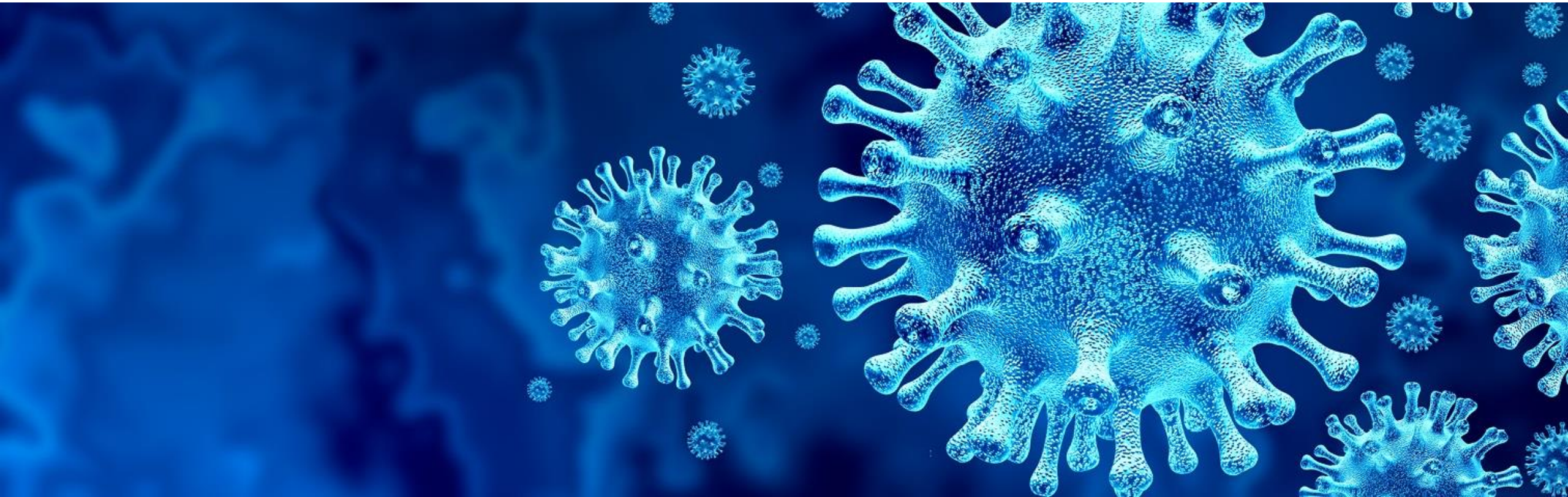
ICAO MID

FIFTH MEETING OF THE PERFORMANCE BASED NAVIGATION SUB-GROUP (PBN SG/5)

(19 - 20 October 2020)



PBN SG/5

Agenda Item 3: Global and Regional Developments

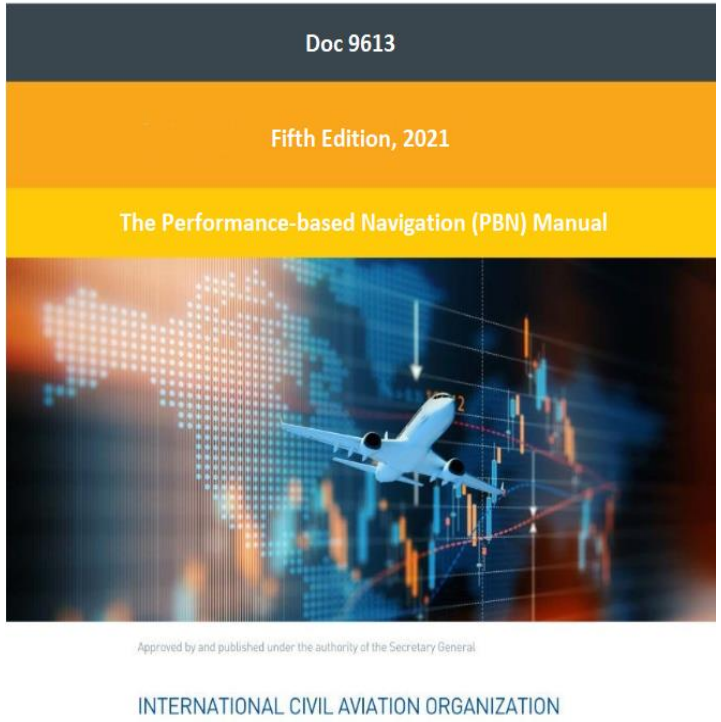
Draft Doc 9613 Edition 5

List of main Changes from Edition 4

ICAO

The 5th Edition has been updated to reflect new requirements, as well as to provide additional or revised guidance on a range of subjects. Specific changes include:

- Part B – Implementation Guidance removed
- Attachment C on Operational Approval removed
- Clarification of the use of PBN on Free routes
- Clarification of the ability to choose RNAV or RNP NAVSPEC irrespective of the availability of surveillance
- Recognition of GBAS as a positioning sensor
- Clarification of Surveillance requirements
- Deletion of Final Approach Segment from A-RNP
- Addition of RNP AR DP criteria and a complete update of RNP AR APCH criteria
- Additional guidance on the implementation of A-RNP



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List of main Changes from Edition 4 (cont.)

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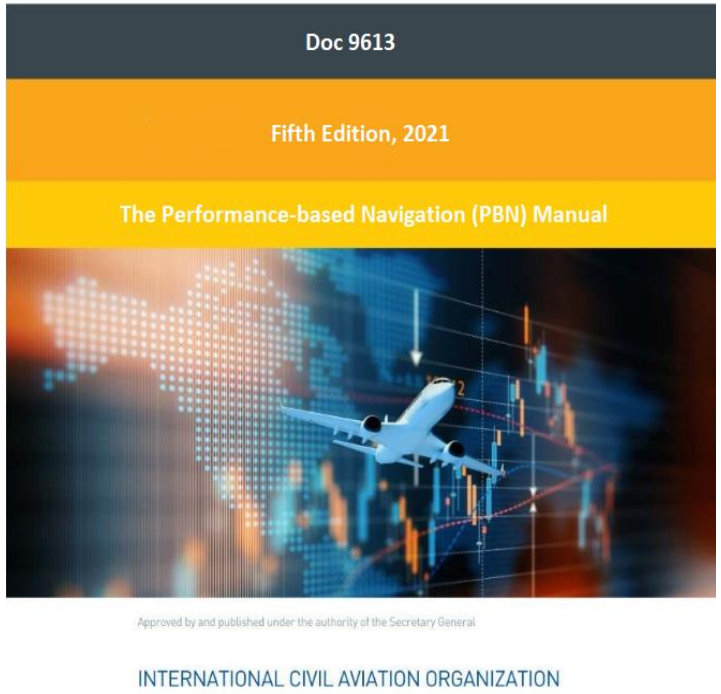
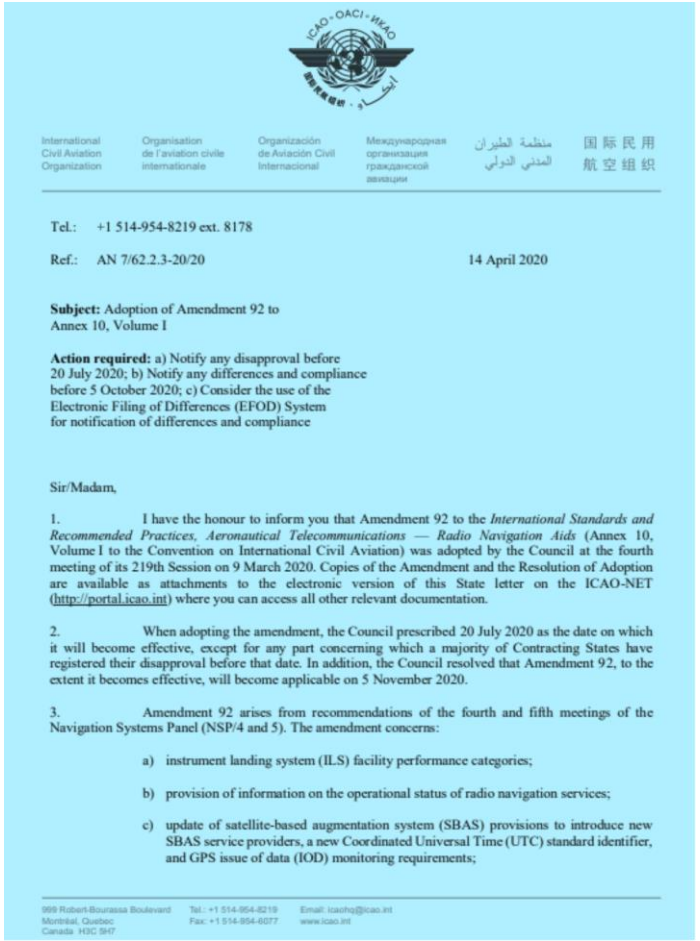
- Additional guidance on temperature correction and New Attachment B to Vol II, containing Temperature Compensation for Barometric VNAV
- RNP 0.3 navigation specification explicitly defined as helicopter only
- Guidance on ATC status monitoring for GNSS
- Sample Airspace Concepts based on Navigation Specifications now available as Attachment C
- Consideration and awareness is provided on the development of GNSS reversion capability;
- Removal of references to the Minimum Navigation Performance Standards (MNPS) which is no longer used.
- Review of applicable path terminators for navigation specifications, and guidance on combinations of such path terminators in procedure design.



For more details on the information presented in this update, refer to the PBN Study Group report at Appendix 3A.

Status Monitoring of Individual GNSS Signals

- SL AN 7/62.2.3-20/20 issued 14 April 2020 on Adoption of Amendment 92 to Annex 10 applicable 5 November 2020.
- The amendment addresses among others provision of information on the operational status of radio navigation services.
- STD 2.3.1 does not change but a Note is added — Guidance material on the application of this Standard in the case of PBN-based operations supported by GNSS is contained in the Performance-based Navigation (PBN) Manual (Doc 9613), is added.
- 2.3.1 Standard refers to approach control services only.
- does not address the status monitoring of individual GNSS signals, but rather of essential radio navigation services.
- The real-time monitor concept is neither practical nor required for PBN ABAS operations.
- Mitigation of the absence of service monitoring for PBN operations.
- Implementing an RNAV service monitoring for DME/DME consists mainly of assessing the operational status of any “critical DMEs”.



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Ref.: AN 7/62.2.3-20/20 14 April 2020

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

Action required: a) Notify any disapproval before 20 July 2020; b) Notify any differences and compliance before 5 October 2020; 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 — Radio Navigation Aids* (Annex 10, Volume I to the Convention on International Civil Aviation) was adopted by the Council at the fourth meeting of its 219th Session on 9 March 2020. 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 20 July 2020 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 5 November 2020.

3. Amendment 92 arises from recommendations of the fourth and fifth meetings of the Navigation Systems Panel (NSP/4 and 5). The amendment concerns:

a) instrument landing system (ILS) facility performance categories;

b) provision of information on the operational status of radio navigation services;

c) update of satellite-based augmentation system (SBAS) provisions to introduce new SBAS service providers, a new Coordinated Universal Time (UTC) standard identifier, and GPS issue of data (IOD) monitoring requirements;

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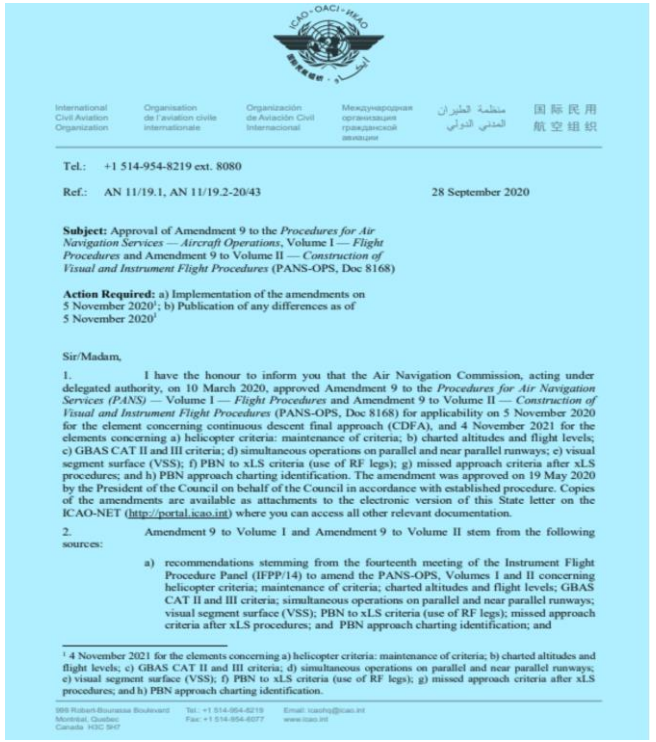
Amendment 9 to the Procedures for Air Navigation Services — Aircraft Operations, Volume I and Volume II — (PANS-OPS, Doc 8168)

- ICAO State Letter 20-43 dated 28 September 2020, Approval of Amdt 9 PANS-OPS, Doc 8168 Volume I and Volume II .
  - on 5 November 2020: CDFA,
  - Applicable as of 4 November 2021:

a) helicopter criteria;
b) charted altitudes and flight levels;
c) GBAS CAT II and III criteria;
d) SOIR;
e) VSS;
f) PBN to xLS;
g) MA after xLS; and
h) PBN approach charting identification.



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Ref.: AN 11/19.1, AN 11/19.2-20/43 28 September 2020

Subject: Approval of Amendment 9 to the *Procedures for Air Navigation Services — Aircraft Operations*, Volume I — *Flight Procedures* and Amendment 9 to Volume II — *Construction of Visual and Instrument Flight Procedures* (PANS-OPS, Doc 8168)

Action Required: a) Implementation of the amendments on 5 November 2020[1]; b) Publication of any differences as of 5 November 2020[1]

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, acting under delegated authority, on 10 March 2020, approved Amendment 9 to the *Procedures for Air Navigation Services (PANS)* — Volume I — *Flight Procedures* and Amendment 9 to Volume II — *Construction of Visual and Instrument Flight Procedures* (PANS-OPS, Doc 8168) for applicability on 5 November 2020 for the element concerning continuous descent final approach (CDFA), and 4 November 2021 for the elements concerning a) helicopter criteria: maintenance of criteria; b) charted altitudes and flight levels; c) GBAS CAT II and III criteria; d) simultaneous operations on parallel and near parallel runways; e) visual segment surface (VSS); f) PBN to xLS criteria (use of RF legs); g) missed approach criteria after xLS procedures; and h) PBN approach charting identification. The amendment was approved on 19 May 2020 by the President of the Council on behalf of the Council in accordance with established procedure. Copies of the amendments 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. Amendment 9 to Volume I and Amendment 9 to Volume II stem from the following sources:

a) recommendations stemming from the fourteenth meeting of the Instrument Flight Procedure Panel (IFPP/14) to amend the PANS-OPS, Volumes I and II concerning helicopter criteria; maintenance of criteria; charted altitudes and flight levels; GBAS CAT II and III criteria; simultaneous operations on parallel and near parallel runways; visual segment surface (VSS); PBN to xLS criteria (use of RF legs); missed approach criteria after xLS procedures; and PBN approach charting identification; and

[1] 4 November 2021 for the elements concerning a) helicopter criteria: maintenance of criteria; b) charted altitudes and flight levels; c) GBAS CAT II and III criteria; d) simultaneous operations on parallel and near parallel runways; e) visual segment surface (VSS); f) PBN to xLS criteria (use of RF legs); g) missed approach criteria after xLS procedures; and h) PBN approach charting identification.

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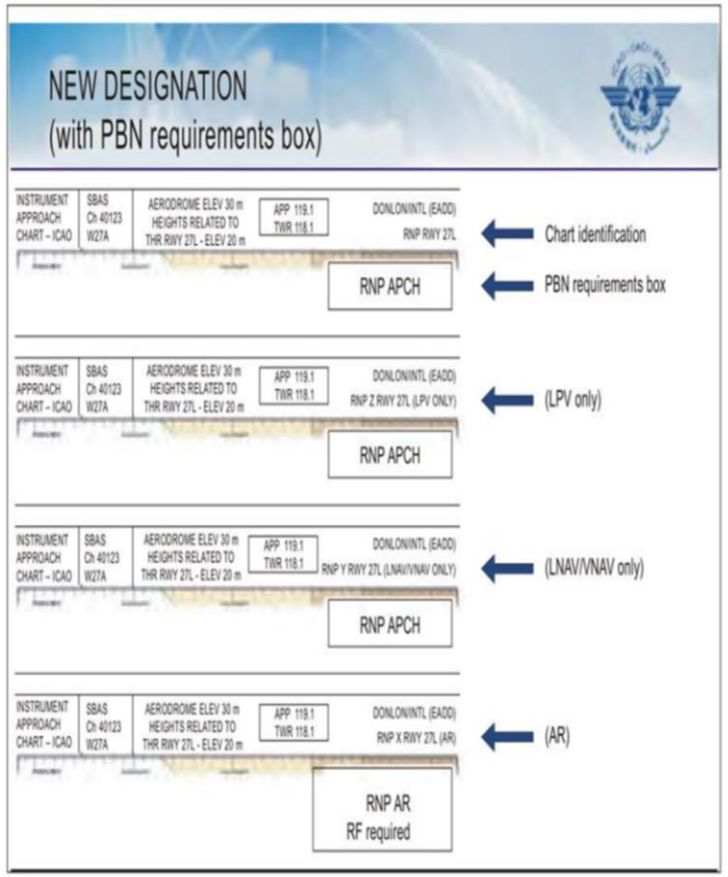
MID Region PBN Charting Transition Plan and Status

- ICAO published provisions for a coherent naming convention that reflect the navigation application being used on the approach, either RNP APCH or RNP AR APCH (ICAO Circular 353).
- Until 30 November 2022, approach charts depicting procedures that meet the RNP APCH navigation specification criteria must include either the term RNP or RNAV (GNSS) in the identification; e.g. RNP RWY 23 or RNAV (GNSS) RWY 23. However, from 1 December 2022, only the term RNP will be permitted.
- Until 30 November 2022, approach charts depicting procedures that meet the RNP AR APCH navigation specification criteria must include either the term RNP (AR) or RNAV (RNP) in the identification; e.g. RNAV (RNP) RWY 23.
- However, from 1 December 2022, only the term RNP (AR) will be permitted.



MID Region PBN Charting Transition Plan and Status

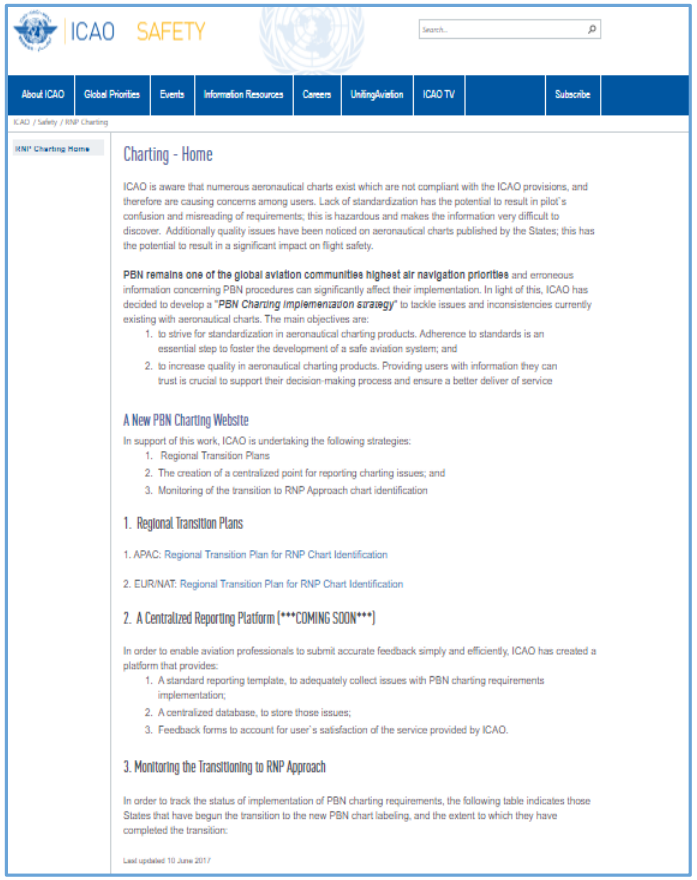
- MIDANPIRG/17 requested MID Office to coordinate with ICAO HQ for the provision of available data through platform for reporting purpose.
- ICAO is providing the central repository of information on the chart transitions.
- The PBN Charting Website contains :

i. Regional Transition Plans,

ii. A Centralized Reporting Platform (Ongoing)

iii. Monitoring the Transitioning to RNP Approach to identify, graphically, those States that have indicated a timeline for the transition as well as those which have finally completed this work.

- The platform is available through: https://www.icao.int/safety/charting/.



Monitoring the Transitioning to RNP Approach

- In order to track the status of implementation of PBN charting requirements, the following table indicates those MID States that have begun the transition to the new PBN chart labeling, and the extent to which they have completed the transition.

- Last updated 01 October 2020

State	Total PBN APTs	Total PBN Approaches	Number of PBN APCHs using new name	% of PBN APCHs using new name
COMPLETED				
Egypt	17	17	41	100.00%
Iran	3	4	4	100.00%
Oman	8	8	16	100.00%
Qatar	2	6	6	100.00%

Monitoring the Transitioning to RNP Approach

State	Total PBN APTs	Total PBN Approaches	Number of PBN APCHs using new name	% of PBN APCHs using new name
In progress				
Bahrain	1	4	0	0%
Iraq	4	8	2	25.00%
Jordan	3	6	0	0%
Kuwait	1	12	0	0%
Lebanon	1	4	0	0%
Libya	0	0	0	-
Saudi Arabia	AIP			
Sudan	Information Not available			
UAE	8	28	6	28.57%
Syria	1	1	0	0%
Yemen	2	3	0	0%

MID Region PBN Charting Transition Plan

- MID States, that have not yet done so, should implement RNAV to RNP Chart naming convention for their current PBN Approach Procedures published in their AIPs, until 8 September 2022.

- Key factor to the successful implementation of the new Charting convention is good coordination with the ICAO MID Office and the States to develop a plan for the structured transition to the new approach charts.

- States are required to provide the ICAO MID Office with their action plan for the implementation of RNAV to RNP Chart naming convention, and keep the MID Office apprised of the status of implementation.

Action by the meeting

The meeting is invited to:

- note the information presented; and take action, as appropriate; and
- provide ICAO MID office with update on the status of RNAV to RNP Charting Depiction

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Middle East (MID) Office Cairo
Eastern and Southern African (ESAF) Office Nairobi
Asia and Pacific (APAC) Sub-office Beijing
Asia and Pacific (APAC) Office Bangkok
THANK YOU

PBN Study Group

Draft Doc 9613 Edition 5

List of Changes from Edition 4

Volume I - Concept and Implementation Guidance

Structural Changes to Vol I:

Duplicated material removed

- Part B – Implementation Guidance removed
  - It was felt that that Part B duplicated text already found in Doc 9992 – Manual on the use of PBN in Airspace Design, and was therefore redundant in Doc 9613
  - Introduction to PBN Implementation retained, but Processes removed
- Attachment C on Operational Approval removed
  - Again, this text more expansively covered in Doc 9997 – PBN Operational Approval Manual, therefore redundant in Doc 9613

Vol I - Detailed Changes

- Update to the executive summary to present an overview of the proposed PBN Strategy
- Inclusion of guidance regarding the judicious use of RF Legs (and in Vol II Part A)
- Clarification of the use of PBN on Free routes and in airspace, rather than just on published ATS routes
- Clarification of the ability to choose either RNAV or RNP navigation specifications regardless of the availability of suitable surveillance
- Inclusion of references to material on the conduct of safety case assessments
- Consideration of reversion from RNP following loss of GNSS

Vol I - Detailed Changes (cont.)

- Clarification on expected behaviour of the system when no performance requirement exists – all RNAV must be PBN
- Clarification provided within Specific RNAV and RNP System Functions of the application of Holding Patterns
  - Consequential changes to all navigation specifications in Vol II
- Recognition of GBAS as a positioning sensor (also in Vol II Parts B and C)
- General text highlighting the need for education and training
- Clarification of Surveillance requirements (also in Vol II Parts B and C)
- Consistent use of terminology for operational approval, acceptance and authorisation (also in Vol II Parts B and C)

Volume II – Implementing RNAV and RNP Operations

Significant Changes to Vol II

- Part C, Chapter 4 Implementing Advanced RNP
  - Dropping of scalability requirement and adoption of a fixed RNP 0.3 lateral navigation accuracy in terminal airspace applications, with the exception of the Missed Approach which remains at RNP 1
  - Deletion of Final Approach Segment from A-RNP nav spec
- Part C, Chapter 6 now addresses Implementing RNP with Authorisation Required (AR) (RNP AR APCH and RNP AR DP)
  - Addition of RNP AR DP criteria and a complete update of RNP AR APCH criteria in-line with the latest regulatory standards and practices

Structural Changes to Vol II: Attachments

- Edition 4, Attachment A to Vol II, Barometric VNAV (Baro-VNAV) is removed, as criteria is outdated
  - Industry standards and regulatory guidance has moved on
  - Attachment did not address other forms of VNAV or the application of VNAV for credit in the Final Approach Segment verses it use for Advisory purposes
  - Attachment A now speaks to Vertical Navigation (VNAV) in the Final Approach Segment
  - We know that Vol II Table of Contents is in error!
- New Attachment B to Vol II, containing Temperature Compensation for Barometric VNAV
  - Taken from RTCA/EUROCAE industry standards

Structural Changes to Vol II: Attachments (cont.)

- Edition 4 Attachment B to Vol II, Sample Airspace Concepts based on Navigation Specifications now Attachment C
  - Attachment C to Vol II, new route spacings based on EUROCONTROL and UK studies
- New Attachment D to Vol II, containing guidance on the application of Magnetic Variation (MagVar)
  - Taken from RTCA/EUROCAE industry standards
- New Attachment E to Vol II, containing Document References for Navigation Specifications
  - A compendium of the latest industry and regulatory reference material used within Vol II Parts B and C
  - Facilitates an easier maintenance of references within the PBN Manual as those references are updated by external bodies

Vol II - Detailed Changes

- Update to Part A Chapter 1, Table II-A-I-I and Notes reflecting applicability of navigation specifications to the relevant flight phases
- Update to Part A Chapter 1, Table II-A-1-3 Navigation Specifications and RNP System Functions
- Part A Chapter 2, On-board performance Monitoring and Alerting concept revised to align with aircraft requirements and remove the current confusion with external signal-in-space requirements
- Consequential changes to the OBPMA paragraphs in all of the RNP navigation specifications and RNAV navigation specifications changed to be consistent

Vol II - Detailed Changes

- Part A, Chapter 4, recognition of the evolution of GNSS elements including Dual Frequency and Multiple Constellation (DFMC) GNSS
- Clarification of GNSS monitoring requirements
- Addition of a new Appendix to Chapter 4 providing guidance on the application of Advanced RNP
- Part B, Appendix to Chapter 3 – non-significant differences between FAA AC 90-100 and JAA TGL No. 10 (Rev 1) removed
  - Regulatory documents are no longer in use and their reference to USRNAV Type A and B and European P-RNAV has been replaced globally by RNAV 1 and 2

Vol II - Detailed Changes cont.

- Part C, Chapter 5 Implementing RNP APCH – general update and changes reflecting the inclusion of the new Attachment A to Vol II Vertical Navigation (VNAV) in the Final Approach Segment
- Part C, Chapter 6 Implementing RNP AR - in addition to the significant changes already mentioned, inclusion of guidance for operators conducting a Flight Operational Safety Assessment (FOSA)
- Part C, Chapter 7 Implementing RNP 0.3 - now intended for the exclusive use of helicopters and rotorcraft

Vol II - Detailed Changes

- Appendix 1 to Part C Radius to Fix (RF) Path Terminator updated
- Guidance for use of RF Legs by General Aviation aircraft without Autopilot and/or Flight Director (AP/FD)
- All navigation specifications - updated in line with RTCA DO-236C/EUROCAE ED-75D MASPS and RTCA DO-283B MOPS
- All navigation specifications - description of use of ARINC 424 path terminators and caution on use of non-standard path terminator combinations
- Reference to Circular 353 for charting and publication of RNP APCH and RNP AR APCH