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INTERNATIONAL CIVIL AVIATION ORGANIZATION

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GLOBAL DEVELOPMENTS
RELATED TO CNS

RECONNECTING **THE** WORLD

GLOBAL DEVELOPMENTS RELATED TO CNSS & GIS

BY CNSS SECTION AND GIS SECTION

Twenty Seventh Meeting of the Communications/
Navigation and Surveillance Sub-group (CNS SG/27)
of APANPIRG

Bangkok, Thailand, 28 August - 1 September 2023

Presentation Overview

3

01 COMMUNICATIONS

02 NAVIGATION

03 SURVEILLANCE

04 SPECTRUM

05 INTEGRATED CNS &
SPECTRUM

06 OTHER CNSS ACTIVITIES

07 GLOBAL INTEROPERABLE SYSTEMS

GLOBAL DEVELOPMENTS RELATED TO CNS & Spectrum

COMMUNICATIONS

The 7th meeting of the Data Communication Infrastructure Specific Working Group of the Communications Panel (CP-DCIWG/7) was held 11-14 June 2024. Several deliverables, proposals for amendment to Annex 10 Volume III, were provided by CP-DCIWG/7.

➤ **Amendment to Annex 10-Aeronautical Telecommunications, Volume III – Communication Systems relating to Updates of the SATCOM SARP.**

(The PfA introduces in the AMS(R)S SARPS stringent performance provisions for new technical capabilities which will support new enhanced services, such as ATS B2 for data and one stage secure dialing for voice. These new provisions are based on published industry (EUROCAE/RTCA) performance standards.)

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- PfA preliminary review is expected in Q1 2025

COMMUNICATIONS

- In support of the Provisions on the exchange of information using the aeronautical telecommunication network over the internet protocol suite for which the preliminary review was carried out on 13 June 2023, three new manuals and new edition of Doc 9896 were endorsed:
 - Doc 10090 “Manual of Security Services for Aeronautical Communications”
 - Doc 10095 “Manual of Public Key Infrastructure (PKI) Policy for Aeronautical Communication
 - Doc 10145 “Manual of Security Risk Assessment for Aeronautical Communications”
 - Doc 9896 “Manual on the Aeronautical Telecommunication Network (ATN) using Internet Protocol Suite (IPS) Standards and Protocol, edition 3”

COMMUNICATIONS

Proposed amendment to Annex 10, Volume III related to ATN/IPS and consequential amendment to Annex 10, Volume II Cont.



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Ref: AN 7/63.1.3, AN 7/64.1.1- 23/59

31 July 2023

Subject: Proposed amendment to Annex 10, Volume III related to ATN/IPS and consequential amendment to Annex 10, Volume II, stemming from the sixth meeting of the Data Communications Infrastructure Working Group of the Communications Panel (CPDCIWG/6)

Action required: Comments to reach Montréal by 31 January 2024

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission (ANC), at the sixth meeting of its 223rd Session held on 13 June 2023, considered a proposal developed by the sixth meeting of the Data Communications Infrastructure Working Group of the Communications Panel (CPDCIWG/6) to amend Annex 10 — *Aeronautical Telecommunications*, Volume III — *Communication Systems*, Part I — *Digital Data Communication Systems* and Part II — *Voice Communication Systems*, and consequential amendment to Annex 10, Volume II — *Communication Procedures including those with PANS status*. The Commission authorized its transmission to Member States and appropriate international organizations for comments.

2. The proposal introduces provisions relating to updates to the aeronautical telecommunication network (ATN)/Internet Protocol Suite (IPS) requirements regarding IPS mobility across multiple media, naming and addressing, IPS security, quality of service (QoS), system management and overall transitional aspects.

State Letter (AN 7/63.1.3, AN 7/64.1.1- 23/59) was published on 31 July 2023 and circulated to States and international organizations for their comments.

Due date for comments was 31 January 2024.
Replies received all agreements and comments received there were no objections.

The Secretary will present the results of the consultation for a final review by the ANC during its 227th Session (Fall 2024 in October 2024)

The expected applicability date for the PfA is 27 November 2025.

COMMUNICATIONS

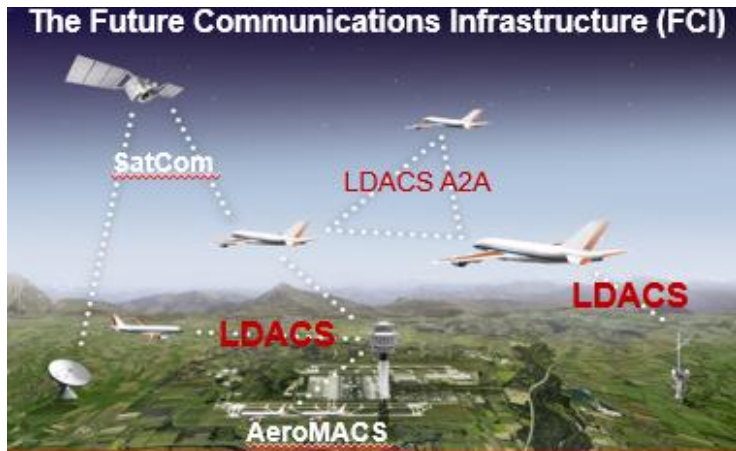
➤ SARPS on L-Band Terrestrial Data Link System (LDACS)

Future ATM Operations will require capacity and performance that cannot be met by the terrestrial data link systems in use today.

New operational procedures for ATM, as well as increasing demands for operational and business continuity require greater robustness, resilience and security in air/ground communications systems. These can be realized through the introduction of LDACS.

LDACS, a broadband system based on Orthogonal Frequency-Division Multiplexing (OFDM) like current/future cellular mobile radio standards, applies modern and highly efficient transmission concepts and advanced recover design for interference robustness. LDACS is highly flexible and scalable and, thus, enables long-term evolution. LDACS supports high-rate data communications and voice, which enables important future applications.

- Postpone the PfA submission until the resolution of the comments from NSP and SP on compatibility (inter-panel TF)



COMMUNICATIONS

- CP-DCIWG/7 also discussed and approved:
-
- Two new job Cards:
 - Advanced cellular and RPAS Alignment for AeroMACS
 - Air ground data link Documents maintenance and improvements
 - The Space Based VHF PfA is expected next year 2025
 - New job card on Development and standardization of emerging aeronautical communication technologies and systems operating in VHF frequency band
 - Introduction of VoIP Air-ground Networks

NAVIGATION

Amendment 94 to Annex 10 — Aeronautical Telecommunications, Volume I & V — Radio Navigation Aids, regarding:

- Advanced receiver autonomous integrity monitoring (ARAIM);
- update GPS Standards and Recommended Practices (SARPs);
- updates the existing provisions for ISD in the Galileo SARPs;
- DME coverage to support PBN implementation;
- Frequency assignment planning and utilization for ILS, VHF VOR, DME and GBAS

Applicability on 27 November 2025



NAVIGATION

Ongoing NAV developments :

- Update to GNSS Manual (Doc 9849) guidance on the detection, reporting, and resolution of GNSS RFI;
- Develop a concept of operation for next generation equipment functions to improve navigation service robustness in the presence of RFI to GNSS;
- Updates to Annex 10, Volume I Standards to add SBAS Provider optional “Data Message” authentication capability
- Updates to Annex 10, Volume I to add Standards for Vertical Advanced Receiver Autonomous Integrity Monitoring (V-ARAIM)

NAVIGATION

13

ICAO organized a Radio Navigation Symposium with the focus on GNSS RFI for ICAO EUR & MID Regions.

State letter dated 30 April 2024 circulated the outcome of the symposium and requested States to disseminate the guidance material and implement recommendations, as applicable.

Several Regional Navigation Workshops are planned during 2024-2025.



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30 April 2024

Ref.: E 3/5-24/54

Subject: Aviation safety concerns regarding interference to the Global Navigation Satellite System (GNSS)

Action required: a) disseminate guidance material; and
b) implement recommendations, as applicable

Sir/Madam,

1. I have the honour to bring to your attention the concerning escalation of jamming and spoofing activities targeting the global navigation satellite system (GNSS), which have been increasingly observed recently in various regions globally. GNSS, as one of the main enablers for performance-based navigation (PBN), provides navigation guidance for all phases of flight, from enroute through to precision approach. By providing accurate position and timing information, GNSS enables several systems critical to the safety of flight.

2. Since 2003, the International Civil Aviation Organization (ICAO) has been actively developing recommendations and guidance concerning GNSS Radio Frequency Interference (RFI). It is pertinent to recall ICAO Assembly Resolution A41-8, Appendix C: *Ensuring the resilience of ICAO CNS/ATM systems*, which serves as the latest ICAO policy on GNSS resilience.

3. To bring attention to the critical issue of GNSS interference, and to foster discussions on the management of GNSS vulnerabilities and potential mitigation measures against GNSS RFI, ICAO recently convened the ICAO EUR/MID Radio Navigation Symposium from 6 to 8 February 2024 in Antalya, Turkey. One important outcome of this symposium is the attached list of recommendations regarding Stakeholders' continued efforts towards ensuring safe, reliable, and resilient air navigation.

4. I would like to take this opportunity to refer to recent safety-related publications by the European Union Aviation Safety Agency (EASA), [Safety Information Bulletin No. 2022-02R2](#) and the Federal Aviation Administration (FAA), [Safety Alert for Operators \(SAFO 24002\)](#).

SURVEILLANCE

14

Proposal for amendments (PfA) to Annex 10, Volume III, related to 24-Bit aircraft address.



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Ref.: AN 7/64.2.3-24/25 24 April 2024

Subject: Adoption of Amendment 92 to Annex 10, Volume III

Action required: a) Notify any disapproval before 22 July 2024; b) Notify any differences and compliance before 28 October 2024; c) Consider the use of the Electronic Filing of Differences (EFOD) System for notification of differences and compliance

Sir/Madam,

1. I have the honour to inform you that Amendment 92 to the *International Standards and Recommended Practices, Aeronautical Telecommunications — Communication Systems* (Annex 10, Volume III to the Convention on International Civil Aviation) was adopted by the Council at the fifth meeting of its 231st Session on 18 March 2024. Copies of the Amendment and the Resolution of Adoption are available as attachments to the electronic version of this State letter on the ICAO-NET (<http://portal.icao.int>) where you can access all other relevant documentation.

2. When adopting the amendment, the Council prescribed 22 July 2024 as the date on which it will become effective, except for any part concerning which a majority of Contracting States have registered their disapproval before that date. In addition, the Council resolved that Amendment 92, to the extent it becomes effective, will become applicable on 28 November 2024.

3. Amendment 92 arises from:

- recommendations from the fourth meeting of the Surveillance Panel (SP/4) concerning 24-bit aircraft address; and
- consequential amendment arising from the Second meeting of the Information Management Panel (IMP/2) concerning system-wide information management (SWIM) and information security.

4. The amendment concerning 24-bit aircraft address contains new and modified provisions aiming at the effective management of the 24-bit aircraft address scheme. Air-ground and air-air surveillance systems are heavily reliant on the 24-bit aircraft address configured on board aircraft. There

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Amendment 92 to Annex 10 Volume III was adopted by the Council at the 5th meeting of its 231st Session on 18 March 2024. **This will be applicable on 28 November 2024.**

The electronic version of this State letter (AN 7/64.2.3-24/25) published on 24 April 2024 is available on the ICAO-NET ([StateLetters2024 \(icao.int\)](http://portal.icao.int)).

SURVEILLANCE

15

On-going activities

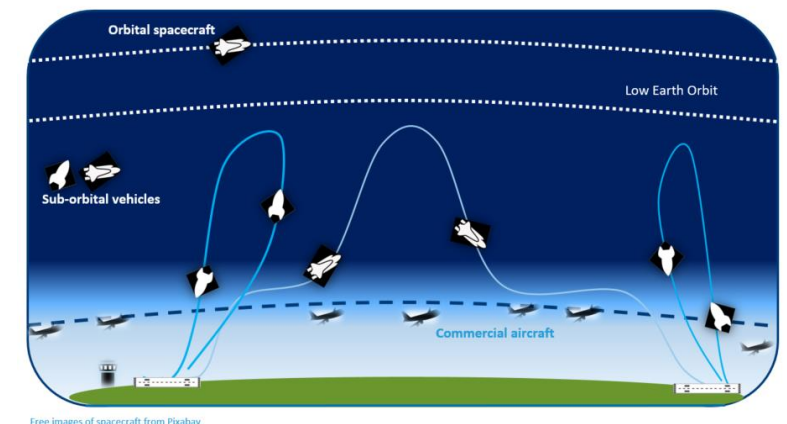
The 5th meeting of the Surveillance Panel (SP/5) was held 20-29 September 2023. Several deliverables, proposals for amendment to Annex 10 Volume IV, were provided by SP/5. The PfA updates the SSR transponder requirements for compatibility with the new 1090 MHz extended squitter ADS-B version 3 Format.

ADS-B version 3 will provide new capabilities including :

- autonomous distress tracking support
- information to support future interval management operations;
- broadcast of aircraft-based derived weather data;
- Broadcast of lost C2 Link state for UAS/RPAS;
- broadcast of 1030/1090 MHz spectrum monitoring data; and
- functionality to support sub-orbital vehicle operations.

This is related to:

➤ **WRC-23 Agenda item 1.6 and 1.8**



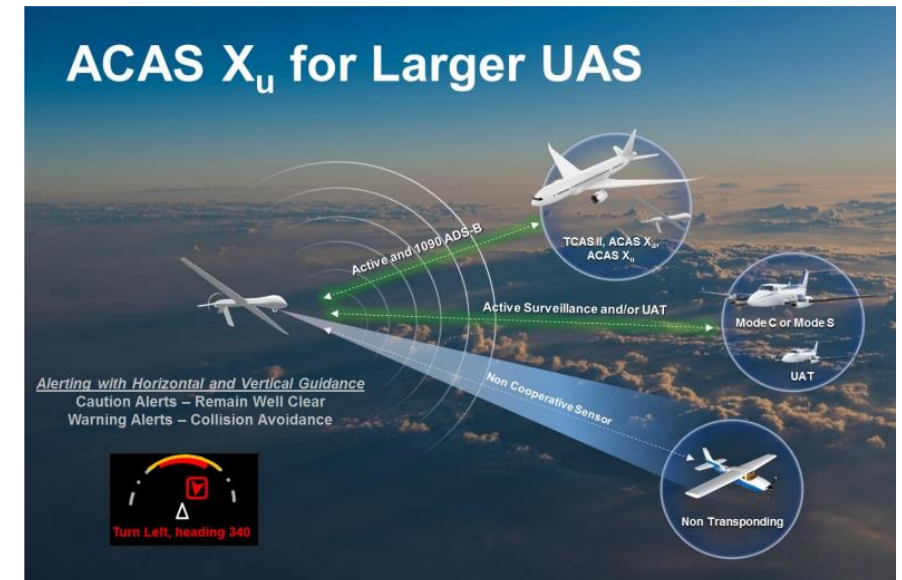
SURVEILLANCE

On-going activities, continued

16

SP/5 (20-29 Sep 2023) also discussed and approved PfA to Annex 10, Volume IV:

- to provide technical provisions for **the efficient use of the 1090 MHz radio frequency (RF)**, providing means and measurements to reduce 1090 MHz RF congestion, ensuring better performance of surveillance systems and continued use of 1090 MHz systems;
- to introduce ACAS III technical provisions, based on **ACAS Xu** (Unmanned Aircraft System) avionics standards developed by RTCA/EUROCAE; and
- to provide a proposed revision to Chapter 7 of Annex 10 Volume IV, which specifies technical requirements for **airborne surveillance applications utilizing ADS-B IN.**



FREQUENCY SPECTRUM MANAGEMENT

17

ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference 2027 (WRC-27)

- The initial ICAO Position will be presented at 227th ANC (Oct 2024). It then will be circulated to States/international organizations for their comments (comment due expected: Q1 2025).
- To promote ICAO position and increase awareness of WRC-27 agenda items related to aviation, Frequency Spectrum Management Panel (FSMP) will organize 4 workshops in total in 2025/2026.

The first WRC27 Workshop will be held in Bangkok.

- WRC27 Workshop 24-25 Feb 2025
- FSMP-WG/20 26 Feb -7 March 2025

**Many WRC agenda items
could affect
aeronautical safety services!**

**- *Further collaboration
is needed!***

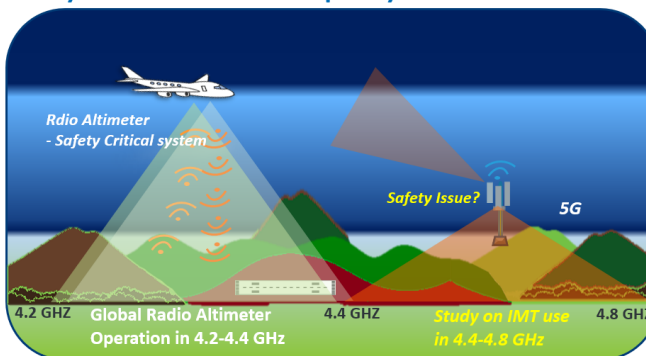
FREQUENCY SPECTRUM MANAGEMENT

18

- ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference 2027 (WRC-27)

Active support from States is deemed to be the only means to ensure that the results of the WRC-27 reflect civil aviation's interest.

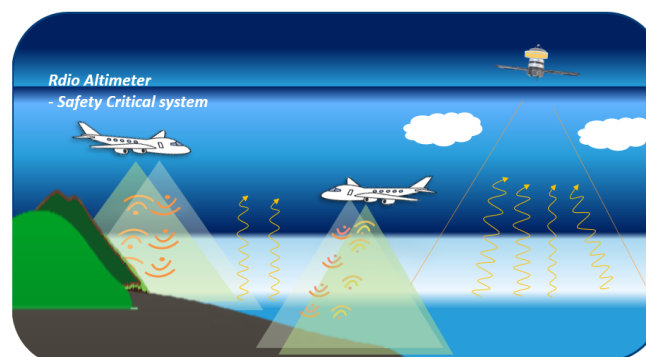
WRC-27 WRC-27 Agenda Item 1.7:
Study on IMT Use in the frequency bands 4400-4800 MHz



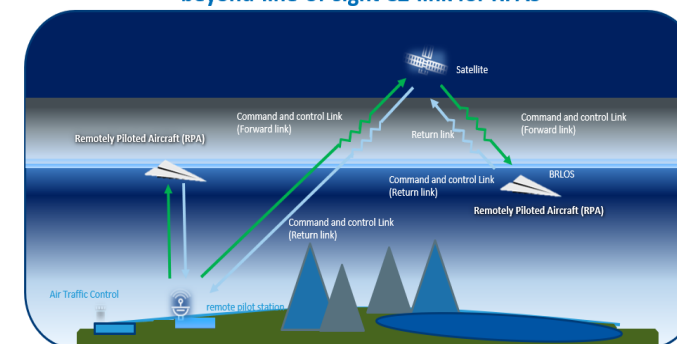
WRC-27 WRC-27 Agenda Item 1.17:
Space Weather Sensors



WRC-27 WRC-27 Agenda Item 1.19: Primary allocations
to the EESS passive in the bands 4200-4400



WRC-27 WRC-27 Agenda Item 6:
Urgent action by Study groups in prep for the next WRC
beyond-line-of-sight C2-link for RPAS



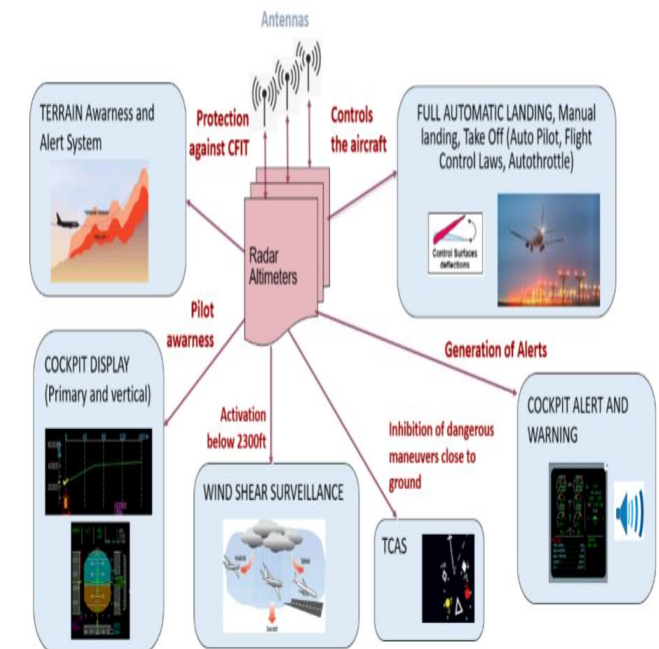
FREQUENCY SPECTRUM MANAGEMENT

Potential interference to Radio Altimeters (RA) and development of relevant SARPs

Potential interference concerns from 5G services operated in the frequency range **below** the RA band 4.2 – 4.4 GHz

The studies since 2014 carried out, which **generally concluded that several models of RA will not operate as intended** if 5G services are deployed at high powers in frequency bands close to 4.2-4.4 GHz.

Several States have already implemented temporary mitigations on 5G systems operating/to be operated in the **lower side of the adjacent bands to protect radio altimeters**, while the aviation industry is working on long-term solutions (including development of the relevant SARPs) to redesign and retrofit altimeters to improve compatibility between cellular broadband technologies and aviation systems .



FREQUENCY SPECTRUM MANAGEMENT

20

Potential interference to Radio Altimeters and development of relevant SARPs Cont.

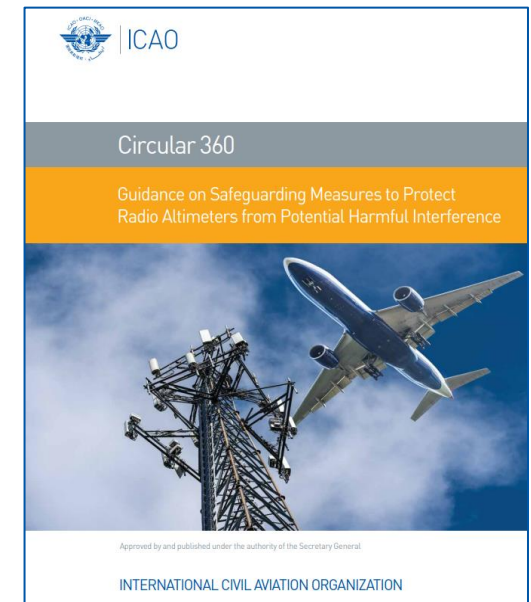
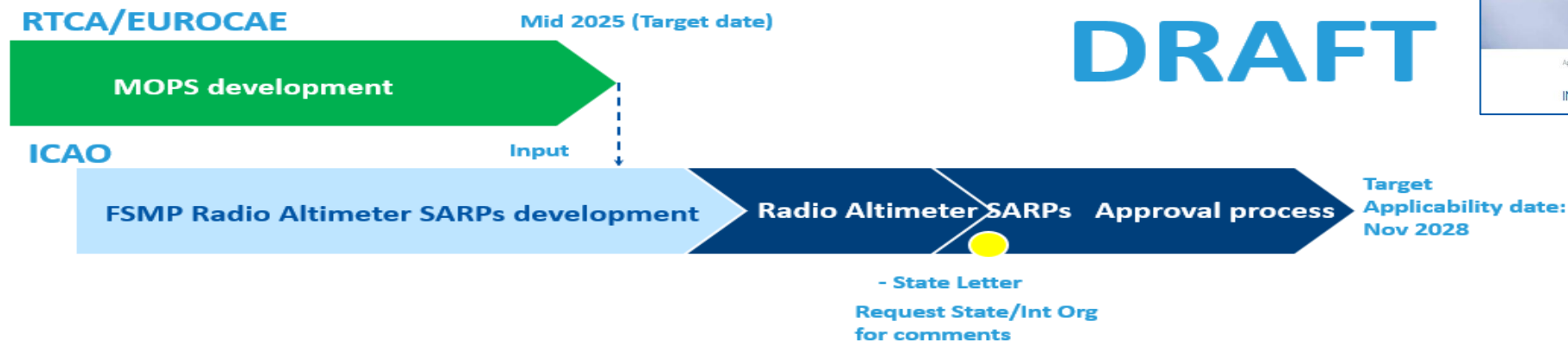
The 41st Assembly requested ICAO/its Member States to continue taking necessary measures/ efforts to ensure that RAs and other aeronautical systems are free from harmful interference, including **implementation of mitigation measures, sharing of best practices, as well as development of relevant provisions and guidance.**

➤ Guidance Material: Circular 360 is now available!

To assist States to consider necessary measures to protect RAs from potential harmful interference, **circular 360** provides essential guidance including several real examples of technical and operational measures taken by some States.

➤ SARPs development

Radio Altimeter SARPs Development Schedule



FREQUENCY SPECTRUM MANAGEMENT

Proposed amendment to Annex 10, Volume V related to WAIC



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Ref.: AN 7/66.1.1-23/47

1 June 2023

Subject: Proposal for the amendment of Annex 10, Volume V relating to implementation of wireless avionic intra-communications (WAIC) for radiocommunication between two or more aircraft stations located onboard a single aircraft

Action required: Comments to reach Montréal by 1 December 2023

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission (ANC), at the third meeting of its 223rd Session held on 16 May 2023, considered a proposal developed by the third meeting of the Frequency Spectrum Management Panel (FSMP/3) to amend Annex 10 — *Aeronautical Telecommunications*, Volume V — *Aeronautical Radio Frequency Spectrum Utilization*. The ANC authorized its transmission to Member States and appropriate international organizations for comments.

2. The proposal introduces provisions relating to the implementation of wireless avionic intra-communications (WAIC) for radiocommunication between two or more aircraft stations located onboard a single aircraft. New definitions related to WAIC in Chapter 1 and new Standards and Recommended Practices (SARPs) in Chapter 4, including a description of radio frequency (RF) characteristics of the WAIC transmitter and the WAIC receiver, are presented in Attachment B.

3. The background of the aforementioned proposal is explained in Attachment A. The proposal for amendment to Annex 10, Volume V is contained in Attachment B. A rationale box providing more information has been included immediately following the proposal.

State Letter (AN 7/66.1.1-23/47) was published on 1 June 2023 and circulated to States and international organizations for their comments.

Due date for comments was 1 December 2023. Most replies indicated broad support for the PfA.

On 7 May 2024, the Secretary presented the results of the consultation, and the final review was conducted by the 226th Session of the ANC.

The expected applicability date for the PfA is 27 November 2025.

INTEGRATED CNS AND SPECTRUM

(Long Term Evolution of CNS and Spectrum matters)

In addition to the continued engagement in the ITU spectrum management process, aviation also needs to engage in a proactive and long-term evolution of the CNS systems

AN-Conf/13 Recommendation 2.2/1

- › ICAO to launch a study on evolving the required CNS and spectrum access strategy in the long term, to ensure that CNS systems remain efficient users of the spectrum resource
- › request States to engage in the spectrum regulatory process to ensure the continued necessary access and protection of the safety critical aeronautical CNS systems

The study was initiated in 2020.

This activity is expected to benefit the development of aeronautical CNS systems and their spectrum use in the medium to longer term and eventually the formulation of the ICAO spectrum policy for future WRCs

INTEGRATED CNS AND SPECTRUM

The Global concept for Integrated Communications, Navigation, Surveillance (CNS) and Spectrum

The ICNSS-TF is drafting the global concept for Integrated Communications, Navigation, Surveillance (CNS) and Spectrum, which will include the following deliverables:

- a) a roadmap of CNSS evolution including a blueprint for CNS systems evolution; and
- b) a new and streamlined framework for CNSS standardization which delivers:

Relevant WPs were discussed under the agenda item 31 (Aviation Safety and Air Navigation Standardization) at the 41st Assembly (27 Sep to 7 Oct 2022).

The draft Global Concept for Integrated CNS & Spectrum was shared with States and the aviation community, through the link embedded in the A41-WP/58.

(For more information, refer to the Integrated CNSS project: [Pages - Integrated CNSS Project \(icao.int\)](#))

INTEGRATED CNS AND SPECTRUM

The Global concept for Integrated Communications, Navigation, Surveillance (CNS) and Spectrum Cont.

Feedback received was very positive and lead to the following strong support:

“The Commission reviewed A41-WP/58, presented by the Council, which contained information on progress achieved by the Integrated Communications, Navigation, Surveillance and Spectrum (ICNSS) project.

Noting that the ultimate objective of the ICNSS project was to propose a set of recommendations for endorsement by the next Assembly, the Commission expressed its satisfaction with the efforts underway and encouraged States, international organizations and other stakeholders to support the continued development and implementation of a medium to long-term roadmap for the evolution of ICNSS and a new streamlined framework for communications, navigation, surveillance (CNS) and frequency spectrum standardization”.

OTHER CNSS ACTIVITIES

25

Refinement of Frequency Finder (FF)

➤ In order to better support States and ICAO regional offices, ICAO continues to enhance the Frequency Finder tool. The following features have now been implemented:

Plotting interference contours in the NAV module; and

A global database for Mode S II/SI code assignments.

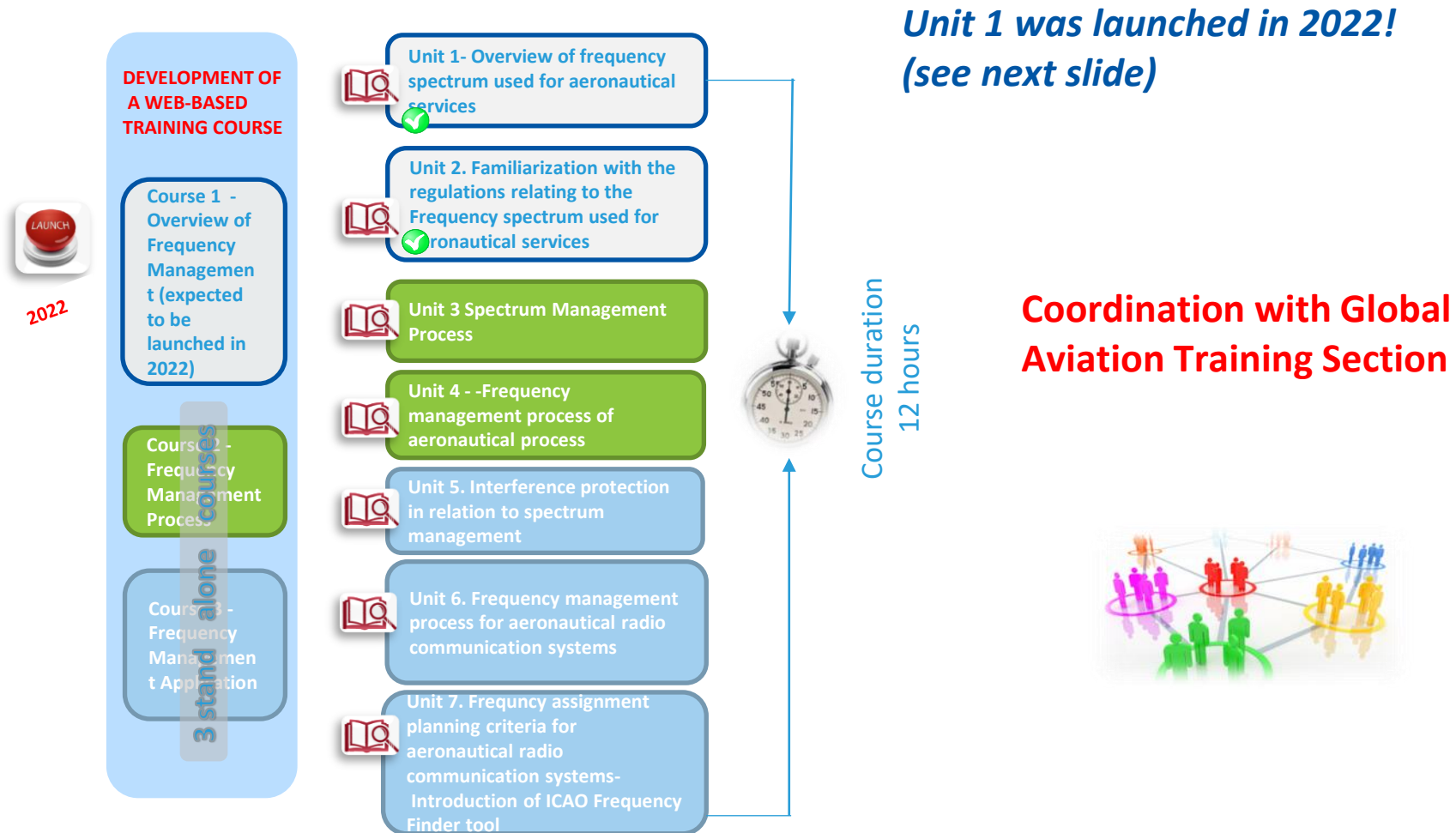
Several additional enhancements have been implemented and are being tested such as: hiding the coordinates of radar location in the SSR module as well as importing bulk records for States into the VHF-COM module and the following are currently being planned to be developed and implemented (such as adding simulation capability, better cyber resilience of the tool) to facilitate efficient use of spectrum, assisting States and ICAO regional offices to visualize the current and future frequency congestions as well as to identify the optimal spectrum assignment globally and regionally.

Workshops to promote Frequency Finder (FF)

➤ Workshops will continue to be provided to assist States in use of FF

Development of an online course, frequency management for civil aviation (refer to the next slide)

ONLINE COURSE DEVELOPMENT RELATED TO FREQUENCY MANAGEMENT FOR CIVIL AVIATION



ONLINE COURSE DEVELOPMENT RELATED TO FREQUENCY MANAGEMENT FOR CIVIL AVIATION

27

Aeronautical Spectrum Use with Special Focus on VHF (ASU) | ICAO Store



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Offered in English only

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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.

Course Description

The course starts by providing clear explanations of key terms to help you understand Very High Frequency (VHF), in addition to providing an overview of key concepts related to Frequency Management. It further enables you to explore the aeronautical services carried out in VHF and helps you to identify the frequency bands for a wide variety of uses in communications, navigation and surveillance (CNS).

GLOBAL DEVELOPMENTS RELATED TO GIS

GLOBAL INTEROPERABLE SYSTEMS

29

Focusing on global planning, information management and global interoperability for aviation information exchange

- Major update for the 8th edition of the Global Air Navigation Plan (GANP) being finalized for the 42nd Assembly
- PANS-IM to be published in November 2024
- Guidance on Information Security supporting PANS-IM and trusted information exchange to be published in November 2024



Thank You