



International Civil Aviation Organization

**The Second Meeting of ICAO Asia/Pacific Performance Based Navigation  
Implementation Coordination Group (PBNICG/2)**

Bangkok, Thailand, 11-12 June 2015

Agenda Item 3: Review of Related Global/Regional Plans, Priorities and Targets

Agenda Item 6: Report of Progress from PBNICG Tasks

Agenda Item 10: Issues and Challenges regarding PBN Implementations

**APAC SEAMLESS ATM PLAN UPDATE**

(Presented by Secretariat)

**SUMMARY**

This paper presents the need for updating PBN related material to achieve the targets and metrics in the APAC Seamless ATM Plan and proposes the meeting to review the material and present any amendments thereof to APANPIRG/27 in 2016 to facilitate implementation of PBN in the Region. Action by the meeting is in paragraph 3.1.

**1. INTRODUCTION**

1.1 The 25<sup>th</sup> Meeting of Asia and Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/25) held in Kuala Lumpur, Malaysia from 8 to 11 September 2014 adopted the terms of reference (TOR) for the APAC PBN Implementation Coordination Group (PBNICG) which specifies the scope of work. Based on this TOR, PBNICG is to review regional issues / targets and related regional plans that are related to implementation of PBN.

1.2 In addition, during the First Meeting of ICAO Asia and Pacific PBN Implementation Coordination Group (PBNICG/1) which was held in Beijing China from 10 to 12 March 2015, the meeting deliberated on the *APAC Seamless ATM Plan (APSAP)*. PBNICG/1 recognized the challenges to the implementation of RNP2 NavSpecs and timelines stated in the APSAP and recognized the need to review the targets and metrics which are related to PBN in the APSAP and provide inputs, if any, to the APAC Regional Office before the next review cycle of APSAP (Refer to Action 1/12 of PBNICG/1).

**2. DISCUSSION**

Asia/Pacific Seamless ATM Plan

2.1 The APANPIRG/24 which were held in Bangkok, Thailand from 24 to 28 June 2013 approved the *Asia and Pacific Seamless ATM Plan (APSAP)* to provide a framework for a transition to a Seamless ATM environment and to facilitate Seamless ATM operations in the Asia and Pacific Region. Following this, APANPIRG/25 adopted *Asia and Pacific Seamless ATM Implementation Guidance* to provide recommended implementation actions and guidance to States. These documents include PBN related elements as shown in **Appendix A**.

2.2 However, as these documents were planned during the initial phase of PBN implementation, the planned targets do not match the current status of the implementation of PBN in this Region. The

global targets/metrics for PBN implementation differ from those of the Region in terms of the area of application (instrument runway vs international aerodrome, international airports and busy domestic airports vs. international high density aerodromes), phase of flight (none vs. PBN ATS routes) and application phase (2016 vs. Nov 2015 and Nov 2018) and these targets may not be achieved by those dates either globally or regionally. Moreover, some concepts of operations such as RNP2 navigation specifications are still not applicable due to the lack of documentation and guidance material, and thus cannot meet the timelines proposed in the regional plan.

2.3 In addition, the reference documents related to PBN implementation do not reflect the ICAO documents which are available currently such as *Manual on the Use of PBN in Airspace Design (Doc 9992)*, *Continuous Climb Operations (CCO) Manual (Doc 9993)* and *PBN Operational Approval Manual (Doc 9997)*. Also some elements in *Asia and Pacific Seamless ATM Implementation Guidance* need more documents for the implementation such as PANS-OPS Volume II for PBN Visual Departure and Arrival Procedures, Doc 9997 for 140 PBN Routes, Doc 9992, Doc 9993 and Doc 9931 (CDO Manual) for 150, PBN Airspace, and so on (see **Appendix B**)

Review of the APAC Seamless ATM Plan

2.4 During PBNICG/1, the secretariat informed the meeting that the APSAP was to reviewed regularly and the next review cycle would be 2016. In view of this, it would be opportune for the meeting to review PBN related documents, targets and metrics and identify the items that needed to be updated and included in the APSAPG to reflect current PBN implementation status.

2.5 In order to achieve this, it is suggested that a small group be established to review the targets, metrics, implementation status and the related documents in the APSAP and draft a work plan with dates for deliverables. The discussions and reviews can be continued through PBNICG/3 and PBNICG/4 It is proposed that the small group review report be presented to the Twentieth Meeting of Communication, Navigation and Surveillance Sub-group (CNS SG/20) of the APANPIRG in 2016.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) form a small group to review PBN related elements in the APAC Seamless ATM Plan detailed in paragraph 2.5; and
- c) further discuss any relevant matters as appropriate.

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## Appendix A. List of Seamless ATM Plan Specifications

Seamless ATM Plan reference, paragraph	Aerodrome	Terminal	En-route	Specification title	ASBU module	Phase 1 (12 Nov. 2015)	Phase 2 (08 Nov. 2018)
10 (7.1)	✓			Apron Management	Regional	✓	
20 (7.1)	✓	✓		ATM-Aerodrome Coordination	Regional	✓	
30 (7.1, 13)	✓			Aerodrome capacity	Regional	✓	✓
40 (7.1)	✓			Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	B0-SURF	✓	
50 (7.25, 45)	✓	✓		Arrival Manager/Departure Management (AMAN/DMAN)	B0-RSEQ	✓	✓
60 (7.44, 50)		✓	✓	ATC Sector Capacity	Regional		✓
70 (7.2)	✓			Airport Collaborative Decision-Making (ACDM)	B0-ACDM	✓	
80 (7.27, 47)		✓	✓	Air Traffic Flow Management/Collaborative Decision-Making (ATFM/CDM)	B0-NOPS	✓	✓
90 (7.3)		✓		Continuous Descent Operations (CDO)	B0-CDO	✓	
100 (7.3)		✓		Continuous Climb Operations (CCO)	B0-CCO	✓	
110 (7.5, 14, 16)		✓		Performance-based Navigation (PBN) Approach	B0-APTA	✓	✓
120 (7.4, 15)		✓		Standard Instrument Departures/Standard Terminal Arrivals (SID/STAR)	B0-CCO	✓	✓
130 (7.19)		✓		Performance-based Navigation (PBN) Visual Departure and Arrival Procedures	Regional		✓
140 (7.9, 22)			✓	Performance-based Navigation (PBN) Routes	B0-FRTO	✓	✓
150 (7.8)			✓	Performance-based Navigation (PBN) Airspace	Regional	✓	
160 (7.52, 54)		✓	✓	Safety Nets	B0-SNET		✓
170 (7.7, 21)		✓	✓	Airborne Safety Systems	B0-ACAS	✓	✓
180 (7.6, 23, 24)		✓	✓	Ground-based surveillance	B0-ASUR	✓	✓
190 (7.28)			✓	Airspace classification	Regional	✓	
200 (7.10)			✓	Flight Level Orientation Scheme (FLOS)	Regional	✓	
210 (7.36, 40)			✓	Flight Level Allocation Schemes (FLAS)	Regional	✓	
220 (7.35, 49)		✓	✓	ATS Inter-facility Data-link Communications (AIDC)	B0-FICE	✓	✓
230 (7.29,46)	✓	✓	✓	Automated Transfer of Control	Regional	✓	✓
240 (7.34,48)		✓	✓	ATS Surveillance data sharing	Regional	✓	✓
250 (7.37, 43, 53)	✓	✓	✓	ATM systems enabling optimal PBN/ATC operations	B0-APTA	✓	✓
260 (7.30)	✓	✓	✓	ATC Horizontal separation	Regional	✓	
270 (7.32)	✓	✓	✓	Situation display integrating surveillance data	B0-ASUR	✓	
280 (7.33)		✓	✓	ADS-C, CPDLC	B0-TBO	✓	
290 (7.33)	✓	✓	✓	UPR and DARP	B0-FRTO	✓	
300 (7.38, 51)	✓	✓	✓	Aeronautical Information Management	B0-DATM	✓	✓
310 (7.26, 39)	✓	✓	✓	Meteorological Information	B0-AMET	✓	
320 (7.41, 55)	✓	✓	✓	ATM Managers' Performance	Regional	✓	✓
330 (7.41)	✓	✓	✓	ATC simulators performance	Regional	✓	
340 (7.41)	✓	✓	✓	Safety assessment of changes	Regional	✓	
350 (7.41)	✓	✓	✓	ATM Operators' performance	Regional	✓	
360 (7.11)		✓	✓	Civil Military use of SUA	B0-FRTO	✓	
370 (7.42)		✓	✓	Strategic Civil Military coordination	Regional	✓	
380 (7.42)		✓	✓	Tactical Civil Military coordination	Regional	✓	
390 (7.42)	✓	✓	✓	Civil Military system integration	Regional	✓	
400 (7.42)	✓	✓	✓	Civil Military nav aids joint provision	Regional	✓	
410 (7.42)	✓	✓	✓	Civil Military common training	Regional	✓	
420 (7.42)	✓	✓	✓	Civil Military common procedures	Regional	✓	



**Appendix B. Recommended Implementation Actions and Guidance**

90	Continuous Descent Operations (B0-CDO)	7.3 CDO operations should be considered for implementation at all high density international aerodromes after analysis, based on a performance-based approach.		<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> </tr> <tr> <td>2</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> <td>√</td> <td>-</td> </tr> <tr> <td>3</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>√</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	F	1	√	√	√	√	√	-	2	√	√	√	-	√	-	3	√	√	√	√			4	√	√	√	√			5	√	√	√	√			6	√	√	√	√			7	√	√					<p><b>Main impacts</b></p> <ul style="list-style-type: none"> <li>• People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO</li> <li>• Procedures: ANSP, Airspace users</li> <li>• Systems: Avionics, Ground Systems, Navaid infrastructure</li> </ul> <p><b>Main requirements/guidance</b></p> <ul style="list-style-type: none"> <li>• ICAO Continuous Descent Operations (CDO) Manual (Doc 9931)</li> <li>• ICAO Performance Based Navigation Manual (ICAO Doc 9613)</li> <li>• ICAO PBN operational approval guidance material</li> <li>• ICAO Doc 9868 (PANS training)</li> </ul> <p>Note: Since RNP AR Approaches require significant training, ANSPs should work closely with airspace users to determine where RNP AR approaches are to be implemented.</p>
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110	<b>Performance -based Navigation (PBN) Approach (B0-APTA)</b>	<p>7.5 Where practicable, all high density aerodromes with instrument runways serving aeroplanes should have approaches with vertical guidance (APV). should have:</p> <p>a) precision approaches; or</p> <p>b) approaches with vertical guidance (APV), either RNP APCH with Barometric Vertical Navigation (Baro-VNAV) or augmented GNSS (SBAS or GBAS; or when an APV was not practical, straight-in RNP APCH with Lateral Navigation (LNAV)</p> <p>c)</p>	<p>7.14 RNP 0.3 arrival/departure, approach and/or en-route transiting procedures should be considered at high density aerodromes with rotary wing operations.</p> <p>7.16 Where practicable, all aerodromes with instrument runways serving aeroplanes should have (ASBU Priority 2):</p> <p>a) precision approaches; or</p> <p>b) APV, either RNP APCH with Barometric Vertical Navigation (Baro-VNAV) or augmented GNSS (SBAS or GBAS); or</p> <p>c) when an APV is not practical, straight-in RNP APCH with LNAV</p>	A	B	C	D	E	F	<p><b>Main impacts</b></p> <ul style="list-style-type: none"> <li>• People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO</li> <li>• Procedures: ANSP, Airspace users</li> <li>• Systems: Avionics, ANSP Ground Systems, SBAS and GBAS infrastructure</li> </ul> <p><b>Main requirements/guidance</b></p> <ul style="list-style-type: none"> <li>• ICAO Annex 11</li> <li>• ICAO Annex 10</li> <li>• ICAO PANS-OPS Volume 1</li> <li>• ICAO PBN Manual</li> <li>• ICAO GNSS Manual</li> <li>• ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II</li> <li>• ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)</li> <li>• ICAO Doc 9868 (PANS training)</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>• the APAC PBN Plan Version 3 required RNP APCH (with Baro-VNAV) for 30% of instrument runways by 2010 and 50% by 2012 (priority should be given to airports with operational benefits); and RNP APCH with Baro-VNAV or APV in 100% of instrument runways by 2016.</li> <li>• For avionics consider Basic IFR Avionics (TSO C129 with RAIM), Basic IFR GNSS receivers with Baro VNAV, SBAS avionics (TSO C145/146), GBAS receivers (TSO C161/162)</li> </ul>	
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120	Standard Instrument Departures/ Standard Terminal Arrivals (SID/STAR) (B0-CCO)	7.4 All international high density aerodromes should have RNAV 1 (ATS surveillance environment) or RNP 1 (ATS surveillance and non-ATS surveillance environments) SID/STAR.	7.15 All international aerodromes should have RNAV 1 (ATS surveillance environment) or RNP 1 (ATS surveillance and non-ATS surveillance environments) SID/STAR.	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> <td>√</td> <td>-</td> </tr> <tr> <td>2</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> <td>√</td> <td>-</td> </tr> <tr> <td>3</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>√</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	F	1	√	√	√	-	√	-	2	√	√	√	-	√	-	3	√	√	√	√			4	√	√	√	√			5	√	√	√	√			6	√	√	√	√			7	√	-					<p><b>Main impacts</b></p> <ul style="list-style-type: none"> <li>• People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO</li> <li>• Procedures: ANSP, Airspace users</li> <li>• Systems: Avionics, ANSP Ground Systems, SBAS and GBAS infrastructure</li> </ul> <p><b>Main requirements/guidance</b></p> <ul style="list-style-type: none"> <li>• ICAO Annex 11</li> <li>• ICAO Annex 10</li> <li>• ICAO PANS-OPS Volume 1</li> <li>• ICAO PBN Manual</li> <li>• ICAO GNSS Manual</li> <li>• ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II</li> <li>• ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)</li> <li>• ICAO Doc 9868 (PANS training)</li> </ul> <p>Note: the Asia/Pacific PBN Plan Version 3 required RNAV 1 SID/STAR for 50% of international airports by 2010 and 75% by 2012 (priority should be given to airports with RNP Approach); and RNAV 1 or RNP 1 SID/STAR for 100% of international airports and 70% of busy domestic airports where there are operational benefits by 2016.</p>
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130	Performance-based Navigation (PBN) Visual Departure and Arrival Procedures - REGIONAL		7.19 PBN procedures that overlay visual arrival and departure procedures should be established where this provided an operational advantage.	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> </tr> <tr> <td>2</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> <td>√</td> <td>-</td> </tr> <tr> <td>3</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>√</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	F	1	√	√	√	√	√	-	2	√	√	√	-	√	-	3	√	√	√	√			4	√	√	√	√			5	√	√	√	√			6	√	√	√	√			7	√	-					<p><b>Main impacts</b></p> <ul style="list-style-type: none"> <li>• People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO</li> <li>• Procedures: ANSP, Airspace users</li> <li>• Systems: Avionics, ANSP Ground Systems, SBAS and GBAS infrastructure</li> </ul> <p><b>Main requirements/guidance</b></p> <ul style="list-style-type: none"> <li>• ICAO Annex 11</li> <li>• ICAO Annex 10</li> <li>• ICAO PANS-OPS Volume 1</li> <li>• ICAO PBN Manual</li> <li>• ICAO GNSS Manual</li> <li>• ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II</li> <li>• ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)</li> <li>• ICAO Doc 9868 (PANS training)</li> </ul>
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140	<p><b>Performance-based Navigation (PBN) Routes (B0-FRTO)</b></p>	<p>7.9 All ATS routes should be designated with a navigation performance specification to define the CNS/ATM operational environment. The ATS route navigation performance specification selected should be the least stringent needed to support the intended operation. When obstacle clearance or ATC separation requirements demand, a more stringent navigation specification may be selected. ATS routes should be established in accordance with the following PBN specifications:</p> <ul style="list-style-type: none"> <li>Category R airspace – RNP 4, RNP 10 (RNAV 10) (other acceptable navigation specifications – RNP 2 oceanic); and</li> <li>Category S airspace – RNP 2 or RNAV 2 (other acceptable navigation specifications – RNAV 5).</li> </ul>	<p>7.22 All en-route controlled airspace should be designated as being exclusive PBN airspace with mandatory carriage of GNSS utilising RNP navigation specifications, except for State aircraft. Such implementation mandates should be harmonised with adjacent airspace. ATS routes should be established in accordance with the following PBN specification:</p> <ul style="list-style-type: none"> <li>Category R and S airspace – RNP 2</li> </ul>	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> </tr> <tr> <td>2</td> <td>√</td> <td>-</td> <td>√</td> <td>-</td> <td>√</td> <td>-</td> </tr> <tr> <td>3</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>√</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	F	1	√	√	√	√	√	-	2	√	-	√	-	√	-	3	√	√	√	√			4	√	√	√	√			5	√	√	√	√			6	√	√	√	√			7	√	-					<p><b>Main impacts</b></p> <ul style="list-style-type: none"> <li>People: Flight crew, ATCO, Airspace Planners, Airspace users</li> <li>Procedures: ANSP (letters of agreement, airspace, AIP/AIC), Airspace users</li> <li>Systems: Avionics (Flight following/monitoring), ANSP Ground Systems (support of Flexible Routing)</li> </ul> <p><b>Main requirements/guidance</b></p> <ul style="list-style-type: none"> <li>ICAO Annex 11</li> <li>ICAO Annex 10</li> <li>ICAO PANS-OPS Volume 1</li> <li>ICAO PBN Manual</li> <li>ICAO GNSS Manual</li> <li>ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II</li> <li>ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)</li> <li>ICAO Doc 9868 (PANS training)</li> </ul> <p>Note: The possibility of a regional mandate of PBN should be considered</p>
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150	<p><b>Performance-based Navigation (PBN) airspace - REGIONAL</b></p>	<p>7.8 All Category R and S upper controlled airspace, and Category T airspace supporting high density aerodromes should be designated as non-exclusive or exclusive PBN airspace as appropriate. This is to allow operational priority for PBN approved aircraft, harmonised specifications and to take into account off-track events such as weather deviations, with priority implementation for high density FIRs.</p>		<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> </tr> <tr> <td>2</td> <td>√</td> <td>√</td> <td>√</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>3</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>-</td> <td>-</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>√</td> <td>-</td> <td>√</td> <td>√</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>√</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	F	1	√	√	√	√	√	-	2	√	√	√	-	-	-	3	√	√	√	√			4	√	√	√	√			5	-	-	√	√			6	√	-	√	√			7	√	-					<p><b>Main impacts</b></p> <ul style="list-style-type: none"> <li>People: Flight crew, Airspace users, Civil aviation authorities, ANSP</li> <li>Procedures: ANSP</li> <li>Systems: Avionics, ANSP Ground Systems</li> </ul> <p><b>Main requirements/guidance</b></p> <ul style="list-style-type: none"> <li>ICAO Annex 11</li> <li>ICAO Annex 2</li> </ul>
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250	ATM systems enabling optimal PBN/ATC operations (B0-APTA)	7.37 ATM systems, including communication and ATS surveillance systems and the performance of those systems, should support the capabilities of PBN navigation specifications and ATC separation standards applicable within the airspace concerned .	7.43 ATM system design (including ATS surveillance, ATS communication systems, ATC separation minimum, aircraft speed control and ATC training) should be planned and implemented to support optimal aerodrome capacity expectations for the runway(s) concerned.  7.53 Electronic flight progress strips should be utilised wherever practicable.	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>3</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	F	1	✓	✓	✓	✓	✓	✓	2	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	✓			4	✓	✓	✓	✓			5	✓	✓	✓	✓			6	✓	✓	✓	✓			7	✓	✓					<p><b>Main impacts</b></p> <ul style="list-style-type: none"> <li>• People: ATCO, ANSP system engineers and industry stakeholders</li> <li>• Procedures: ANSP (design and maintenance of ATS systems)</li> <li>• Systems: ANSP Ground Systems</li> </ul> <p><b>Main requirements/guidance</b></p> <ul style="list-style-type: none"> <li>• guidance on the performance of datalink communication and surveillance systems</li> <li>• guidance on the performance of ATS communication and surveillance systems is available in the Global Operational Datalink Document Ed.2</li> <li>• Eurocae ED-109A for Software Integrity Assurance Considerations for CNS/ATM Systems</li> <li>• Eurocae ED-153: Guidelines for ANS Software Safety Assurance</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>• The efficacy, continuity and availability of ATM services should be supported by adherence with regional planning and guidance material regarding ATM automation and ATM contingency systems.</li> <li>• The ATM systems should deal particularly with: <ul style="list-style-type: none"> <li>○ Flight plan provisions related to PBN,</li> <li>○ Support of free routes (FDPS, conflict detection algorithm, and degraded cases)</li> <li>○ Coordination and transfer on non-published points</li> <li>○ Electronic dialogue</li> <li>○ Level of safety assurance to be met by the system</li> </ul> </li> </ul>
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