ICAO

INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

Frequency coordination process

- The current practice of frequency coordination

  a) Frequency coordination is **performed by the Regional Office**

  b) **States/GCC can submit** to the Regional Office their requests for new or modified frequency assignments in **any format** (e.g. letter, email)

- The introduction and use of the ICAO Frequency Finder tool for the coordination of frequency assignments within the MID Region as well as with adjacent Regions has presented the opportunity to improve the efficiency in the frequency coordination and frequency assignment processes

- Harmful interference incidents management process.

Frequency coordination process

Frequency Finder tool offer the option of **generating electronic submissions** for new or modified frequency assignments.

This option permits States to **check a selected frequency** to satisfy any operational need and to **check the compatibility** of this (proposed) frequency with other frequency assignments in the Frequency List.

The electronic submission(s), in the format of an **Excel file, can be sent** to the ICAO Regional Office malnadaf@icao.int

Inter-regional coordination takes place between the Regional Offices

- Its very important that states provide accurate information to the extent possible about frequency usage.

- Designated Operational Coverage (Range and height)

- Inaccurate info may result in either:
  - an overprotection of the desired facility or,
  - an erroneous incompatibility of current frequency assignments

- ICAO MID office issued a state letters Ref: AN7/5.7-20/117 dated 21 May 2020 requesting States to review and update the registered frequencies in the ICAO COM List2 using the exported Excel form. Reply received from **12 States** (Bahrain, Egypt, Iraq, Iran, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria and UAE)

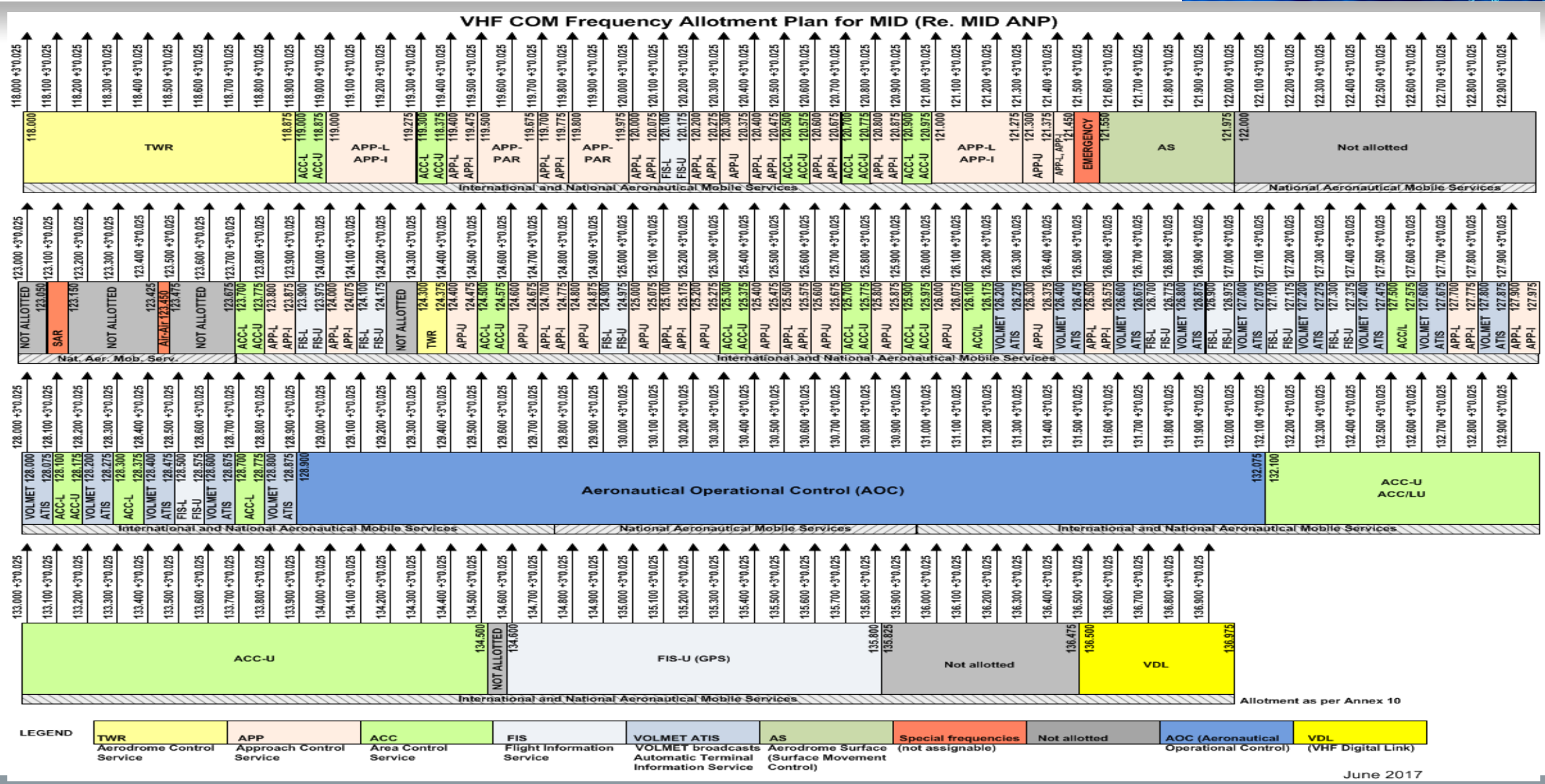
MID Region Allotment Plan

- Each Region has developed a frequency allotment plan where sub-bands in the band 117.975 - 137 MHz have been allotted to specific air-ground communication services

- Review of the allotment plan may increase the amount of spectrum that can be used for ATC Services
  - **Current sub-bands that are not allotted (135.825 – 136.475)MHz**
  - **Band that is currently allotted for AOC (ex. 128.900 – 132.075)MHz**

ICAO UNITING AVIATION

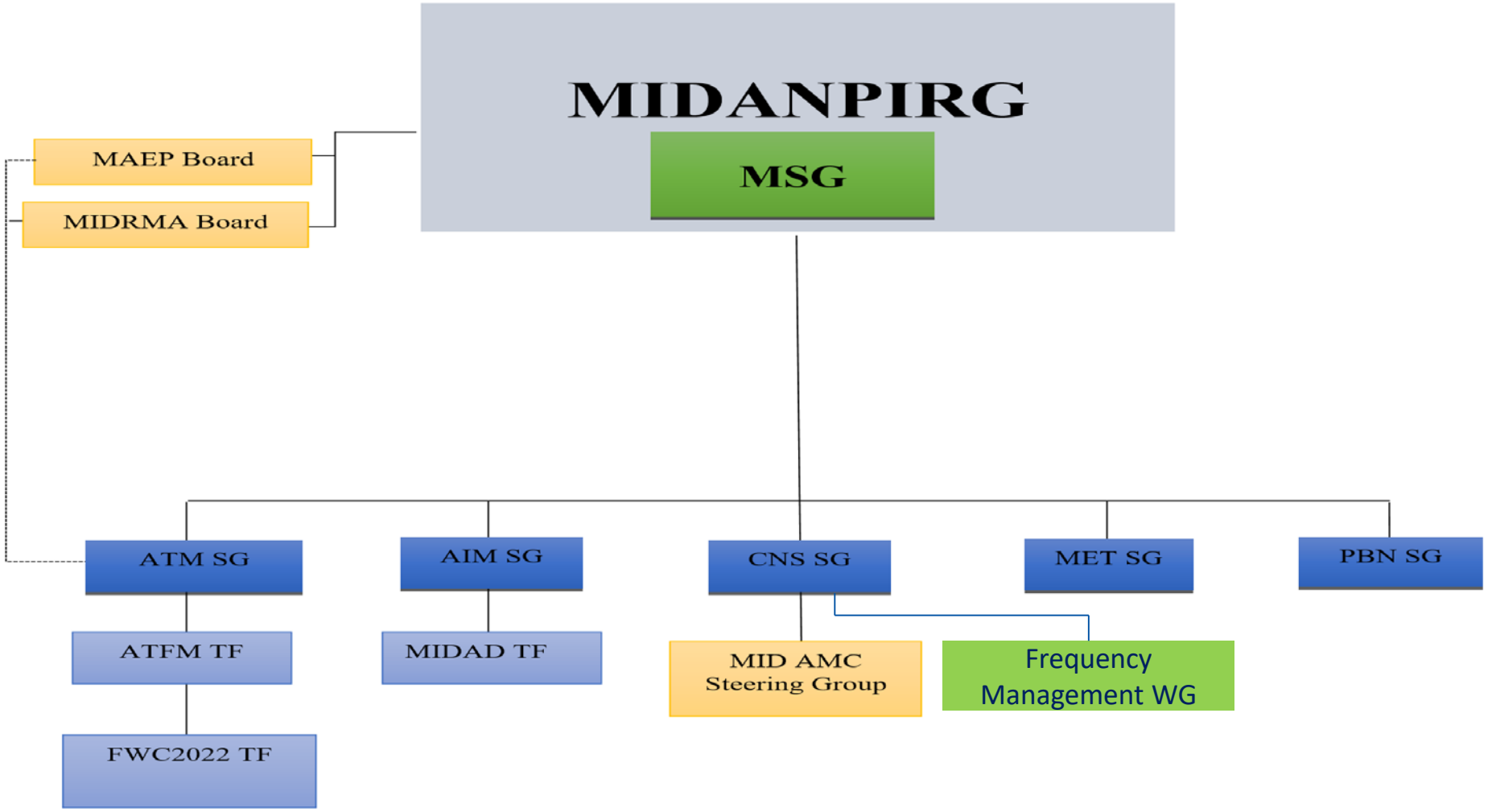
ICAO MID COVID19



No.	Conclusions & Decisions	Concerns/ Challenges/ Rationale	Deliverables/ To be initiated by		Target Date	Status/ Remarks
C. 6/26	**Registered Frequency Update** That, for an optimized frequency assignment process and in order to ensure that assigned frequencies to MID States are not interfering, States that have not yet done so, be urged to: a) verify and update existing registered frequencies in the COM list b) add any missing frequencies with the full details, where applicable; c) delete unused frequencies; d) send the changes in excel format generated by the FF export function; and e) provide the ICAO MID Office with feedback before 15 February 2019.	To optimize frequency assignment process and reduce interferences	State Letter Registered frequency database is up to date	ICAO States	Dec. 2018 15 Feb. 2019	Actioned/Completed SL Ref. AN 7/5.7 – 18/410 dated 19 December 2019. Replies received from **Bahrain, Egypt, Iraq, Kuwait, Qatar, Saudi Arabia, Sudan, and UAE**

No.	Conclusions & Decisions	Concerns/ Challenges/ Rationale	Deliverables/ To be initiated by		Target Date	Status/ Remarks
C. 17/33	**FREQUENCY MANAGEMENT AD-HOC WORKING GROUP** That, the Frequency Management Ad-hoc Working Group be established with Terms of Reference as at Appendix 6.2U.	To support States in fulfilling ICAO Radio Frequency Spectrum Requirements	State Letter	ICAO	August 2019	**Actioned** SL AN7/38 – 19/243 dated 6 Aug. 2019 (Replies: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon Oman & Qatar)

MIDANPIRG ORGANIZATIONAL CHART



Frequency Management Working Group Terms of Reference

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k) *ensure the continuous and coherent development of the relevant sections of the MID eANP, taking into account the evolving operational requirements in the MID Region and the need for harmonization with the adjacent regions in compliance with the Global Air Navigation Plan;*

l) develops recommendations for CNS SG about how to address the future operational needs and limitations in VHF voice communications, aiming at avoiding introduction of 8.33 kHz spacing in the MID Region for as long as practicable;

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NAV Module

- There are some discrepancies between ICAO FF Tool- NAV database and States' AIP.

- In some cases, it may be possible that States have put into operation NAV facilities with frequency assignments that have not been coordinated with ICAO. This may result in such facilities not being protected from harmful interference or such facilities causing harmful interference to facilities for which the frequency assignment has been coordinated with ICAO.

NAV Module

- it is recognized that some NAV facilities are in operation and do not cause harmful interference to NAV facilities that are in operation in adjacent countries may not require coordination with ICAO; in these cases, **States themselves are responsible for the necessary (internal) frequency coordination**.

- **ICAO holds the view that frequency assignments that have been coordinated with ICAO have priority over those that have not been coordinated**.

Spectrum capacity assessment for the frequency band 108 – 117.975 MHz

Organization of the simulation

For this purpose, a set of (fictious) requirements for new ILS/DME and VOR/DME facilities was generated as follows:

- For each airport for which one (or more) ILS facilities are in the ICAO COM list 2 a requirement for an additional ILS/DME facility was established
- For each airport for which one (or more) ILS facilities are in the ICAO COM list 2 the requirement for an additional VOR/DME facility was established

The result was for 98 airports in the MID Region the addition of a single ILS/DME facility at each airport as well as the addition of a single VOR/DME facility at each airport.

Spectrum capacity assessment for the frequency band 108 – 117.975 MHz

An assessment of available spectrum for VHF NAV systems (ILS/DME and VOR/DME) operating in the frequency band 108 – 117.975 MHz was performed with the view to:

- Determine the need for a full implementation of 50 kHz channel spacing
- Identify areas where future implementation of ILS or VOF systems may be difficult.

Spectrum capacity assessment for the frequency band 108 – 117.975 MHz

Organization of the simulation

- A check was performed to find for each facility in the simulation a frequency assignment for equipment designed for 100 kHz channel spacing and for 50 kHz channel spacing (mixed environment). Any ILS or VOR facility that could not be assigned a frequency on a 100 kHz channels was considered in the simulation for a frequency assignment on a 50 kHz channel.

- A separate simulation is planned performed with using only 50 kHz channel spacing characteristics for the Localizer and the VOR.

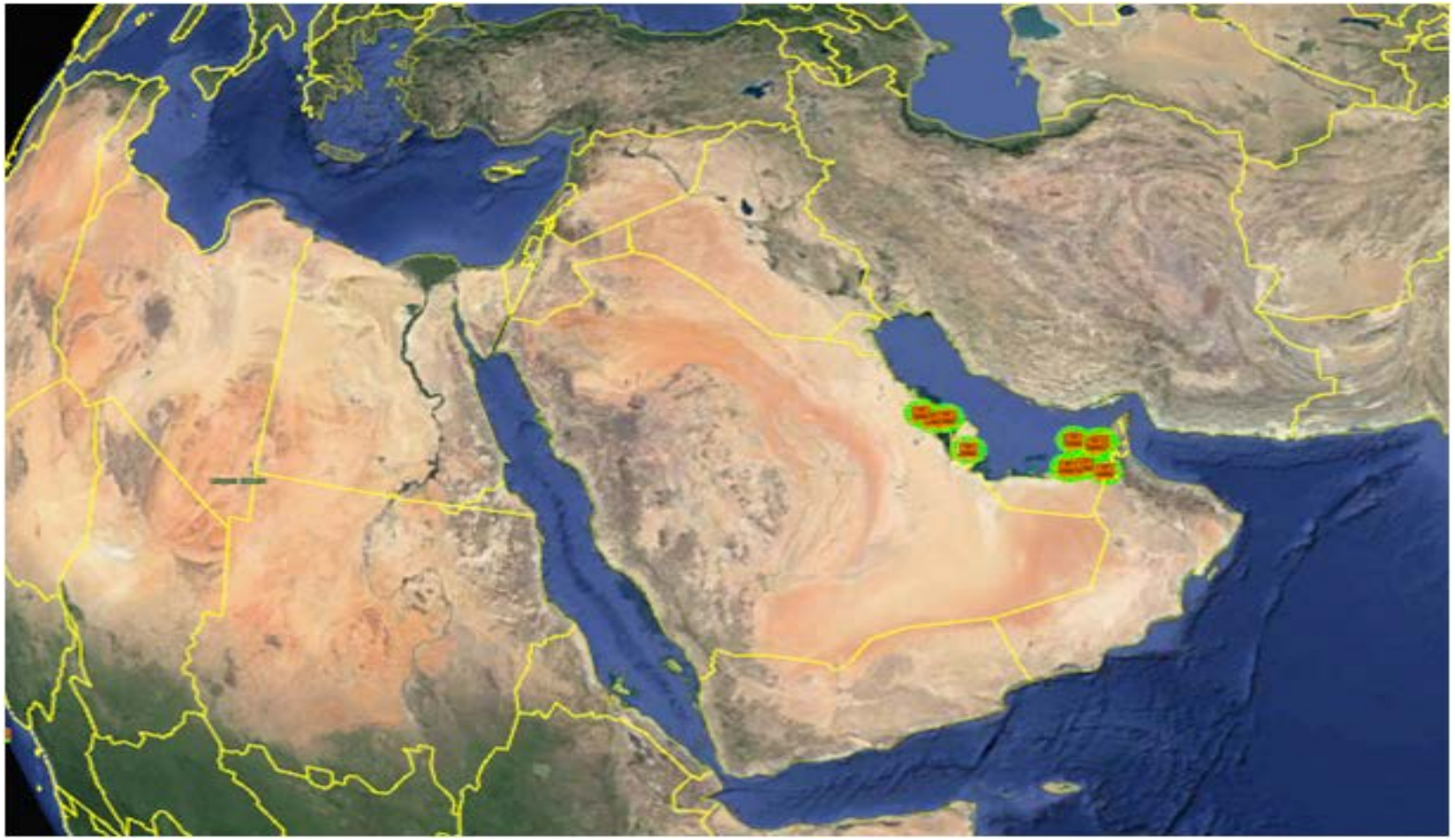
Spectrum capacity assessment for the frequency band 108 – 117.975 MHz

Result

- In the MID Region, 98 requirements for an ILS/DME frequency were established and 477 requirements for a VOR/DME and 98 requirements for an ILS/DME

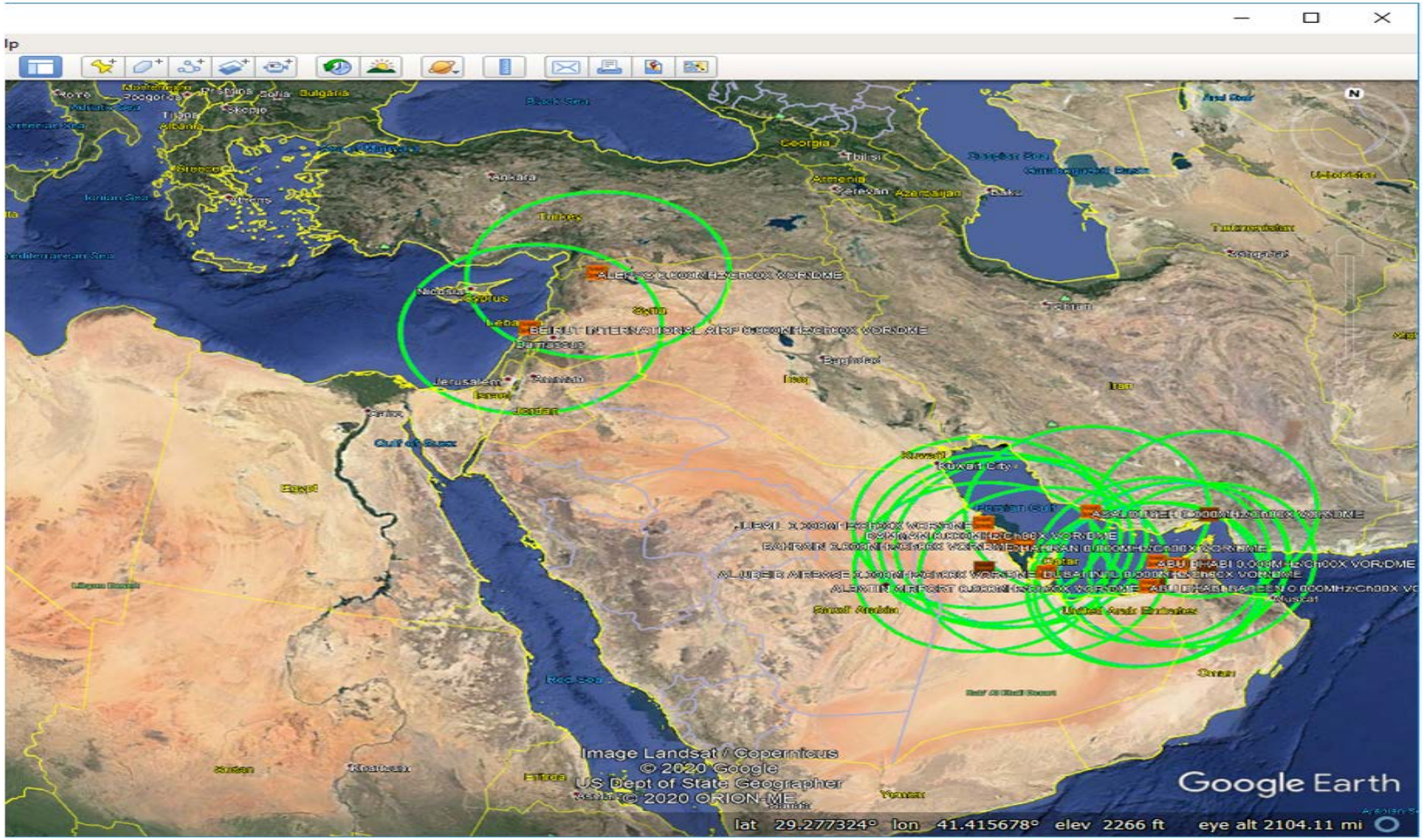
- ILS/DME - No frequency could be assigned to 16 (out of 98) ILS/DME facilities

Spectrum capacity assessment for the frequency band 108 – 117.975 MHz



Locations of ILS/DME facilities where no frequency assignment could be made

Spectrum capacity assessment for the frequency band 108 – 117.975 MHz



VOR/DME - No frequency on 100 kHz channels could be assigned to 17 VOR/DME facilities

Spectrum capacity assessment for the frequency band 108 – 117.975 MHz

Conclusions

- From the simulation it can be concluded that currently in the MID Region in the area around the UAE as well as in the northern part of the MID Region the frequency band is heavily congested or saturated for ILS/DME and VOR/DME frequency assignments.

- The congestion in the areas identified may raise questions with regard to additional implementation of requirements for GBAS/VDB frequency assignments in these areas.

Spectrum capacity assessment for the frequency band 108 – 117.975 MHz

Identified solutions

- To update the NAV module with operating facilities in the MID Region; ongoing
- implementing reduced channel spacing (50KHz); and
- enhancement of FF to facilitate efficient use of spectrum in cooperation with the ACAO (Arab Civil Aviation Organization) to assist States and ICAO regional offices to visualize the current and future frequency congestions of VHF NAV facilities (ILS/DME and VOR/DME) as well as to identify the optimal spectrum assignment globally and regionally.

Enhancement of the FF Tool

Proposed enhancements:

- Add keyhole coverage indication when appropriate;
- Better cyber resilience of the FF tool;
- Add simulation capability to assist more efficient frequency assignment planning for ICAO States;
- Identify best way forward to enhance indication of geographic details (e.g. mountains display: by displaying limits VOR (and DME) range to the horizon—or closer if mountains intervene)

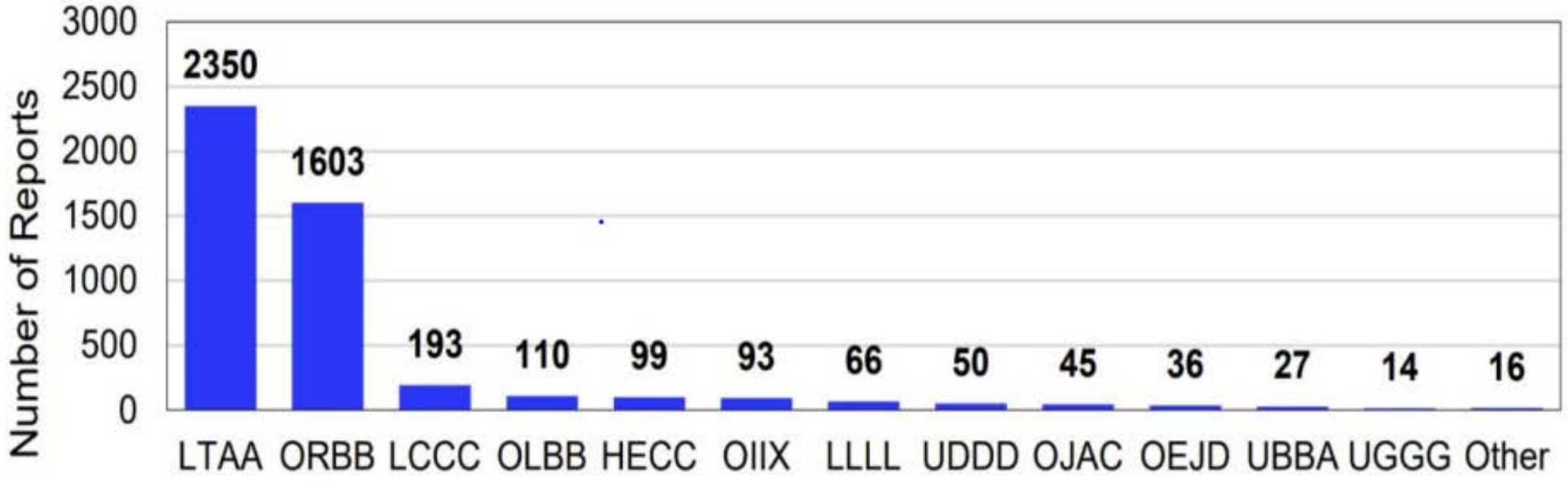
Cost estimated 100K USD

GNSS Interference

- GNSS is a key technology of the Communications, Navigation, and Surveillance (CNS) infrastructure. GNSS can support navigation applications in all phases of flight as well as surveillance application like ADS-B. GNSS is also used in safety nets like the GPWS (Ground Proximity Warning Systems) and provides the time reference that is used to synchronise systems and operations in ATM.

- GNSS interference has been identified as a major safety issue as GNSS is embedded in numerous critical infrastructures. The intentional interference presents a substantial safety threat to aircraft and passengers. 2.2 A

GNSS Interference



*Aggregated Data from IATA GADM

GNSS Interference

- Regional Safety advisory (RSA) have been developed including mitigation strategies to reduce the likelihood and the impact of the GNSS interference on Aviation.

- The RSA includes a reporting procedure that airspace users follow to report about any GNSS interference incident(s)

GNSS Interference

- mitigation strategies to reduce the likelihood:

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.

GNSS Interference

- mitigation strategies to reduce the likelihood (contd):

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.

GNSS Interference

- mitigation strategies to reduce the Impact:

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

b) Development of contingency procedures and processes to enable operations in a fallback mode in case of loss of GNSS (aircrew and/or ATC).

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

GNSS Interference

MIDANPIRG/19 CONCLUSION19/4: REPORTING OF GNSS RFI TO ITU

That, States are invited to report GNSS radio frequency interferences to ITU radiocommunication bureau (ITU-BR), describing GNSS RFI impact either in their State or reported by their registered aircraft.

Online Web Course

Aeronautical Spectrum Use with Special Focus on VHF"

(https://store.icao.int/en/aeronautical-spectrum-use-special-focus-training)

Description

Goal

This course aims to provide the fundamentals of frequency and spectrum management, focusing mainly on Very High Frequency (VHF) used by aeronautical communications systems, as well as a description of the specific terms used in frequency management in civil aviation including a brief discussion about aeronautical communications and navigation systems.

WRC23 Preparatory Workshop

- ICAO MID WRC23 Preparatory Workshop 28-29 August 2023, Cairo, Egypt
- Frequency Spectrum Management Panel (FSMP WG/17) 30 August – 8 September 2023, Cairo, Egypt

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Thank you for your Attention