links meeting requirements for safety critical communication	3				
COMS							
COMS	**B0/1**	CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace	2				

Thread	Element code	Title	Priority	Start Date	Monitoring		Remarks
					Main	Supporting	
	B0/2	ADS-C (FANS 1/A) for procedural airspace	2				
	B1/1	PBCS approved CPDLC (FANS 1/A+) for domestic and procedural airspace	2				
	B1/2	PBCS approved ADS-C (FANS 1/A+) for procedural airspace	2				
	B1/3	SATVOICE (incl. routine communications) for procedural airspace	2				
	B2/1	PBCS approved CPDLC (B2) for domestic and procedural airspace	3				
	B2/2	PBCS Approved ADS-C (B2) for domestic and procedural airspace	3				
	B2/3	PBCS approved SATVOICE (incl. routine communications) for procedural airspace	3				
	B3/1	Extended CPDLC (B2 incl. Adv-IM and dynamic RNP) for dense and complex airspace	3				
	B3/2	Extended ADS-C (B2 incl. Adv-IM and dynamic RNP) for dense and complex airspace	3				

5. Implementation and Monitoring of the priority 1 ASBU Elements

5.1 The monitoring of air navigation performance and its enhancement is achieved, inter-alia, through identification of relevant air navigation Metrics and Indicators as well as the adoption and attainment of air navigation system Targets. The priority 1 ASBU Threads/Elements is monitored through the MID eANP Volume III.

5.2 The progress made by MID States in implementing priorities 2 and 3 ASBU elements is reflected in the remark's column of Table 1. States may share details on the implementation during the meetings of subsidiary bodies of the MIDANPIRG.

5.3 MIDANPIRG, through its activities under the various subsidiary bodies, will continue to update and monitor the implementation of the ASBU Threads and elements to achieve the air navigation targets.

5.4 The priority 1 Threads/Elements along with the associated elements, applicability, performance Indicators, supporting Metrics, and performance Targets are shown in the **Table 2** below.

***Note**: Further details on the ASBU elements objectives, description, implementation requirements and performance impact assessment can be found on the ICAO GANP Portal https://www4.icao.int/ganpportal/ASBU*

6. Governance

6.1 Progress report on the status of implementation of the different priorities Threads/Elements should be developed by MIDANPIRG Subsidary bodies. A consolidated MID Air Navigation Report showing the status of implementation of the different priorities ASBU Elements by Thread will be developed by the RANP/NANP TF on annual basis and presented to MIDANPIRG for endorsement.

6.2 The MIDANPIRG will be the governing body responsible for the review and update of the MID Region Air Navigation Strategy.

6.3 The MID Region Air Navigation Strategy will guide the work of MIDANPIRG and its subsidiary bodies and all its member States and partners.

6.4 Progress on the implementation of the MID Region Air Navigation Strategy and the achievement of the agreed air navigation targets will be reported to the ICAO Air Navigation Commission (ANC), through the review of the MIDANPIRG Reports, MID Air Navigation Reports, etc.; and to the stakeholders in the Region within the framework of MIDANPIRG.

Table 2. MONITORING THE IMPLEMENTATION OF THE PRIORITY 1 ASBU THREADS/ELEMENTS (Block 0 & 1) IN THE MID REGION

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
Information Threads							
DAIM							
DAIM B1/1	Provision of quality-assured aeronautical data and information	All States	Indicator*: Regional average implementation status of DAIM B1/1 (provision of quality-assured aeronautical data and information). Supporting Metrics: 1. Number of States that have implemented an AIXM-based AIS database (AIXM V5.1+) 2. Number of States that have established formal arrangements with at least 50% of their AIS data originators.	(2023) 53%	80%	Dec 2024	N/A
DAIM B1/3	Provision of digital terrain data sets	All States	Indicator*: Regional average implementation status of DAIM B1/3(Provision of Terrain digital datasets). Supporting Metric: Number of States that provide required Terrain digital datasets.	(2022) 35%	60%	Dec 2024	N/A
DAIM B1/4	Provision of digital obstacle data sets	All States	Indicator*: Regional average implementation status of DAIM B1/4(Provision of obstacle digital datasets). Supporting Metric: Number of States that provide required obstacle digital datasets.	(2022) 35%	60 %	Dec 2024	N/A
AMET							

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
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	(2022) 65%	80%	Dec 2021	N/A
			(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				

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
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: 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	(2022) 60%	90%	Dec 2021	N/A
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.	(2022) 60%	85%	Dec 2021	N/A
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)	(2022) 60%	85%	Dec 2021	N/A

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
FICE							
FICE B0/1	Automated basic inter facility data exchange (AIDC)	According to the MID Region AIDC/OLDI Priority 1 Applicability Area	Indicator*: % of priority 1 AIDC/OLDI Interconnection have been implemented. Supporting metric: Number of AIDC/OLDI interconnections implemented between adjacent ACCs.	(2023) 26%	70%	Dec 2026	N/A
Operational Threads							
APTA							
APTA B0/1	PBN Approaches (with basic capabilities)	All RWYs ENDs at International Aerodromes	Indicator: % of Runway ends at international aerodromes served by PBN approach procedures with basic functionalities - down to LNAV or LNAV/VNAV minima. Supporting metric: Number of Runways ends at international aerodromes served by PBN approach procedures with basic functionalities - down to LNAV or LNAV/VNAV minima.	(2017) 46.7%	100%	Dec 2018	Capacity/ KPI 10
APTA B0/2	PBN SID and STAR procedures (with basic capabilities)	All RWYs ENDs at International Aerodromes	Indicator: % of Runway ends at international aerodromes provided with PBN SID and STAR (basic capabilities). Supporting Metric: Number of Runway ends at international aerodromes provided with PBN SID and STAR (basic capabilities).	(2022) 55%	70%	Dec 2022	Efficiency Capacity/ KPI 10 KPI 11 KPI 17 KPI 19/

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
APTA B0/4	CDO (Basic)	OBBI, OIIE, OIKB, OIFM, OJAI, OLBA, OOMS, OTHH, TBD, OEJN, EMA, OEDF, ERK, HSSK, HSPN, OMAA, MAL, OMAD, DW, OMDB, MSJ, OMRK and OMFJ	Indicator*: % of International Aerodromes with CDO implemented and published as required. Supporting Metric: Number of International Aerodromes with CDO implemented and published as required. *As per the applicability area	(2022) 65%	100%	Dec 2022	Efficiency/ KPI 19
APTA B0/5	CCO (Basic)	OBBI, OIIE, OIKB, OIFM, OJAI, OLBA, OOMS, OTHH, TBD, OEJN, EMA, OEDF, ERK, HSSK, HSPN, OMAA, MAL, OMAD,MDW, OMDB, MSJ, OMRK and OMFJ	Indicator*: % of International Aerodromes with CCO implemented and published as required. Supporting Metric: Number of International Aerodromes with CCO implemented and published as required. *As per the applicability area	(2022) 65%	100%	Dec 2022	Efficiency/ KPI 17
APTA B0/7	Performance based aerodrome operating minima – Advanced aircraft	All States	Indicator: % of States authorizing Performance-based Aerodrome Operating Minima for Air operators operating Advanced aircraft. Supporting Metric: Number of States 1- having provisions for operational credits to enable lower minima based on advanced aircraft capabilities. (Reference: Annex 6 Part I para. 4.2.8.2.1) 2- Number of States Putting in place an approval process for the operational credit to Aircraft operator conducting PBAOM operations for low visibility operations (Reference: Doc 9365 (AWO Manual)), as applicable.	(2022) 50%	80%	Dec 2025	Capacity/ KPI 10

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
FRTO							
FRTO B0/2	Airspace planning and Flexible Use of Airspace (FUA)	Bahrain, Egypt, Jordan, Qatar, Saudi Arabia (2 ACCs), Sudan, UAE	Indicator*: % of ACCs using and implementing appropriate means (procedures and tools (automation)) to support Airspace planning and FUA and improve data exchange between Civil and Military to improve efficiency of Airspace. Supporting metric: Number of ACCs using and implementing appropriate means (procedures and tools (automation)) to support Airspace planning and FUA and improve data exchange between Civil and Military to improve efficiency of Airspace. * As per the applicability area	(2022) 63%	70%	Dec 2022	Efficiency Access and equity/ KPI 04 KPI 05 KPI 17 KPI 18/ KPI 19
FRTO B0/4	Basic conflict detection and conformance monitoring	Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia (2 ACCs), Sudan, UAE	Indicator*: % States that implemented MTCD and MONA, for ACCs, as required. Supporting metric: The number of States that implemented MTCD and MONA for ACCs, as required. * As per the applicability area	(2022) 63%	100%	Dec 2022	Capacity/ KPI 06 Safety/ KPI 20 KPI 23

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
NOPS							
NOPS B0/1	Initial integration of collaborative airspace management with air traffic flow management	Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Sudan, UAE	Indicator*: % of States implementing ASM/ATFM techniques, procedures and tools for the initial establishment of an integrated collaborative airspace management and air traffic flow and capacity management process. Supporting metric: number of States implementing ASM/ATFM techniques, procedures and tools for the initial establishment of an integrated collaborative airspace management and air traffic flow and capacity management process. * As per the applicability area	(2022) 42%	70%	Dec 2022	Efficiency Capacity/ KPI 04 KPI 05 KPI 17 KPI 18 KPI 19/
ACAS							
ACAS B1/1	ACAS Improvements Operational	All States	Indicator: % of States requiring carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons Supporting metric: Number of States requiring carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons	(2022) 87%	100%	Dec 2024	Safety/ KPI 20 KPI 23
SNET							
SNET B0/1	Short Term Conflict Alert (STCA)	Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Sudan, UAE	Indicator*: % of States that have implemented Short-term conflict alert (STCA) Supporting metric: number of States that have implemented Short-term conflict alert (STCA) * As per the applicability area	(2018) 100%	100%	Dec 2018	Safety/ KPI 20 KPI 23

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
SNET B0/2	Minimum Safe Altitude Warning (MSAW)	Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Sudan, UAE	Indicator*: % of States that have implemented Minimum safe altitude warning (MSAW) Supporting metric: number of States that have implemented Minimum safe altitude warning (MSAW) * As per the applicability area	(2018) 100%	100%	Dec 2018	Safety/ KPI 20
SNET B0/3	Area Proximity Warning (APW)	Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Sudan, UAE	Indicator*: % of States that have implemented Area Proximity Warning (APW) for ACCs, as required. Supporting metric: number of States that have Implemented Area Proximity Warning (APW) for ACCs, as required. * As per the applicability area	(2022) 67%	100%	Dec 2022	Safety/ KPI 20
GADS							
GADS B1/2	Operational Control Directory	All States	Indicator: % of States that provided GADSS Point of Contact (PoC) information Supporting Metric: Number of States that provided GADSS Point of Contact (PoC) information.	(2022) 73%	100%	Dec 2022	N/A
RSEQ							
RSEQ B0/1	Arrival Management	OBBI, HECA, EBA, HELX, HESN, HESH, OTBD, THH, OEJN, OEDF, OEMA, ERK OMDB, MAA	Indicator*: % of Aerodromes that have implemented arrival manager (AMAN), where required/applicable. Supporting Metric: Number of Aerodrome that have implemented arrival manager (AMAN), where required/ applicable. * As per the applicability area	(2022) 36%	80%	Dec 2024	Capacity Efficiency/ KPI 08 KPI 10 KPI 11 KPI 14/

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
SURF							
SURF-B0/1	Basic ATCO tools to manage traffic during ground operations	All International Aerodromes	Indicator: % of Aerodromes having implemented Basic ATCO tools to manage traffic during ground operations Supporting metric: Number of Aerodromes having implemented Basic ATCO tools to manage traffic during ground operations	(2022) 90%	100%	Dec 2022	Efficiency/ KPI 02 KPI 13 Safety/ KPI 20 KPI 21
SURF-B0/2	Comprehensive situational awareness of surface operations	OBBI, HECA, OIII, OOMS, OTBD, THH, OEDF, OEJN, OERK, EMA, OMDB, MAA.	Indicator*: % of Airports having implemented the surveillance service of A-SMGCS Supporting metric: Number of Airports having implemented the surveillance service of A-SMGCS * As per the applicability area	(2022) 61%	80%	Dec 2022	Safety/ KPI 20 KPI 21
SURF-B0/3	Initial ATCO alerting service for surface operations	OBBI, HECA, OIII, OOMS, OTBD, OTHH, OEDF, OEJN, OERK, OEMA, OMDB, OMAA.	Indicator*: % of Airports having implemented the A-SMGCS alerting service. Supporting metric: Number of Airports having implemented the A-SMGCS alerting service. * As per the applicability area	(2022) 74%	80%	Dec 2022	Safety/ KPI 20
ACDM							
ACDM B0/1	Airport CDM Information Sharing (ACIS)	HECA, OBBI, OIII, OKKK, OOMS, OTHH, OEJN, OERK, OMDB, OMAA	Indicator*: % of Airports having implemented ACIS. Supporting metric: number of Airports having implemented ACIS. * As per the applicability area	(2022) 75%	90%	Dec 2024	N/A
ACDM B0/2	Integration with ATM Network function	HECA, OBBI, OIII, OKKK, OOMS, OTHH, OEJN, OERK, OMDB, OMAA.	Indicator*: % of Airports having integrated ACDM with the ATM Network function. Supporting metric: Number of Airports having integrated ACDM with the ATM Network function * As per the applicability area	(2022) 25%	50%	Dec 2024	N/A

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
Technology Threads							
ASUR							
ASUR B0/1	Automatic Dependent Surveillance – Broadcast (ADS-B)	Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi	Indicator*: % of States that have implemented ADS-B to improve surveillance coverage/capabilities for provision of ATS.	(2022) 60%	80%	Dec 2022	N/A
		Arabia, , Sudan, UAE	Supporting Metric: Number of States that have implemented ADS-B to improve surveillance coverage/capabilities for provision of ATS. * As per the applicability area				
ASUR B0/2	Multilateration cooperative surveillance systems (MLAT)	Bahrain, , Kuwait, Oman, Qatar, Saudi Arabia, UAE	Indicator*: % of States that have implemented Multi-lateration (M-LAT) for provision of ATS. Supporting Metric: Number of States that have implemented Multi-lateration (M-LAT) for provision of ATS. Indicator*: % of States that have implemented ADS-B to improve surveillance coverage/capabilities for provision of ATS. Supporting Metric: Number of States that have implemented ADS-B to improve surveillance coverage/capabilities for provision of ATS. * As per the applicability area	(2022) 63%	80%	Dec 2022	N/A
ASUR B0/3	Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS)	Bahrain, Egypt, Iran, Iraq, Kuwait, Lebanon, Jordan, Oman, Qatar, Saudi Arabia, Sudan and UAE	Indicator*: % of States that have implemented Downlink of Aircraft Parameters (SSR-DAPS) Supporting Metric: Number of States that have implemented Downlink of Aircraft Parameters (SSR-DAPS) * As per the applicability area	(2022) 83%	90%	Dec 2023	N/A

Element		Applicability	Performance Indicators/ Supporting Metrics	Baseline	Target	Timeline	KPA/ KPI
NAVS							
NAVS B0/3	Aircraft Based Augmentation Systems (ABAS)	All States	Indicator: % of States requiring Aircraft Based Augmentation System (ABAS) equipage for aircraft with a max certificated take-off mass greater than 5,700 Kg to enable PBN Operations Supporting metric: Number of States requiring Aircraft Based Augmentation System (ABAS) equipage for aircraft with a max certificated take-off mass greater than 5,700 Kg to enable PBN Operations	(2022) 40%	70%	Dec 2022	N/A
NAVS B0/4	Navigation Minimal Operating Networks (Nav. MON)	All States	Indicator: % of States that have developed a plan of rationalized conventional NAVAIDS network to ensure the necessary levels of resilience for navigation Supporting metric: Number of States that have developed a plan of rationalized conventional NAVAIDS network to ensure the necessary levels of resilience for navigation.	(2022) 47%	70%	Dec 2022	N/A
COMI							
COMI B0/7	ATS Message Handling System (AMHS)	All States	Indicator: % of States that have established AMHS interconnections with adjacent COM Centres Supporting metric: Number of States that have established AMHS interconnections with adjacent COM Centres	(2022) 73%	90%	Dec 2022	N/A
COMI B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)	All States	Indicator: % of States that have established National IP Network for voice and data communication Supporting metric: Number of States that have established National IP Network for voice and data communication	(2022) 60%	80%	Dec 2022	N/A

APPENDIX 7A

Deficiencies in the CNS field KUWAIT											
Item No	**Identification**		**Deficiencies**				**Corrective Action**				
	Requirement	Facilities/ Services	Description	Date first reported	Remarks/ Rationale for non-elimination		Facilities/ Services	Executing body	Date of completion	Priority for action
1	MID eANP VOl II, Table CNS II-2	Inter-regional Communication link with ICAO EUR/NAT Region	The Inter-regional Communication Link between Kuwait COM Centre and one of the entry/exit points of the ICAO EUR/NAT Region is not implemented	Mar 2019	-	O	-	Kuwait	Dec 2021	B

Deficiencies in the CNS field LEBANON											
Item No	**Identification**		**Deficiencies**				**Corrective Action**				
	Requirement	Facilities/ Services	Description	Date first reported	Remarks/ Rationale for non-elimination		Facilities/ Services	Executing body	Date of completion	Priority for action
1	MID eANP VOL II, Table CNS II-3	ATS Direct Speech circuit Ankara - Beirut	ATS Direct Speech Circuit between Ankara and Beirut is not implemented	Mar 2019	-	O	-	Lebanon and Turkey	Dec 2021	B

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

Deficiencies in the CNS field LIBYA										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	Facilities/ Services	Description	Date first reported	Remarks/ Rationale for non-elimination		Facilities/ Services	Executing body	Date of completion	Priority for action
1	MID eANP Vol II, Table CNS II-4	HF Service	HF Service in Tripoli is unserviceable	Mar 2019	-	O	-	Libya	Dec 2021	A

Deficiencies in the CNS field YEMEN										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	Facilities/ Services	Description	Date first reported	Remarks/ Rationale for non-elimination		Facilities/ Services	Executing body	Date of completion	Priority for action
1	MID eANP VOL II Table CNS II-3	ATS Direct speech Circuits Sana'a-Asmara, Sana'a-Djibouti, Sana'a-Mogadishu and Sana'a-Mumbai	ATS Direct speech circuits are not implemented between Sana'a-Mumbai a	Oct 1998	-	O	Corrective Action Plan has not been formally provided by the State	Yemen and India	Dec 2021	A

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

Deficiencies in the ATM field IRAN										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	MID ANP TABLE ATM II-MID-1 MID REGION ATS ROUTE NETWORK	-	ATS routes A418/UP574 not implemented	Dec 2006	KUMUN-PAPAR segment not implemented.	S O	Corrective Action Plan has not been formally provided by the State	Iran- UAE	Dec 2021	B

Deficiencies in the ATM field IRAQ										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	MID ANP Table ATM II-MID-1 MID REGION ATS ROUTE NETWORK	-	ATS route G667 not implemented	Sep 2006	Segment ALSAN-ABD not implemented	S	Corrective Action Plan has not been formally provided by the State	Iraq- Iran-Kuwait	Dec 2021	B
2	Annex 11 Para. 2.31	-	Development of contingency plan for implementation in the event of disruption or potential disruption of ATS and related supporting services. The Plan should also address natural disasters and public health emergencies. Contingency agreements should be signed with all adjacent ACCs.	Nov 2006	Contingency Agreement to be signed with Syria	S	Corrective Action Plan has not been formally provided by the State	Iraq	Dec 2021	A
3	MID ANP Table ATM II-MID-1 MID REGION	-	ATS route G795 not implemented	May 2008	RAF-BSR segment not implemented	S	Corrective Action Plan has not been formally	Iraq- Saudi Arabia	Dec 2021	B

	ATS ROUTE NETWORK						provided by the State			
4	MID ANP Table ATM II-MID-1 MID REGION ATS ROUTE NETWORK	-	ATS route A424 not implemented	May 2008	LOTAN-LOVEK segment not implemented	O	Corrective Action Plan has not been formally provided by the State	Iraq	Dec 2021	B

Deficiencies in the ATM field **JORDAN**										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 11 Para. 2.31	-	Development of contingency plan for implementation in the event of disruption or potential disruption of ATS and related supporting services. The Plan should also address natural disasters and public health emergencies. Contingency agreements should be signed with all adjacent ACCs.	Nov 2006	Contingency agreements not signed with Syria.	H	Corrective Action Plan has not been formally provided by the State. State comment: due to political impact in the region Jordan is not able to complete the signature of contingency agreements with all adjacent States	Jordan	Dec 2021	A

Deficiencies in the ATM field

LEBANON

Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 11 Para. 2.31	-	Development of contingency plan for implementation in the event of disruption or potential disruption of ATS and related supporting services. The Plan should also address natural disasters and public health emergencies. Contingency agreements should be signed with all adjacent ACCs.	Nov 2006	Contingency agreements not signed with Syria	S	Corrective Action Plan has not been formally provided by the State	Lebanon	Dec 2021	A
2	Annex 11 Para 3.3.5.1	-	Not reporting the required data to the MIDRMA in a timely manner.	March 2023	-	HO	Corrective Action Plan has not been formally provided by the State	Lebanon		A

Deficiencies in the ATM field LIBYA										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 11 Para 3.3.5.1	-	Not reporting the required data to the MIDRMA in a timely manner.	Dec 2013	-	H O	Corrective Action Plan has not been formally provided by the State	Libya	Dec 2021	A
2	Annex 11 Para. 2.31	-	Development of contingency plan for implementation in the event of disruption or potential disruption of ATS and related supporting services. The Plan should also address natural disasters and public health emergencies. Contingency agreements should be signed with all adjacent ACCs	Dec 2014	Agreement signed only with Egypt	S O	Corrective Action Plan has not been formally provided by the State	Libya	Dec 2021	A

Deficiencies in the ATM field

SAUDI ARABIA

Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 11 Para. 2.31	-	Development of contingency plan for implementation in the event of disruption or potential disruption of ATS and related supporting services. The Plan should also address natural disasters and public health emergencies. Contingency agreements should be signed with all adjacent ACCs.	Nov 2006	Contingency Agreements not signed with ~~Iraq, Qatar and~~ Sudan.	S	Corrective Action Plan has not been formally provided by the State	Saudi Arabia	Dec 2021	A

Deficiencies in the ATM field **SUDAN**											
Item No	**Identification**		**Deficiencies**				**Corrective Action**				
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 11 Para. 2.31	-	Development of contingency plan for implementation in the event of disruption or potential disruption of ATS and related supporting services. The Plan should also address natural disasters and public health emergencies. Contingency agreements should be signed with all adjacent ACCs.	Dec 2014	Contingency Agreement signed only with Egypt	H S O	Corrective Action Plan has not been formally provided by the State	Sudan	Dec 2021	A
2	Annex 11 Para 3.3.5.1	-	Not reporting the required data to the MIDRMA in a timely manner.	March 2024	-	H O	Corrective Action Plan has not been formally provided by the State	Sudan		A

Deficiencies in the ATM field SYRIA										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	MID ANP Table ATM II-MID-1 MID REGION ATS ROUTE NETWORK	-	ATS route G202 not implemented	Dec 1997	Segment DAKWE - Damascus not implemented	S	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2021	B
2	MID ANP Table ATM II-MID-1 MID REGION ATS ROUTE NETWORK	-	ATS route UL602 not implemented	Dec 2003	Segments ELEXI-DRZ-GAZ not implemented.	S	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2021	B
3	Annex 11 Para. 2.31	-	Development of contingency plan for implementation in the event of disruption or potential disruption of ATS and related supporting services. The Plan should also address natural disasters and public health emergencies. Contingency agreements should be signed with all adjacent ACCs.	Nov 2006	No signed agreement yet	H O	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2021	A

Deficiencies in the ATM field UAE											
Item No	**Identification**		**Deficiencies**				**Corrective Action**				
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	MID ANP Table ATM II-MID-1 MID REGION ATS ROUTE NETWORK	-	ATS routes A418/UP574 not implemented	Dec 2006	KUMUN-PAPAR segment not implemented.	S	Corrective Action Plan has not been formally provided by the State	Iran- UAE	Dec 2021	B

Deficiencies in the SAR field

IRAQ

Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 12 Para. 2.1	-	Lack of provision of required SAR services	Apr 2012	-	O	Corrective Action Plan has not been formally provided by the State	Iraq	Dec 2021	A

Deficiencies in the SAR field KUWAIT											
Item No	**Identification**		**Deficiencies**				**Corrective Action**				
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 6 Part I chap. 6 and Part II chap. 2 Annex 10, Vol III, Chap. 5 Annex 12 para. 2.6.4	ELT	Non-compliance with carriage of Emergency Locator Transmitter (ELT) requirements	Apr 2012	-	O	Corrective Action Plan has not been formally provided by the State	Kuwait	Dec 2021	A

Deficiencies in the SAR field LEBANON											
Item No	**Identification**		**Deficiencies**				**Corrective Action**				
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 12 Para. 2.1	-	Lack of provision of required SAR services	Apr 2012	-	O	Corrective Action Plan has not been formally provided by the State	Lebanon	Dec 2021	A

Deficiencies in the SAR field

LIBYA

Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 6 Part I chap. 6 and Part II chap. 2 Annex 10, Vol III, Chap. 5 Annex 12 para. 2.6.4	-	Non-compliance with carriage of Emergency Locator Transmitter (ELT) requirements	Dec 2014	-	H S O	Corrective Action Plan has not been formally provided by the State	Libya	Dec 2021	A
2	Annex 12 Para. 2.1	-	Lack of provision of required SAR services	Dec 2014	-	H S O	Corrective Action Plan has not been formally provided by the State	Libya	Dec 2021	A

Deficiencies in the SAR field

SYRIA

Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 12 Para. 2.1	-	Lack of provision of required SAR services	Apr 2012	-	O	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2021	A
2	Annex 6 Part I chap. 6 and Part II chap. 2 Annex 10, Vol III, Chap. 5 Annex 12 para. 2.6.4	-	Non-compliance with carriage of Emergency Locator Transmitter (ELT) requirements	Apr 2012	-	O	Corrective Action Plan has not been formally provided by the State	Syria	Dec 2021	A

Deficiencies in the SAR field YEMEN										
Item No	**Identification**		**Deficiencies**				**Corrective Action**			
	Requirement	**Facilities/ Services**	**Description**	**Date first reported**	**Remarks/ Rationale for non-elimination**		**Facilities/ Services**	**Executing body**	**Date of completion**	**Priority for action**
1	Annex 12 Para. 2.1	-	Lack of provision of required SAR services	Apr 2012	-	O	Corrective Action Plan has not been formally provided by the State	Yemen	Dec 2021	A
2	Annex 6 Part I chap. 6 and Part II chap. 2 Annex 10, Vol III, Chap. 5 Annex 12 para. 2.6.4	-	Non-compliance with carriage of Emergency Locator Transmitter (ELT) requirements	Apr 2012	-	O	Corrective Action Plan has not been formally provided by the State	Yemen	Dec 2021	A

COMMUNICATION, NAVIGATION AND SURVEILLANCE SUB-GROUP (CNS SG)

1. TERMS OF REFERENCE

1.1 The Terms of Reference of the CNS Sub-Group are:

a) ensure that the implementation of CNS 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 CNS-related ASBU Modules included in the MID Region Air Navigation Strategy as well as other required CNS supporting infrastructure, identify the associated difficulties and deficiencies and provide progress reports, as required;

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

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

e) provide a platform for harmonization of developments and deployments of CNS facilities and procedures within Region and inter regional;

f) monitor and review the latest developments in the area of CNS, , in particular, those related to the implementation of system-wide information management (SWIM) and flight and flow – information for a collaborative environment (FF-ICE), and provide expert inputs for CNS-related issues; and propose solutions for meeting ATM operational requirements;

g) follow-up the developments of ICAO position for future ITU World Radio Communication (WRC) Conferences and provide expert advises to States;

h) follow-up the operation of the MID ATS Message Management Center (MIDAMC);

i) ~~-~~monitor the allocation of aeronautical frequencies managed through the ICAO frequency finder tool;

~~h)~~j) provide regular progress reports to the MSG and MIDANPIRG concerning its work programme; and

~~i)~~k) review periodically its Terms of Reference and propose amendments, as necessary.

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

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

b) provide necessary inputs to the MID Region Air Navigation Strategy through the monitoring of the agreed Key Performance Indicators related to CNS facilities and procedures;

c) identify and review those specific deficiencies and problems that constitute major obstacles to the provision of efficient CNS implementation, and recommend necessary remedial actions;

d) lead the work programme of the MID-AMC including the conduct of trainings and upgrades;

e) monitor the MID aeronautical spectrum frequencies and recommend optimization and improvements as appropriate;

f) lead the technical activities related to the coordination and monitoring of the harmonized planning and implementation of system-wide information management (SWIM) and transition to flight and flow – information for collaborative environment (FF-ICE) services;

~~d)~~g) assist, coordinate, harmonize and support in the implementation of CNS facilities and procedures;

~~e)~~h) seek States support to ICAO Position at WRCs, and encourage States for the proper utilization of the Frequency Spectrum and Interrogation Code Allocations;

~~f)~~i) follow-up surveillance technologies implementation to be in line with the MID Region surveillance plan and the operational improvements in coordination with other Sub-Groups;

~~g)~~j) review, identify and address major issues in technical, operational, safety and regulatory aspects to facilitate the implementation or provision of efficient Surveillance services in the MID Region;

~~h)~~k) follow-up Global GNSS evolution, and provide assistance/guidance to states on available GNSS services;

~~i)~~l) address Datalink communication services and support implementation where operationally required;

~~j)~~m) review and identify inter-regional and intra-regional co-ordination issues in the field of CNS, harmonize and recommend actions to address those issues; and

~~k)~~n) Coordinate with relevant MIDANPIRG and RASG-MID Subsidiary bodies issues with common interests.

2. COMPOSITION

2.1 The Sub-Group is composed of:

a) MIDANPIRG Member States;

b) 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

List of Participants

State:	Administration	Name	Name in Full:	Job Title / Official Position:
Bahrain	CAA	Mr.	Yaseen AlSayed	Director Air Navigation Systems
Egypt	Egyptian Civil Aviation Authority (ECAA)	Mr.	Ahmed mostafa Mohamed Arman	CNS inspector - Air Navigation
Egypt	National Air Navigation Services Company (NANSC)	Mr.	Mohamed Salah Mohamed Abd El-Khalek Rabie	Central Satellite Stations Manager
Egypt	National Air Navigation Services Company (NANSC)	Mr.	WESSAM SALAHELDIN ABDELAZIZ IBRAHIM	Chief Engineer of the General Administration of Communications Engineering, Senior Communications Engineer with the rank of General Manager
Iraq	General Company for Airports and Air Navigation Management (GCAAN)	Mr.	Ali Nassrullah	CNS deputy director - Frequency Management focal point
Iraq	General Company for Airports and Air Navigation Management (GCAAN)	Mr.	Mohammed Mohsin ABDULAMEER	CNS Chief Engineer - CNS department
Iraq	General Company For Air Navigation	Mr.	Haider Mahdi Sadeq	AFTN-AMHS Programer - CNS department
Libya	Civil Aviation Authority (LYCAA)	Mr.	Alshawesh Abdulhakim Ali	Head of AMHS AFTN UNIT - CNS
Libya	Civil Aviation Authority (LYCAA)	Mr.	Mohamed Ali Khalifa Abdulmalek	Operation Supervisor AMHS Unit - CNS
Oman	Oman CAA - SLL CNS	Mr.	Ghanim Mahad Ali Fadhil	CNS Engineer / Communication Engineer
Oman	Civil Aviation Authority	Mr.	Said Hussein Al Bulushi	CNS Director
Qatar	Qatar Civil Aviation Authority	Mr.	Hussain Mohammed Habib Zainal	Senior Electronics Engineer
Qatar	Qatar Civil Aviation Authority	Mr.	Ali Mohammad Alhail	Head of Radar Engineering Unit, Air Navigation Department
Qatar	Qatar Civil Aviation Authority	Mr.	Khalid Mubarak Al-Muftah	Head of IT, Air Navigation Department
Saudi Arabia	General Authority of Civil Aviation (GACA)	Mr.	Ridha Salah DRIDI	ANS Safety & Technical advisor - Air Safety Safety Directorate
Saudi Arabia	General Authority of Civil Aviation (GACA)	Mr.	Faris Alzahrani	Head of Spectrum Management Office
Saudi Arabia	General Authority of Civil Aviation (GACA)-Saudi Academy of Civil Aviation SACA	Mr.	Mohammed Tariq Alwan	CNS Instructor
Saudi Arabia	General Authority of Civil Aviation (GACA)-Saudi Academy of Civil Aviation SACA	Mr.	Bandar Khalid Al-Harbi	CNS Instructor
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Loay Abdullah Beshawri	Automation Surveillance Engineering Dep Manager, Engineering Services Directorate
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Abdulkhaliq Ali Al Sugair	Maintenance Manager
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Bashar F. Al Thagafi	Maintenance Engn. Department
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Mohammed Al Qahtani	Maintenance Engineering MGR
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Ali Mosa	Systems Safety Specialist
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Jameel Metwalli	SFAC Project Manager
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Mohammad Gulsher Ahmad	Surv. Eng.
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Sameer Qttlan	Planning Eng. Mgr.
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Alaa Turki	Engineering Services Executive Director
Saudi Arabia	Saudi Air Navigation Services (SANS)	Mr.	Zaki Al Amri	Snr. Survellaince Eng.
UAE	Telecommunication & Digital Government Regulatory Authority	Mr.	Abdelrahman Al Muaini	Engineer Terrestrial Services
UAE	General Civil Aviation Authority (GCAA)	Mr.	Hamad Al Marzooqi	Communication Supervisor
UAE	General Civil Aviation Authority (GCAA)	Mr.	Abdulla Alsayed Ahmed Alsayed Abdulla Almarzooqi	Senior Inspector Air Navigation & CNS - Air Navigation & Aerodrome
UAE	General Civil Aviation Authority (GCAA)	Mr.	Rashed Ahmed Al Shehhi	Senior Manager - ANS ENG
UAE	General Civil Aviation Authority (GCAA)	Mr.	Yousif Al Awadhi	Director CNS
Organization/Industry:	**Administration**	**Name**	**Name in Full:**	**Job Title / Official Position:**
GCC Telecom Bureau	GCC Telecommunications Bureau - The Cooperation Council for the Arab States of the Gulf	Mr.	Ali Abdulhameed Saleh	Telecommunication Engineer
IATA	IATA	Mrs.	Lindi-Lee KIRKMAN	Regional Head Flight Operations, Air Traffic Management & Infrastructure
PCCW Global Ltd	Hong Kong China	Mr.	Eddy Lee	Assistant Vice President, Solution Consultant
PCCW Global Ltd	CRV Service Provider	Mr.	Robbert Poon	Senior Solutions Consultant
PCCW Global Ltd	CRV network provider	Mr.	Kung Wai Shun Jarryd	Business Development Manager
PCCW Global Ltd	CRV Service Provider	Mr.	Chun Kwong MAK	Program Director
PCCW Global Ltd	PCCW Global	Mr.	Mohamed AbdelMeged Mohamed	Presales Solutions Architect
ICAO	ICAO APAC	Ms.	SONIYA NIBHANI	REGIONAL OFFICER ANS IMPLEMENTATION
ICAO	ICAO MID	Mr.	MOHAMED IHEB HAMDI	Regional Officer, Aerodromes and Ground Aids and CNS Coordinator

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