

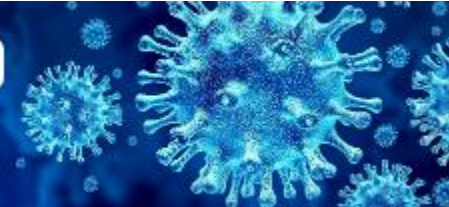


ICAO MID

Sixth Meeting of the MIDANPIRG Air Traffic Management Sub-Group (ATM SG/6)

(9 - 12 November 2020)





ATM SG/6 Meeting

Agenda Item 4: ATM Planning and Implementation Issues:

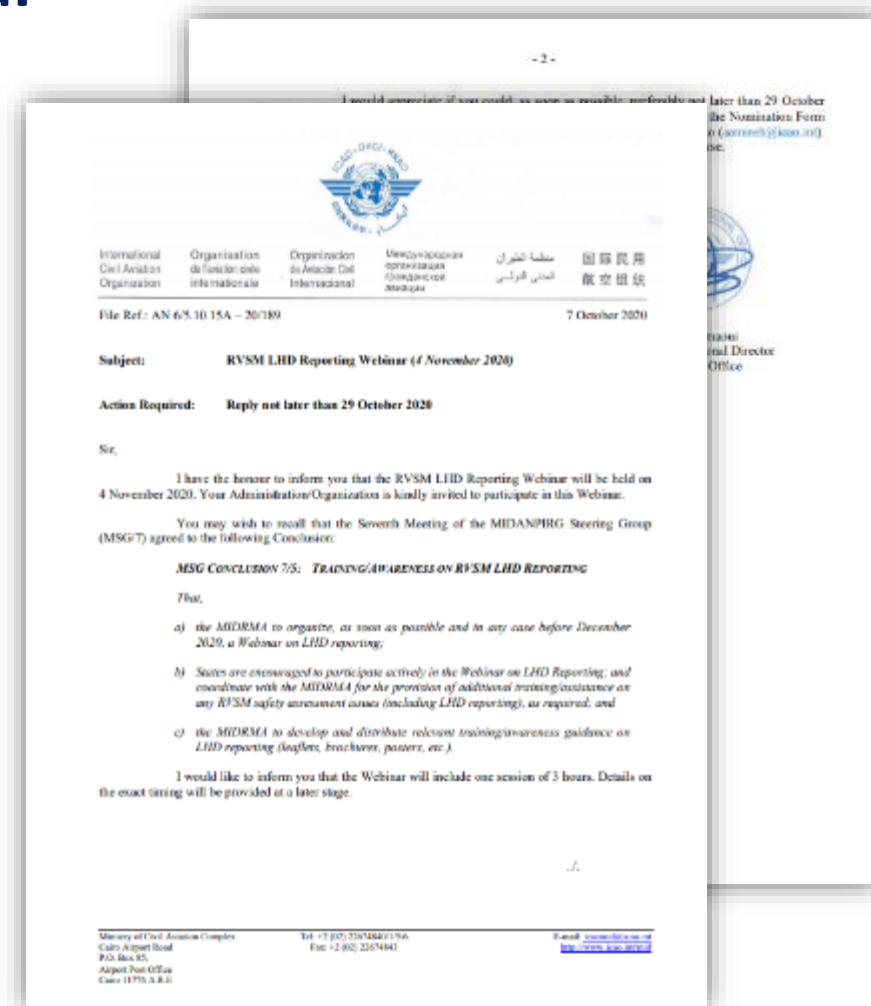
- Follow-up on ATM SG/5 Draft Conclusions and Decisions
- Revised MID Air Navigation Strategy
- **RVSM Implementation**
- Review of the Outcomes of ATFM TF/4 Meeting
- Review of the Outcomes of FWC2022 TF/4 Meeting
- Other ATM Issues
- Air Navigation Deficiencies related to ATM and SAR



RVSM LHD Reporting Webinar

As a follow-up to MSG/7 Conclusion 7/5 related to Training / Awareness on RVSM LHD Reporting, State letter AN 6/5.10.15A – 20/189 dated 7 October 2020 was issued to invite States to participate in the Webinar.

- *The webinar was held virtually on 4 Nov 2020 with a total of 128 Participants; from 14 States and 1 International Organization (IFATCA), including MIDRMA and ICAO MID Office staff.*
- *The scope of the training session focused on MIDRMA duties and responsibilities mainly on the LHD reporting for the development of the Annual SMRs reports.*



SMR2019

Status of reporting:

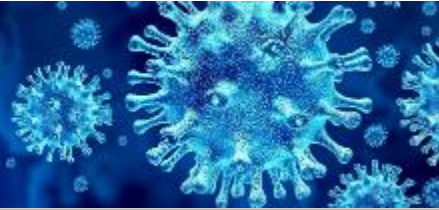
- Reporting period: 1 Aug 2019 – 31 July 2020
- TDS for the period: 1 – 31 Aug 2019
- TDS reporting status: 13 FIRs provided an accepted TDS (Except Tripoli)
- LHD reporting status: Received from main FIRs with high volume of traffic and complexity

| FIR | Status | Remarks |
|--------------------|---------------|-----------------|
| Bahrain FIR | Accepted | - |
| Cairo FIR | Accepted | - |
| Amman FIR | Accepted | - |
| Muscat FIR | Accepted | - |
| Tehran FIR | Accepted | - |
| Khartoum FIR | Accepted | - |
| Emirates FIR | Accepted | - |
| Damascus FIR | Accepted | - |
| Sana'a FIR | Accepted | - |
| Jeddah FIR | Accepted | - |
| Beirut FIR | Accepted | - |
| Baghdad FIR | Accepted | - |
| Kuwait FIR | Accepted | - |
| Tripoli FIR | No TDS | Excluded |
| Total | 13 FIRs | |

SMR2019

| SN | MID FIRs | No of TDS Aug 2018 | No of TDS Aug 2019 | Sep 2018 vs Aug 2019 |
|--------------|--------------|--------------------|--------------------|----------------------|
| 1 | Bahrain FIR | 30703 | 34949 | + 13.83 |
| 2 | Cairo FIR | 31094 | 31843 | + 2.41 |
| 3 | Amman FIR | 6845 | 6645 | - 2.92 |
| 4 | Muscat FIR | 40403 | 46315 | + 14.63 |
| 5 | Tehran FIR | 55628 | 37676 | -32.27 |
| 6 | Khartoum FIR | 7303 | 5115 | -29.96 |
| 7 | Emirates FIR | 23457 | 24259 | + 3.42 |
| 8 | Damascus FIR | No TDS | 4733 | - |
| 9 | Sana'a FIR | 4498 | 4573 | + 1.67 |
| 10 | Jeddah FIR | 48926 | 43728 | -10.62 |
| 11 | Beirut FIR | No TDS | 1537 | - |
| 12 | Baghdad FIR | 21621 | 21580 | -0.19 |
| 13 | Kuwait FIR | 16673 | 19534 | + 17.16 |
| 14 | Tripoli FIR | No TDS | No TDS | - |
| Total | | 287,151 | 282,487 | -1.62% |

| LHD Cat. Code | Large Height Deviation (LHD) Category | No. of LHDs | LHD Duration (Sec.) |
|---------------|--|-------------|---------------------|
| A | Flight crew fails to climb or descend the aircraft as cleared | 5 | 174 |
| B | Flight crew climbing or descending without ATC clearance | 3 | 81 |
| C | Incorrect operation or interpretation of airborne equipment | | |
| D | ATC system loop error | 1 | 120 |
| E | ATC transfer of control coordination errors due to human factors | 8 | 295 |
| F | ATC transfer of control coordination errors due to technical issues | | |
| G | Aircraft contingency leading to sudden inability to maintain level | | |
| H | Airborne equip. failure and unintentional or undetected FL change | 2 | 50 |
| I | Turbulence or other weather related cause | 1 | 20 |
| J | TCAS resolution advisory and flight crew correctly responds | 2 | 50 |
| K | TCAS resolution advisory and flight crew incorrectly responds | | |
| L | An aircraft being provided with RVSM separation is not RVSM approved | | |
| M | Other | 2 | 50 |
| Total | | 24 | 840 |



SMR2019

Conclusions (SMR2019 report para 1.2):

- (i) The estimated **risk of collision associated with aircraft height-keeping performance is 2.012×10^{-13}** and meets the ICAO TLS of 2.5×10^{-9} fatal accidents per flight hour (RVSM Safety Objective 1),
- (ii) The estimated overall risk of collision due to all causes which includes **the technical risk and all risk due to operational errors and in-flight contingencies is 8.345×10^{-10}** meets the ICAO overall TLS of 5×10^{-9} fatal accidents per flight hour (RVSM Safety Objective 2),
- (i) Based on currently-available information (Except for Tripoli FIR), there is no evidence available to MIDRMA that the continued operations of RVSM adversely affects the overall vertical risk of collision.

SMR2020

Status of reporting:

- Reporting period: 1 Jan 2020 – 31 Dec 2020
- TDS for the period: 1 – 31 Jul 2020
- TDS reporting status: 13 / 14
- LHD reporting status: on going

| | FIR | Date of Receipt |
|----|--------------------|-----------------|
| 1 | Bahrain FIR | 24/08/2020 |
| 2 | Cairo FIR | 24/08/2020 |
| 3 | Amman FIR | 14/08/2020 |
| 4 | Baghdad FIR | 15/08/2020 |
| 5 | Tehran FIR | 02/09/2020 |
| 6 | Jeddah FIR | 31/08/2020 |
| 7 | Kuwait FIR | 08/08/2020 |
| 8 | Beirut FIR | 01/09/2020 |
| 9 | Muscat FIR | 24/08/2020 |
| 10 | Damascus FIR | 16/08/2020 |
| 11 | Khartoum FIR | 25/08/2020 |
| 12 | Sana'a FIR | 24/08/2020 |
| 13 | Emirates FIR | 12/08/2020 |
| 14 | Tripoli FIR | No TDS |

Action by the Meeting:

The meeting is invited to:

1. note the progress made on the level of LHD reporting;
2. encourage States to continue providing the LHD reports for the MIDRMA; and
3. review the final draft of SMR2019 report and agree to present it to MIDANPIRG/18 for endorsement.



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(APAC) Office
Bangkok



THANK YOU



MID RVSM SAFETY MONITORING REPORT 2019 (SMR 2019)

Prepared by the Middle East Regional Monitoring Agency (MIDRMA)

SUMMARY

The aim of the MID RVSM Safety Monitoring Report 2019 is to provide airspace safety review of the MID RVSM airspace and to highlight by means of arguments and supporting evidence that the implementation of RVSM in the Middle East is acceptably safe.

1. Introduction:

1.1 Executive Summary

The MID RVSM Safety Monitoring Report is issued by the Middle East Regional Monitoring Agency (MIDRMA) for endorsement by the Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG).

The report presents evidence that according to the data and methods used, all safety objectives set out in the MID RVSM Safety Policy in accordance with ICAO Doc 9574 (2nd Edition) continue to be met in operational services within the Middle East RVSM airspace, however there are some remarks concerning Safety Objective No. 2 which are addressed in the recommendations section of this objective.

To conclude on the current safety of RVSM operations, the three key safety objectives endorsed by MIDANPIRG have to be met:

Objective 1 The risk of collision in MID RVSM airspace due solely to technical height-keeping performance meets the ICAO target level of safety (TLS) of 2.5×10^{-9} fatal accidents per flight hour.

The value computed for technical height risk is estimated 2.012×10^{-13} this meets RVSM Safety Objective 1.

Objective 2 The overall risk of collision due to all causes which includes the technical risk and all risk due to operational errors and in-flight contingencies in the MID RVSM airspace meets the ICAO overall TLS of 5×10^{-9} fatal accidents per flight hour.

The value computed for the overall risk is estimated 8.345×10^{-10} this meets RVSM Safety Objective 2.

Objective 3 Address any safety-related issues raised in the SMR by recommending improved procedures and practices; and propose safety level improvements to ensure that any identified serious or risk-bearing situations do not increase and, where possible, that they decrease. This should set the basis for a continuous assurance that the operation of RVSM will not adversely affect the risk of en-route mid-air collision over the years.

| Middle East RVSM Airspace Estimated Annual Flying Hours = (2,389,128) Average Aircraft Speed = 450.07 kts | | | |
|--|-------------------------------|----------------------------|-----------------------|
| Risk Type | Risk Estimation | ICAO TLS | Remarks |
| Technical Risk | 2.012x10⁻¹³ | 2.5x10⁻⁹ | Below ICAO TLS |
| Overall Risk | 8.345x10⁻¹⁰ | 5x10⁻⁹ | Below ICAO TLS |

1.2 Conclusions:

- (i) The estimated risk of collision associated with aircraft height-keeping performance is **2.012x10⁻¹³** and meets the ICAO TLS of **2.5 x 10⁻⁹** fatal accidents per flight hour (RVSM Safety Objective 1),
- (ii) The estimated overall risk of collision due to all causes which includes the technical risk and all risk due to operational errors and in-flight contingencies is **8.345x10⁻¹⁰** meets the ICAO overall TLS of **5x10⁻⁹** fatal accidents per flight hour (RVSM Safety Objective 2),
- (iii) Based on currently-available information (Except for Tripoli FIR), there is no evidence available to MIDRMA that the continued operations of RVSM adversely affects the overall vertical risk of collision.

1.3 Considerations on the RVSM Safety Objectives for MID RVSM SMRs

When considering the three safety objectives for RVSM, the following considerations should be borne in mind:

1. The assessment of risk against the TLS, both for technical and overall risk estimates, relies on height-keeping performance data to assess the risk in the vertical plane and studies of traffic density to calculate the risk in the horizontal plane. There are numbers of assumptions that must be verified to satisfy the reliability of the risk assessment, the verification of these assumptions deals primarily with monitoring of aircraft performance issues.
2. The Aircraft performance is assessed by individual airframe and by monitoring group. A monitoring group consists of aircraft that are nominally of the same type with

identical performance characteristics that are made technically RVSM compliant using a common compliance method. Monitoring group analysis is necessary to verify that the Minimum Aviation System Performance Standards (MASPS) for that group is valid. Aircraft that are made RVSM compliant on an individual basis are termed non-group.

3. The RVSM Safety Objective 2, dealing with overall risk, takes into account the technical risk together with the risk from all other causes. In practice, this relates to the human influence and assessment of this parameter relies on adequate reporting of Large Height Deviation (LHD) Reports, and the correct interpretation of events for input to the CRM.
4. RVSM Safety Objective 3 requires the RMA to monitor long-term trends and to identify potential future safety issues, this compare the level of risk bearing incidents for the current reporting period. It also highlights if there are issues that should be carried forward as recommendations to be adopted for future reports.

2.1 Discussion

Scope:

The geographic scope of the MID RVSM Safety Monitoring Report covers the MID RVSM airspace, which comprises the following FIRs/UIRs:

| | | | | | | |
|--------|---------|----------|---------|--------|----------|----------|
| Amman | Bahrain | Beirut | Baghdad | Cairo | Damascus | Emirates |
| Jeddah | Kuwait | Khartoum | Muscat | Sana'a | Tehran | Tripoli* |

T-1: FIRs/UIRs of the Middle East RVSM Airspace

***Note: Tripoli FIR excluded from the RVSM safety analysis due to lack of data.**

The Data Sampling periods covered by SMR 2018 are as displayed in the below table

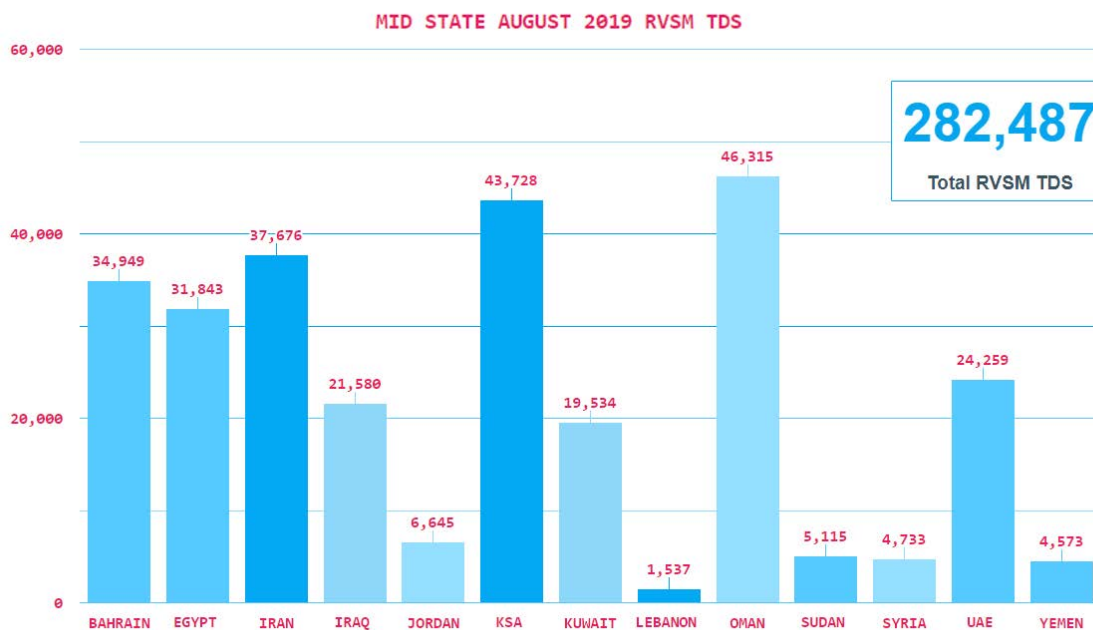
| Report Elements | Time Period |
|--------------------------------|-------------------------|
| Traffic Data Sample | 01/08/2019 - 31/08/2019 |
| Operational & Technical Errors | 01/08/2019 - 31/07/2020 |

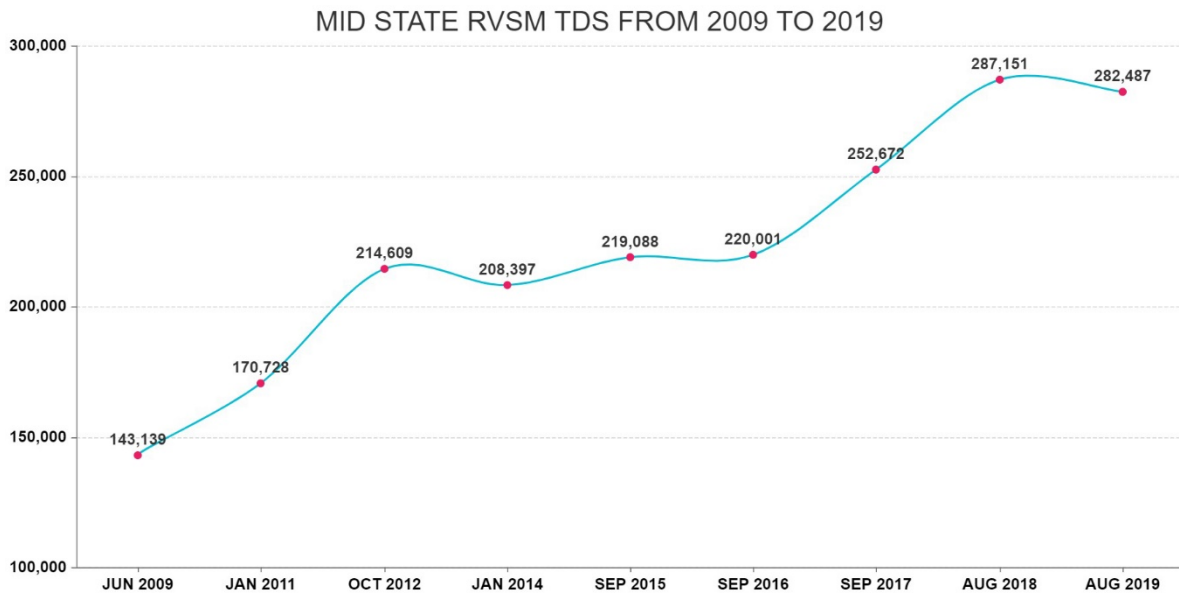
T-2: Time Period for the Reported Elements

| MID States | Status | Remarks |
|--------------------|---------------|-----------------|
| Bahrain FIR | Accepted | - |
| Cairo FIR | Accepted | - |
| Amman FIR | Accepted | - |
| Muscat FIR | Accepted | - |
| Tehran FIR | Accepted | - |
| Khartoum FIR | Accepted | - |
| Emirates FIR | Accepted | - |
| Damascus FIR | Accepted | - |
| Sana'a FIR | Accepted | - |
| Jeddah FIR | Accepted | - |
| Beirut FIR | Accepted | - |
| Baghdad FIR | Accepted | - |
| Kuwait FIR | Accepted | - |
| Tripoli FIR | No TDS | Excluded |
| Total | 13 FIRs | |

Table 1; Status of the MID States RVSM Traffic Data Sample (TDS) for August 2019

2.1.1 The description of the traffic data processed for each MIDRMA member state by the MID Risk Analysis Software (MIDRAS) is depicted in the graph below, a total of **282,487** flights were processed for the 13 FIRs, these flights were evaluated and processed very carefully to ensure accurate results according to the data submitted.





| SN | MID FIRs | No of TDS Aug 2018 | No of TDS Aug 2019 | Sep 2018 vs Aug 2019 |
|--------------|--------------|--------------------|--------------------|----------------------|
| 1 | Bahrain FIR | 30703 | 34949 | + 13.83 |
| 2 | Cairo FIR | 31094 | 31843 | + 2.41 |
| 3 | Amman FIR | 6845 | 6645 | - 2.92 |
| 4 | Muscat FIR | 40403 | 46315 | + 14.63 |
| 5 | Tehran FIR | 55628 | 37676 | -32.27 |
| 6 | Khartoum FIR | 7303 | 5115 | -29.96 |
| 7 | Emirates FIR | 23457 | 24259 | + 3.42 |
| 8 | Damascus FIR | No TDS | 4733 | - |
| 9 | Sana'a FIR | 4498 | 4573 | + 1.67 |
| 10 | Jeddah FIR | 48926 | 43728 | -10.62 |
| 11 | Beirut FIR | No TDS | 1537 | - |
| 12 | Baghdad FIR | 21621 | 21580 | -0.19 |
| 13 | Kuwait FIR | 16673 | 19534 | + 17.16 |
| 14 | Tripoli FIR | No TDS | No TDS | - |
| Total | | 287,151 | 282,487 | -1.62 |

MID States RVSM TDS 2018 VS 2019

| SN | Reporting Point | FIRs | No of Flights |
|----|-----------------|------------------|---------------|
| 1 | SIDAD | BAGHDAD/KUWAIT | 9447 |
| 2 | TASMI | BAGHDAD/KUWAIT | 9298 |
| 3 | DAVUS | KUWAIT/BAHRAIN | 8941 |
| 4 | NINVA | ANKARA/BAGHDAD | 8326 |
| 5 | RATVO | ANKARA/BAGHDAD | 7748 |
| 6 | TUMAK | BAHRAIN/EMIRATES | 7234 |
| 7 | LONOS | KUWAIT/BAHRAIN | 5918 |
| 8 | PASAM | JEDDAH/CAIRO | 5166 |
| 9 | ULADA | BAHRAIN/JEDDAH | 5137 |
| 10 | OBNET | BAHRAIN/EMIRATES | 5106 |
| 11 | RABAP | KUWAIT/BAHRAIN | 5106 |
| 12 | TAPDO | MUSCAT/KARACHI | 5042 |
| 13 | ALPOB | BAHRAIN/EMIRATES | 4774 |
| 14 | PASOV | MUSCAT/EMIRATES | 4502 |
| 15 | ULINA | AMMAN/CAIRO | 4496 |
| 16 | SALUN | ATHINAI/CAIRO | 4470 |
| 17 | ALPOR | MUSCAT/KARACHI | 4402 |
| 18 | TARDI | EMIRATES/MUSCAT | 4345 |
| 19 | DASUT | BAHRAIN/TEHRAN | 4019 |
| 20 | RASKI | MUSCAT/MUMBAI | 3848 |

TDS 2019 Top 20 Busiest FIR Entry / Exit Points

2.1.3 For the Fifth consecutive Safety Monitoring Reports, Tripoli FIR excluded temporary from the RVSM safety analysis due to lack of TDS and LHD reports, taking into consideration the MIDRMA never done any risk analysis for Tripoli FIR RVSM airspace since Libya joint the MIDRMA, this issue require MIDANPIRG to decide what action should be taken if RVSM operations resume again within Tripoli FIR in the future.

2.2 The Collision Risk Model (CRM)

2.2.1 The risk of collision to be modelled is that due to the loss of vertical separation between aircraft flying between FL290 and FL410 in a given portion of an airspace. One collision between two aircraft is counted as the occurrence of two accidents. The risk of collision depends both on the total number and types of aircraft flying in the system and the system characteristics.

2.2.2 The CRM provides an estimate of the number of accidents within an airspace system that might occur per aircraft flight hour due to aircraft collisions resulting from the loss of vertical separation in an RVSM environment analysis, is expressed in terms of quantifiable parameters. In the vertical dimension the CRM can be broken down in order to separately model a single route on which aircraft are flying in the same or opposite directions at adjacent flight levels, pairs of crossing routes and combinations of individual and intersecting routes, this model is applied equivalently to vertical, lateral and longitudinal separation.

2.2.3 Three parameters used within the CRM:

- a. The Vertical Overlap Probability, denoted as $P_z(1\ 000)$.

- b. The Lateral Overlap Probability, denoted as $P_y(0)$.
- c. The aircraft Passing Frequency are the most important quantities in determining the vertical collision risk. Of these, the vertical overlap probability is also an important parameter to calculate.

2.3 TECHNICAL HEIGHT KEEPING PERFORMANCE RISK ASSESSMENT

RVSM Safety Objective 1

The risk of collision in MID RVSM airspace due solely to technical height-keeping performance meets the ICAO target level of safety (TLS) of 2.5×10^{-9} fatal accidents per flight hour.

2.3.1. Direct evidence of compliance with TLS for Technical Height-Keeping Error

The result shows the risk of collision due to technical height-keeping performance is estimated to be 2.012×10^{-13} fatal accidents per flight hour, which is less than the ICAO TLS 2.5×10^{-9} .

2.3.2 Supporting evidence of compliance with TLS for technical height-keeping performance

To demonstrate that the result is reliable, it is necessary to demonstrate that the following assumptions are true:

- a. The estimated value of the frequency of horizontal overlap, used in the computations of vertical-collision risk, is valid,
- b. $P_z(1000)$ – the probability of vertical overlap due to technical height-keeping performance, between aircraft flying 1000 ft. separation in MID RVSM airspace is estimated 3.257×10^{-11} valid and is less than the ICAO requirement of 1.7×10^{-8} ,
- c. All aircraft flying with 1000ft vertical separation in MID RVSM airspace meet the ICAO Global Height Keeping Performance specifications for RVSM(All MID RVSM approved aircraft are part of the MID RVSM Height keeping Performance Program),
- d. All aircraft flying 1000ft vertical separation in MID RVSM airspace meet the individual ICAO performance specification for the components of total vertical error (TVE),
- e. The monitoring target for the MID RVSM height-monitoring programme is an on-going process,
- f. The input data used by the CRM is valid,
- g. An adequate process is in place to investigate and correct problems in aircraft technical height-keeping performance.

2.3.3 Calculating the Probability of Lateral Overlap ($P_y(0)$)

The probability of lateral overlap $P_y(0)$ is the probability of two aircraft being in lateral overlap which are nominally flying on (adjacent flight levels of) the same route. The calculation of the $P_y(0)$ for the SMR 2018 has the following to consider:

- a. The MIDRMA continued to calculate the probability of lateral overlap $P_y(0)$ for all the MID RVSM airspace as per the ICAO methodology developed for this purpose and derived by the MID Risk Analysis Software (MIDRAS).

- b. The MIDRMA calculated the average of the probability of lateral overlap $P_y(0)$ for the whole MID RVSM airspace is estimated to be 1.145×10^{-10}
- c. Overall, the results are considered to be valid.

2.3.4 Pz(1000) Compliance

The Pz(1000) is the probability that two aircraft at adjacent RVSM flight levels will lose vertical separation due to technical height keeping errors. The value of the probability of vertical overlap Pz(1000), based on the actual observed ASE and typical AAD data is estimated to be of 3.257×10^{-11} . This value meets the Global System Performance Specification that the probability that two aircraft will lose procedural vertical separation of 1000ft should be no greater than 1.7×10^{-8} .

The MIDRMA continue to issue the minimum monitoring requirements (MMRs) through the automated MMR software which is programmed to address the MIDRMA member states with their updated requirements according to the latest RVSM approvals received, the MMR table valid for October 2020 is available in **Appendix B**.

Note: All member states are required to check and comply with their MMR through the MIDRMA website (www.midrma.com).

| MID RVSM SMRs Technical Risk Values | | | | |
|-------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Year 2006 | Year 2008 | Year 2010 | Year 2011 | Year 2012/13 |
| 2.17×10^{-14} | 1.93×10^{-13} | 3.96×10^{-15} | 5.08×10^{-14} | 6.37×10^{-12} |
| Year 2014 | Year 2015 | Year 2016 | Year 2017 | Year 2018 |
| 3.18×10^{-12} | 3.056×10^{-10} | 6.347×10^{-11} | 4.966×10^{-11} | 1.562×10^{-11} |
| | | Year 2019 | | |
| | | 2.012×10^{-13} | | |

According to the technical risk values as shown in the above table the TLS values still, meet the ICAO TLS.

2.3.5 Conclusions on Technical Vertical Collision Risk:

- a. The current computed vertical-collision risk due to technical height-keeping performance meets the ICAO TLS.
- b. The probability of vertical-overlap estimate, Pz(1000), satisfies the global system performance specification.
- c. Most monitoring groups are complying with ICAO TVE component requirements (also known as technical height-keeping group requirements).

2.3.6 Recommendations for Safety Objective 1:

- a. The MIDRMA shall continue to review the content and structure of its aircraft monitoring groups.

- b. The MIDRMA will continue to keep the methods of calculating the technical CRM parameters and the risk due to technical height keeping errors under review and explore more options to enhance the MID Risk Analysis Software (MIDRAS).
- c. The MIDRMA shall carry out continuous survey and investigation concerning aircraft flying within the MID RVSM airspace by collecting the TDS from member states offered to submit their RVSM TDS on a monthly basis.

2.4 ASSESSMENT OF OVERALL RISK DUE TO ALL CAUSES AGAINST THE TLS OF 5×10^{-9} FATAL ACCIDENTS PER FLIGHT HOUR

RVSM Safety Objective 2

The overall risk of collision due to all causes which includes the technical risk and all risk due to operational errors and in-flight contingencies in the MID RVSM airspace meets the ICAO overall TLS of 5×10^{-9} fatal accidents per flight hour.

The computed value for the overall risk is 8.345×10^{-10} this meets RVSM Safety Objective 2.

| Overall Risk Values | | | | |
|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Year 2006 | Year 2008 | Year 2010 | Year 2011 | Year 2012/13 |
| Not calculated | 4.19×10^{-13} | 6.92×10^{-12} | 1.04×10^{-11} | 3.63×10^{-11} |
| Year 2014 | Year 2015 | Year 2016 | Year 2017 | Year 2018 |
| 4.91×10^{-11} | 7.351×10^{-10} | 5.691×10^{-10} | 4.518×10^{-11} | 9.845×10^{-11} |
| | | Year 2019 | | |
| | | 8.345×10^{-10} | | |

2.4.1 The vertical risk estimation due to atypical errors has been demonstrated to be the major contributor in the overall vertical-risk estimation for the MID RVSM airspace, In the previous SMRs the processed data were severely influenced by either NIL reporting of Large Height Deviations (LHDs) and no reports of categories A, B, C, D, J and K as without these data (especially from FIRs with high volume of traffic) which was impossible to assess compliance with the ICAO overall TLS of 5×10^{-9} fatal accidents per flight hour.

2.4.2 The MIDRMA presented the progress made in the development of the SMR 2019 to MSG/7 Virtual meeting (01 - 03 September 2020) , and highlighted serious concerns due to the lack of LHD Reports Categories A, B C, D, H, J and K, especially from the States/FIRs with high volume of Traffic. Therefore, the MIDRMA was unable to calculate the overall risk related to RVSM Safety Objective 2 before MSG/7. Accordingly, the meeting urged States to provide the MIDRMA with the required LHD Reports before 15 October 2020, in order for the MIDRMA to finalize the SMR-2019 and present it to the ATM SG (Virtual Meeting) before presentation to MIDANPIRG/18 for endorsement and agreed to the following conclusion:

MSG CONCLUSION 7/4: RVSM DATA PROVISION TO THE MIDRMA

That,

in order to allow the MIDRMA to finalize the development of the SMR-2019 & 2020:

- a) States are urged to comply with the provisions of the MIDANPIRG Conclusion 14/35; and*
- b) States with high volume of traffic be included in the list of air navigation deficiencies, if LHD reports are not provided before 15 October 2020.*

2.4.3 The extreme majority of the MIDRMA Member States complied with the above conclusion and coordinated with the MIDRMA to file all LHD reports from various categories for the reporting cycle of SMR 2019. The MIDRMA was able for the first time to calculate the overall risk for the MID RVSM airspace with LHD reports covering nearly most of its area of responsibility.

2.4.4 The MIDRMA continued to monitor the LHD reports at the eastern FIR boundary of Muscat FIR filed by Mumbai, the MIDRMA indicated in SMR 2017 the level of LHD reports filed by Muscat, Mumbai and Karachi ATCUs related to each other at their transfer of control points reached to a dangerous level and started to effect the ICAO TLS of RVSM implementation in the MID and APAC regions, therefore the MIDRMA requested from MIDRMA Board/15 meeting (Muscat – Oman 29 – 31 January 2018) to open a Safety Protocol for the purpose of resolving this issue as soon as possible.

2.4.5 However, the MIDRMA can't see much improvement for SMR 2019 as the level of reporting LHDs between Mumbai and Muscat remain high and the safety concern still exist at the common FIR boundary points while the level of reporting LHDs between Karachi and Muscat remain in its normal reporting level.

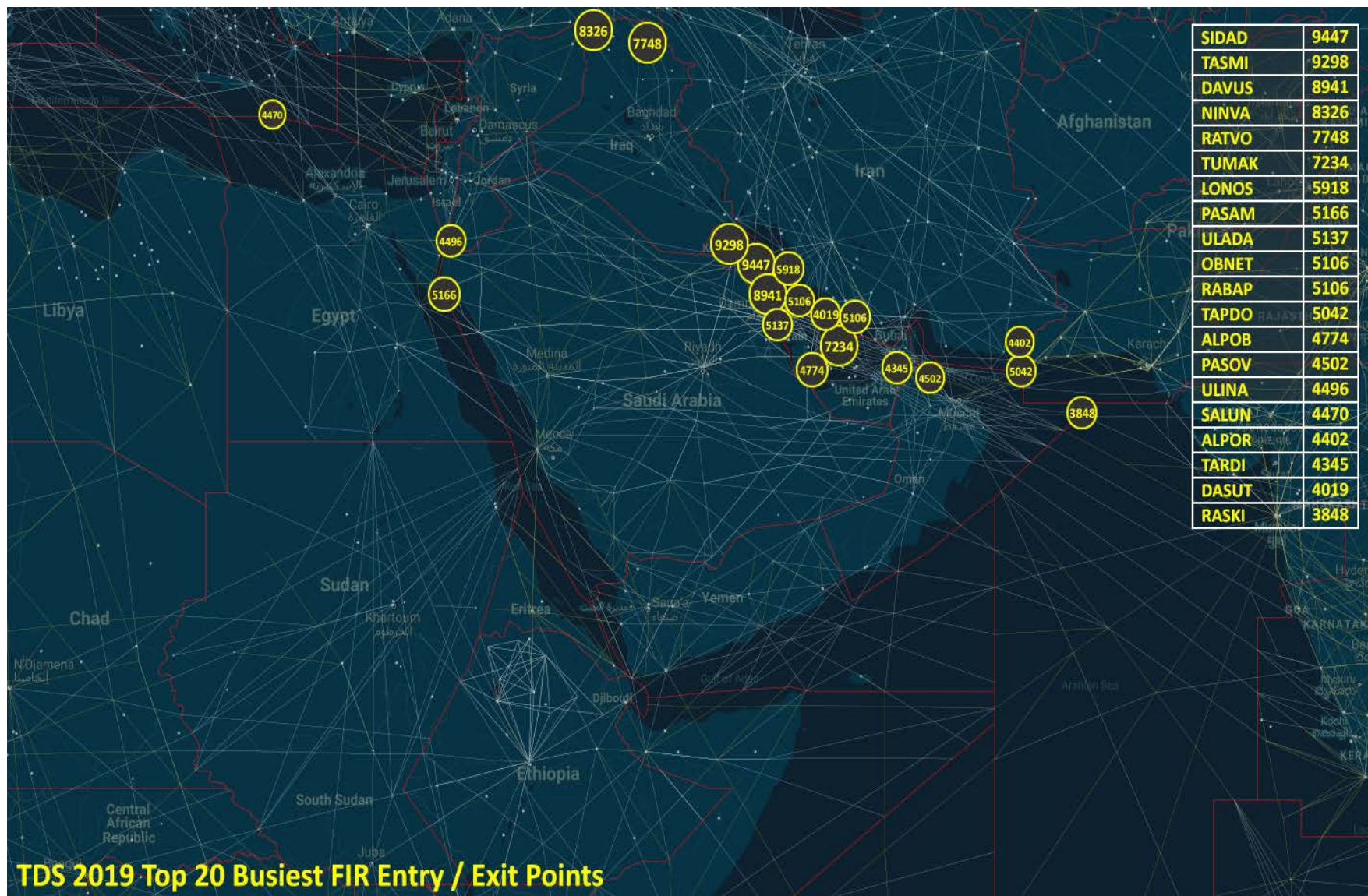
Note: A Safety Protocol is a critical safety issue effecting the implementation of RVSM operations which require the concerned authority an immediate action to rectify/resolve the problem in a certain period of time under the supervision of MIDRMA and ICAO MID Office.

2.4.6 The Safety Protocol is under continuous review by MIDRMA and MAAR and the LHD reports filed by all concerned ATC Units are investigated and evaluated through the MIDRMA online LHD system and further update will be addressed to the next MIDRMA Board meeting.

2.4.7 The Table below presents a summary of operational risk associated with Large Height Deviation (LHD) reports by LHD categories, these reports used to calculate the overall vertical collision risk for the MID RVSM airspace.

| LHD Cat. Code | Large Height Deviation (LHD) Category | No. of LHDs | LHD Duration (Sec.) |
|---------------|--|-------------|---------------------|
| A | Flight crew fails to climb or descend the aircraft as cleared | 5 | 174 |
| B | Flight crew climbing or descending without ATC clearance | 3 | 81 |
| C | Incorrect operation or interpretation of airborne equipment | | |
| D | ATC system loop error | 1 | 120 |
| E | ATC transfer of control coordination errors due to human factors | 8 | 295 |
| F | ATC transfer of control coordination errors due to technical issues | | |
| G | Aircraft contingency leading to sudden inability to maintain level | | |
| H | Airborne equip. failure and unintentional or undetected FL change | 2 | 50 |
| I | Turbulence or other weather related cause | 1 | 20 |
| J | TCAS resolution advisory and flight crew correctly responds | 2 | 50 |
| K | TCAS resolution advisory and flight crew incorrectly responds | | |
| L | An aircraft being provided with RVSM separation is not RVSM approved | | |
| M | Other | 2 | 50 |
| Total | | 24 | 840 |

Summary of Operational Risk associated with Large Height Deviation



2.4.8 Effects of Future Traffic Growth

The effect of future traffic growth on the vertical collision risk can be evaluated on the assumption of a linear relationship between traffic growth and frequency of horizontal overlap, which will directly affect the two components of the risk: the risk due to technical height-keeping performance and due to atypical operational errors.

It is clear that even for the most optimistic forecast range of 13%, the overall risk of collision will continue to meet the TLS at least until 2022. With the current uncertainty over traffic growth this issue will be revisited when the Middle East economic conditions return to more normal growth.

2.4.9 Conclusions on the overall vertical risk:

- a. The overall risk of collision due to all causes which includes the technical risk and all risk due to operational errors and in-flight contingencies in the MID RVSM airspace, estimated from the operational and technical vertical risks calculated with LHD reports from most of the member states, the computed result for this SMR is considered to be representative for the MID RVSM airspace.
- b. The effect of future traffic growth on the vertical collision risk can be evaluated on the assumption of a linear relationship between traffic growth and frequency of horizontal overlap, which will directly affect the two components of the risk: the risk due to technical height-keeping performance and due to atypical operational errors. It is clear that even for the most optimistic forecast range of 13%, the overall risk of collision will continue to meet the TLS at least until 2022.

2.4.10 Recommendations Applicable to Safety Objective 2:

- a. MIDRMA to present the successful progress made concerning the receipt of the LHD reports other than category E to the next MIDANPIRG and MIDRMA board meetings
- b. The MIDRMA shall continue to encourage States to provide Large Height Deviation Reports (LHD) of all categories and not only related to handover issues.
- c. The MIDRMA, in coordination with concerned States, assure that incidents and violations which have direct impact on the implementation of RVSM within the MID Region are reported in a continuous basis through the MIDRMA LHD online reporting system in due time for operational safety assessment analysis.

2.5 ASSESSMENT OF SAFETY-RELATED ISSUES RAISED IN THIS REPORT

RVSM Safety Objective 3

Address any safety-related issues raised in the SMR by recommending improved procedures and practices; and propose safety level improvements to ensure that any identified serious or risk-bearing situations do not increase and, where possible, that they decrease. This should set the basis for a continuous assurance that the operation of RVSM will not adversely affect the risk of en-route mid-air collision over the years.

2.5.1 The identified safety-related issues are:

- a. Confirmation of the approval status of aircraft filling RVSM flight plan (W in field 10), this is done through Bahrain and Emirates TDS received on a monthly basis.
- b. Identification of operators requiring monitoring and address the minimum monitoring requirements to all MIDRMA member states.

2.5.2 Conclusions for Safety Objective 3

-14-

- a. The MIDRMA started to conduct studies and researches for implementing height monitoring using ADSB data.
- b. The MIDRMA address the Hot Spots of each MID FIR generated by the (MIDRAS) Software (for information only).
- c. Current risk-bearing situations have been identified by using the MIDRAS and the MID Visualization and Simulation of Air Traffic and actions will be taken to ensure resolving all violations to RVSM airspace by non-approved aircraft.

2.5.3 Recommendations for Safety Objective 3

- a. The MIDRMA will continue to coordinate with Member States, which have ADSB to provide the ADSB archived data for RVSM height monitoring.
- b. MIDRMA will continue to enhance the (MIDRAS) Software and shall include new features to overcome the issue of corrupted TDS (Traffic Data Sample).
- c. The MIDRMA will coordinate with ICAO MID Office to include in its work program to deliver awareness courses concerning RVSM risk analysis to brief Air Traffic Controllers and Airworthiness Inspectors of MIDRMA Member States to ensure their follow up with ICAO requirements for RVSM implementation and give briefing of updated ICAO requirements, these courses will be delivered as necessary or when requested by any Member State.
- d. The MIDRMA shall continue to carry out continuous survey and investigation on the number and causes of non-approved aircraft operating in the MID RVSM airspace.
- e. The MIDRMA will continue to encourage States to submit their Large Height Deviation Reports using the MIDRMA online reporting tool which has been upgraded to improve the level of reporting.

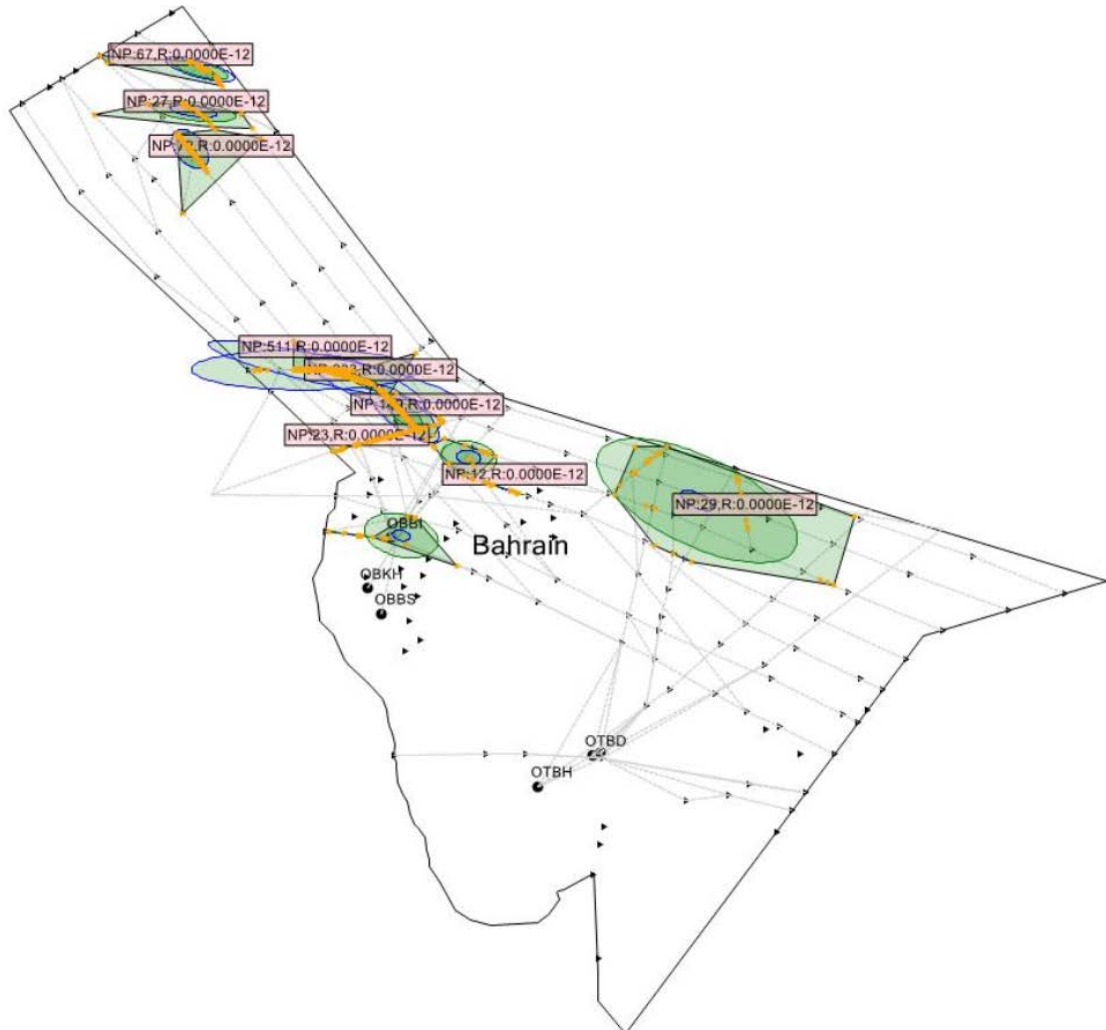
Therefore, it is concluded that this Safety Objective is currently met.

- END -

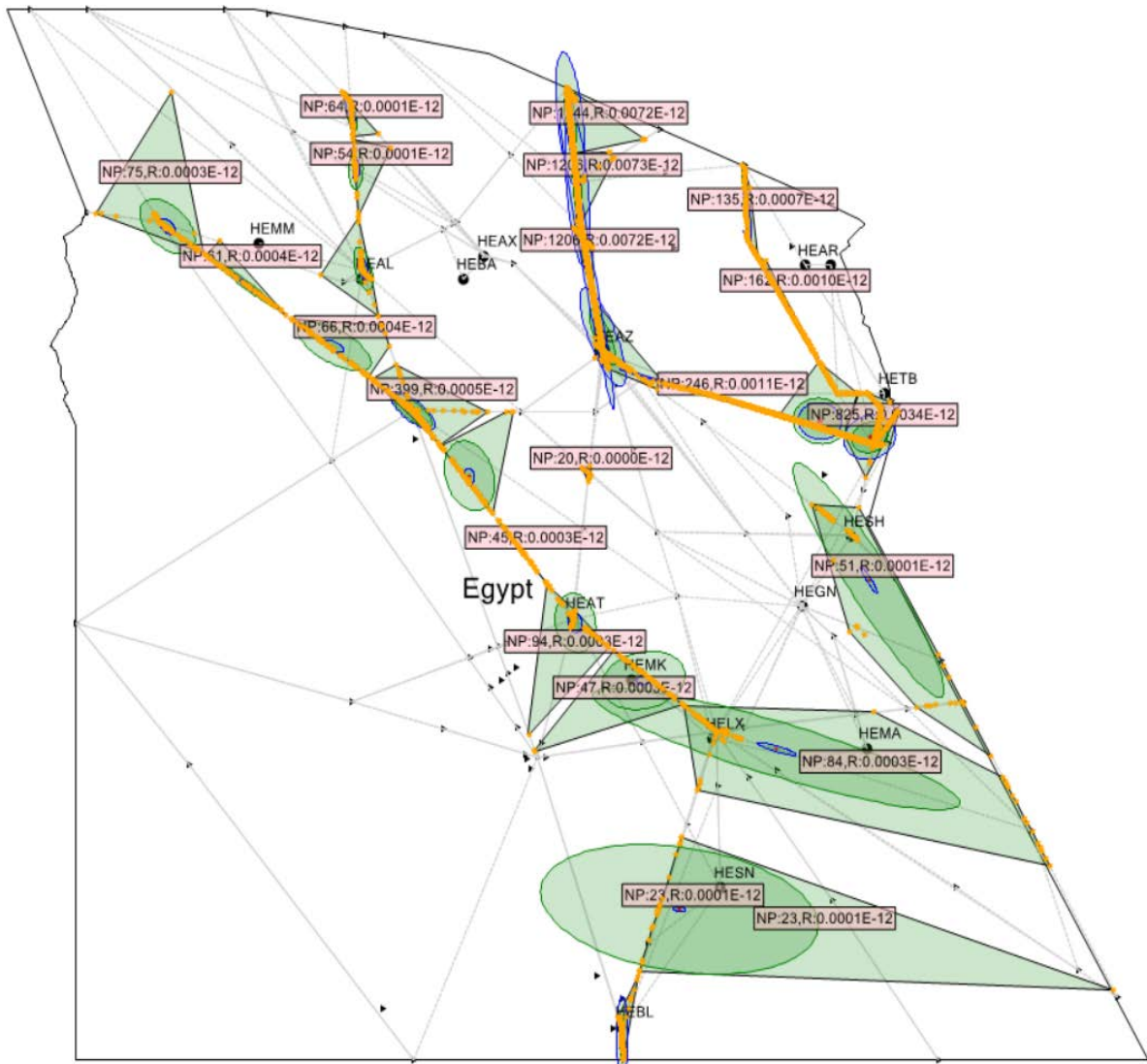
THE MID MMR as of October 2020

| STATE | RVSM APPROVED A/C | NOT COVERED |
|----------------|------------------------------|--------------------|
| BAHRAIN | 54 | 1 |
| EGYPT | 167 | 15 |
| IRAN | 233 | 50 |
| IRAQ | 39 | 8 |
| JORDAN | 44 | 5 |
| KSA | 269 | 7 |
| KUWAIT | 65 | 6 |
| LEBANON | 31 | 0 |
| LIBYA | 30 | 13 |
| OMAN | 72 | 8 |
| QATAR | 280 | 0 |
| SUDAN | 29 | 15 |
| SYRIA | 15 | 8 |
| UAE | 589 | 16 |
| YEMEN | 6 | 3 |

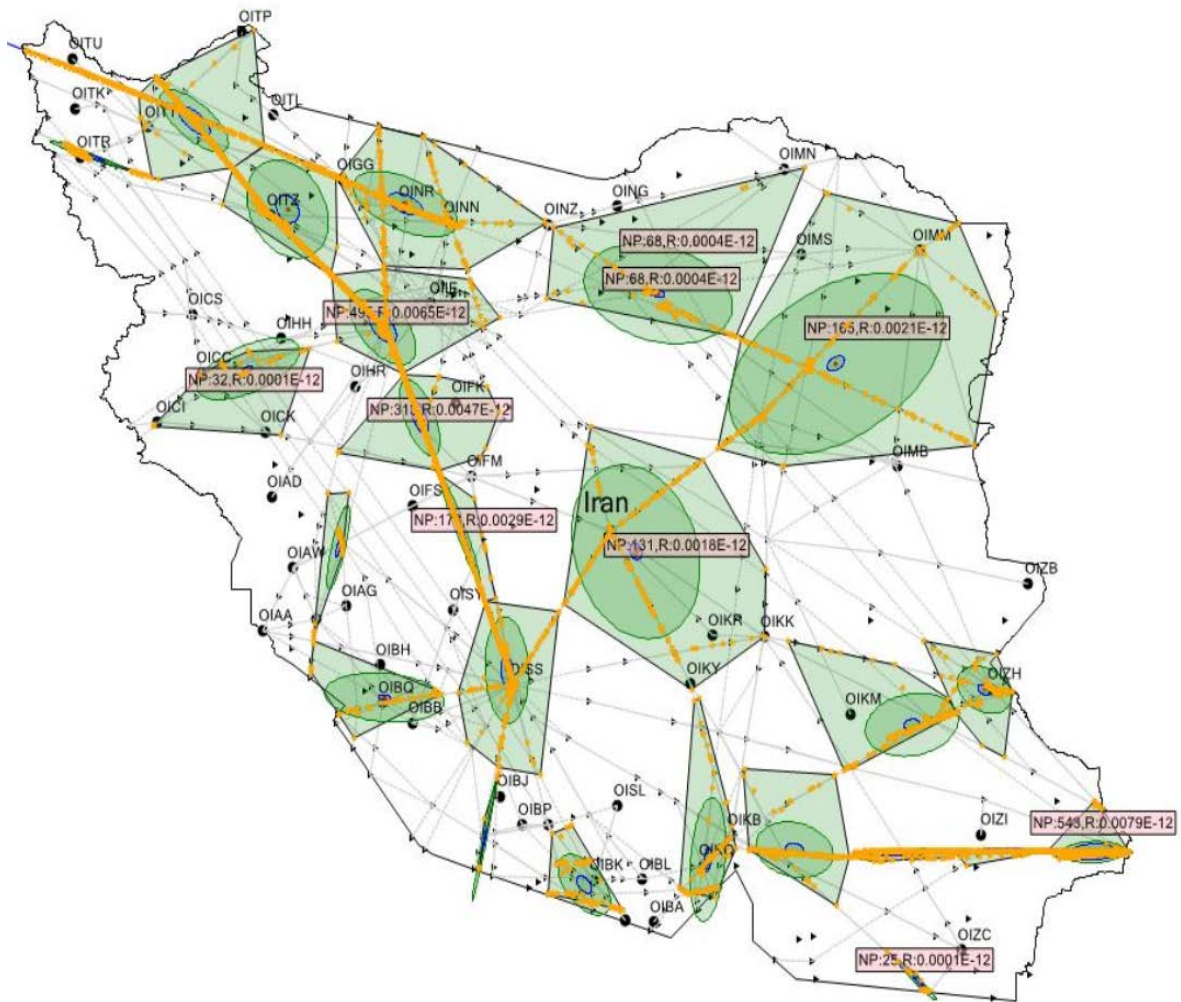
**Appendix C –MIDRMA Member States Hot Spots Generated from September 2019 TDS
(for information ONLY)**



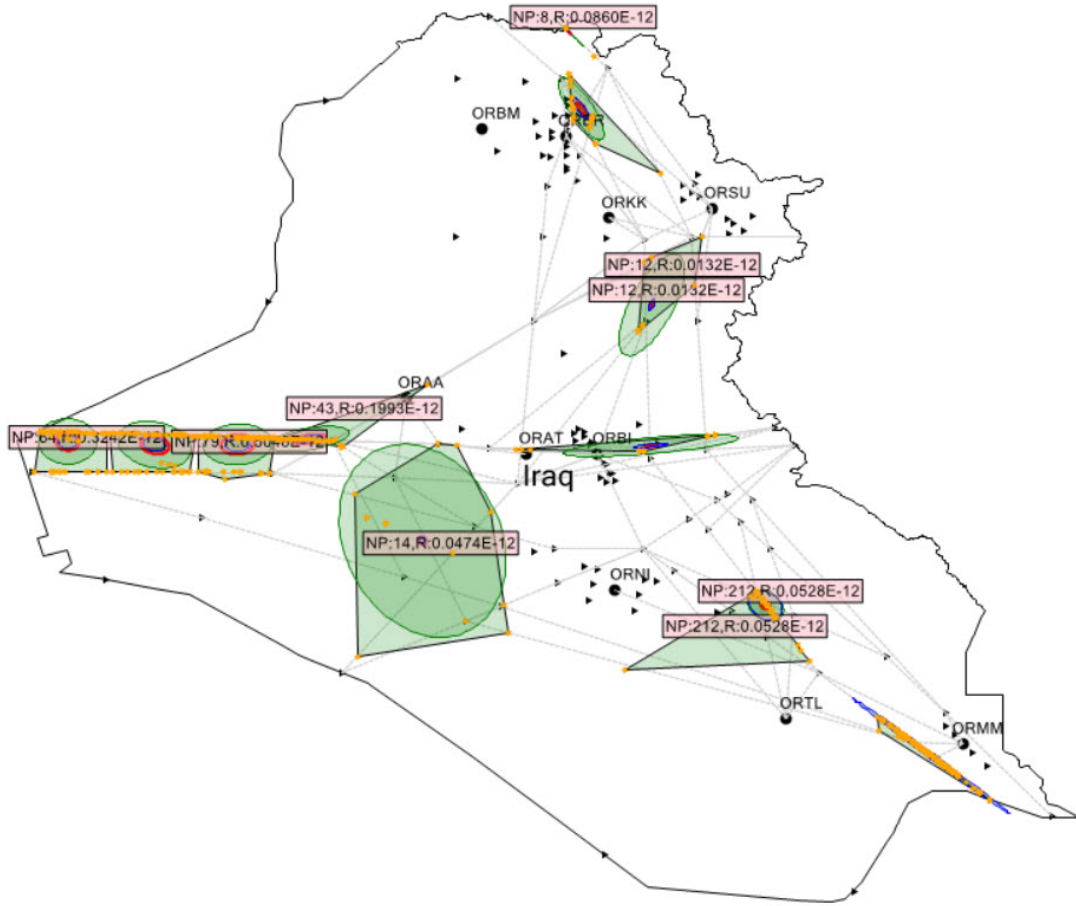
Bahrain FIR



Cairo FIR

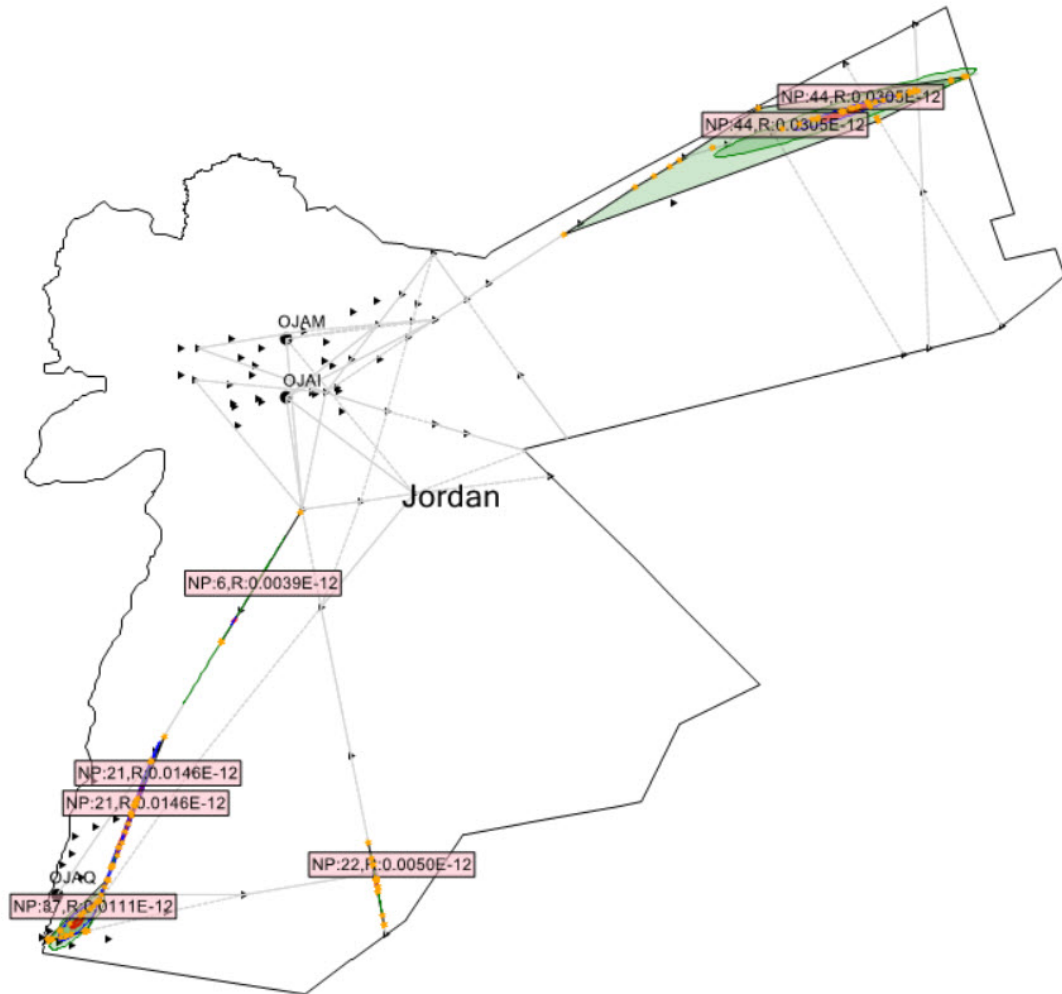


Tehran FIR

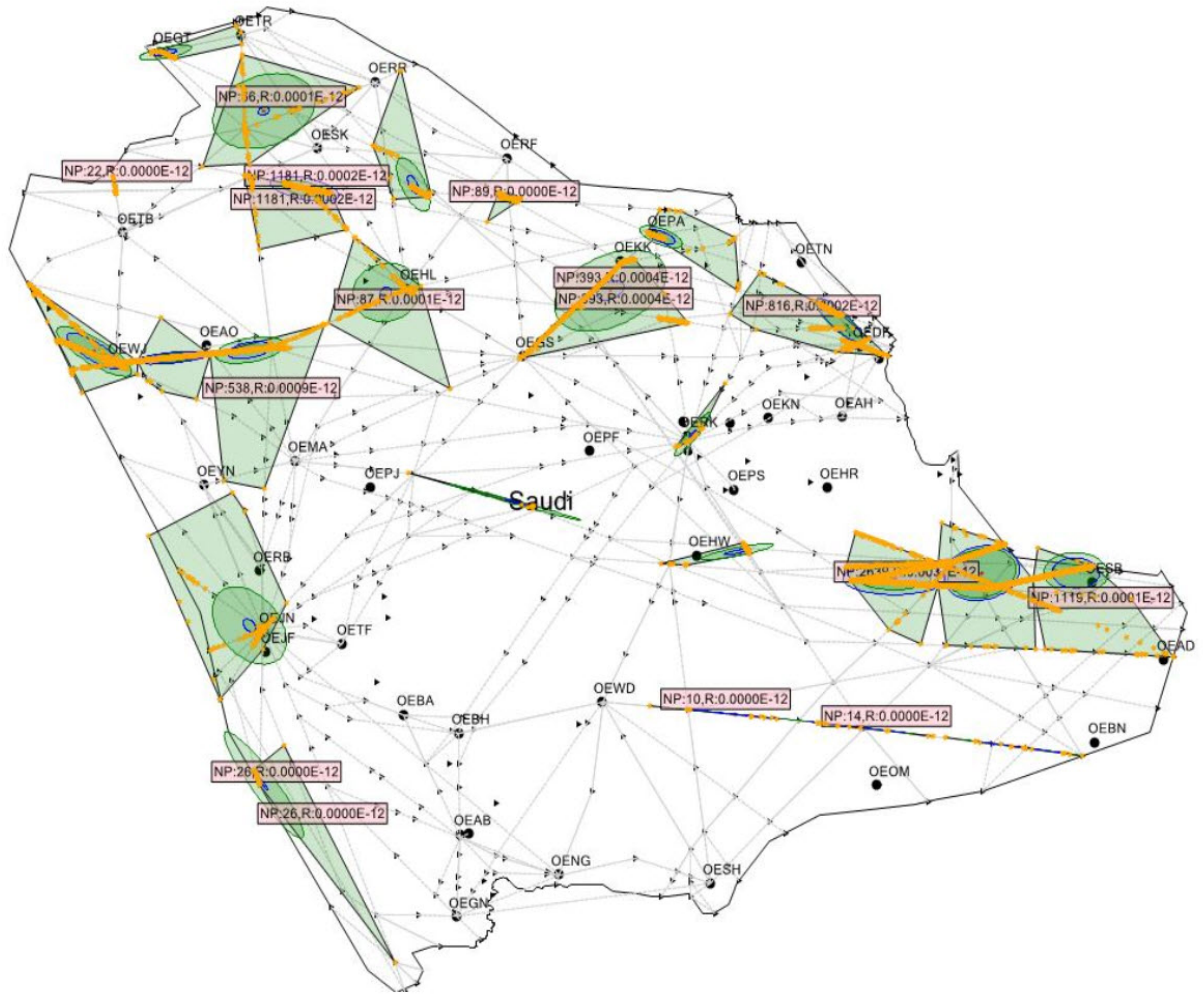


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Baghdad FIR



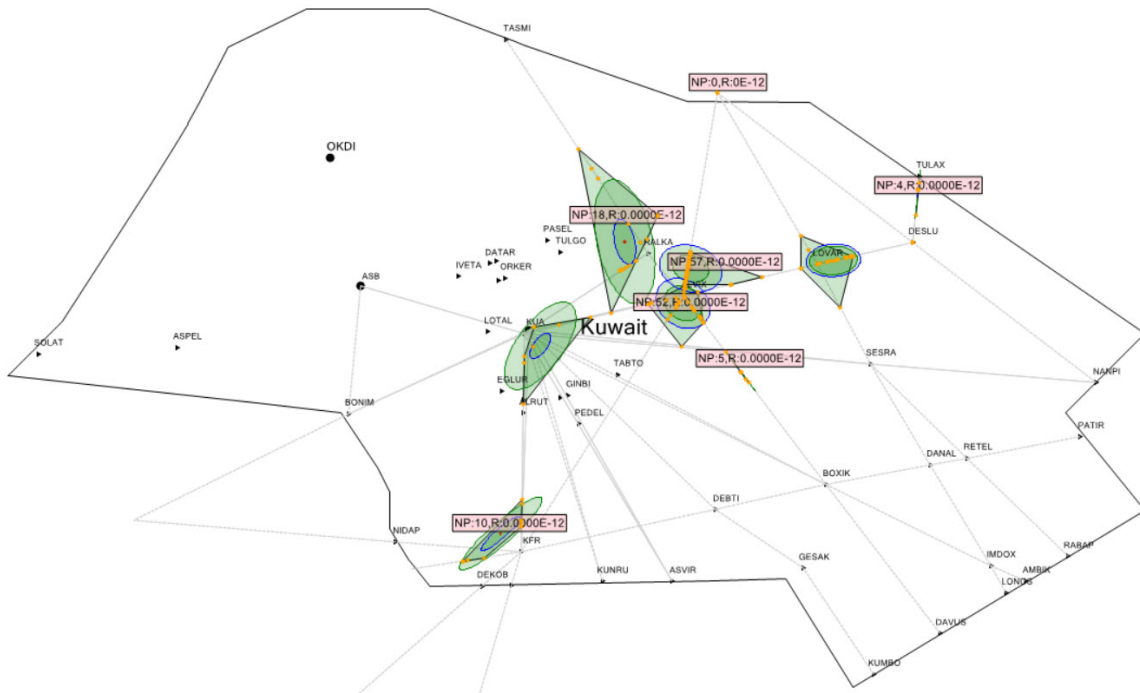
Amman FIR



Jeddah FIR

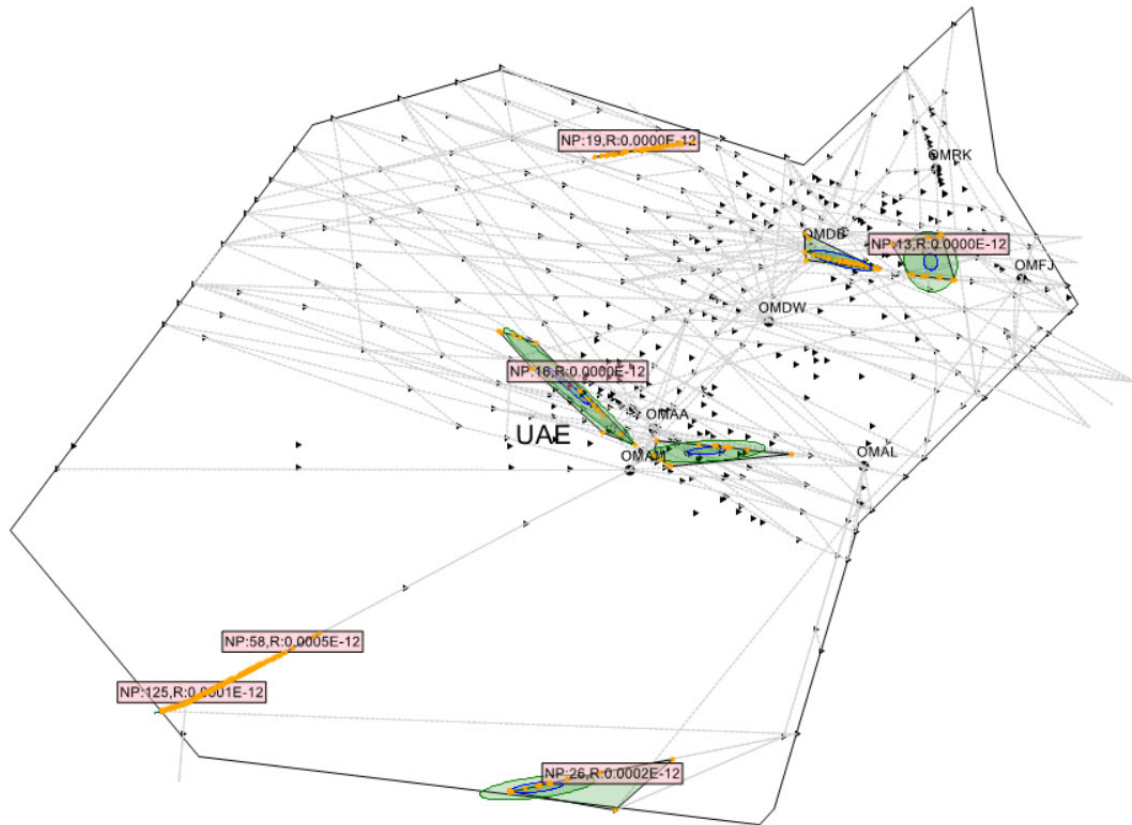


Muscat FIR



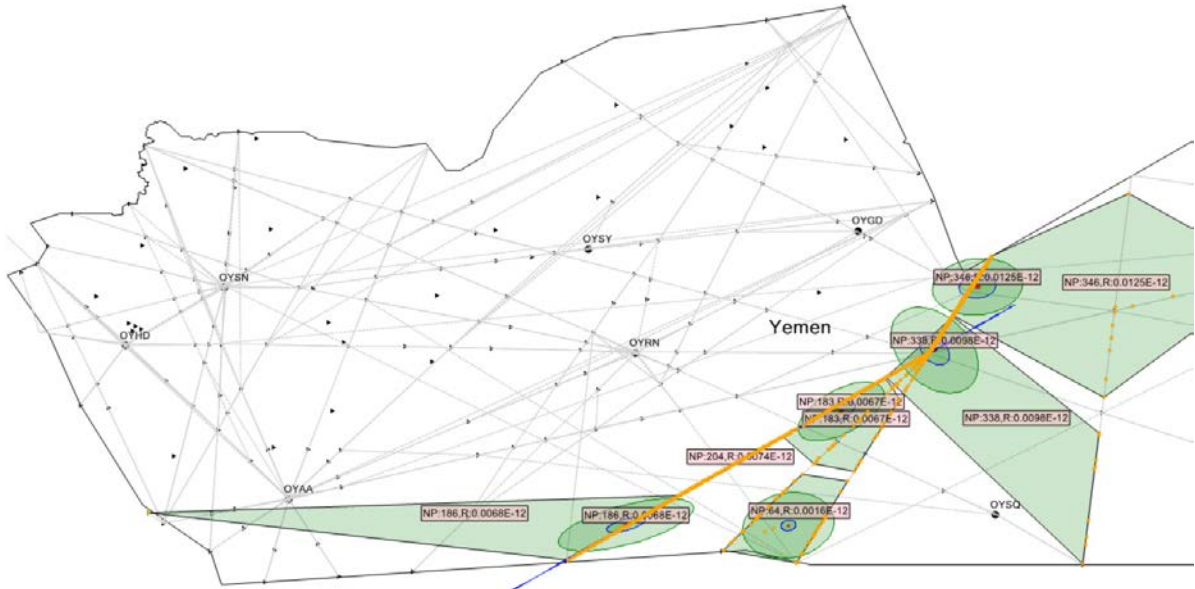
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Kuwait FIR



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Emirates FIR



Sana'a FIR

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