INTERNATIONAL CIVIL AVIATION ORGANIZATION

Seamless ATM Implementation Guidance

Version 4.35.0, January November May 20162014

Adopted by APANPIRG/25 in September 2014

Related to the Asia/Pacific Seamless ATM Plan, Version 1.01

Contents

List of tables

List of figures

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Introduction

1.1   The Seamless ATM plan plans a number of regional planning items. **Table 1** indicates the reference code used to track the large number of separate planning elements, whether the elements affect the aerodrome, terminal or en-route phases (or a combination of these), the cross reference to the Aviation System Block Upgrade (ASBU) module, if any, and in which phase its implementation is expected in the Asia-Pacific Region.

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Seamless ATM Plan reference, paragraph	Aerodrome	Terminal	En-route	Specification title	ASBU module	Phase 1 (12 Nov. 2015)	Phase 2 (08 Nov. 2018 2019)
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 ADS-B Airspace	B0-ASUR	√	√
190 (7.28)			√	Airspace classification	Regional	√	

ICAO Asia/Pacific Seamless ATM Implementation Guidance Material

*Version 5.0 – January 2016*ICAO Asia/Pacific Seamless ATM Implementation Guidance Material

Seamless ATM Plan reference, paragraph	Aerodrome	Terminal	En-route	Specification title	ASBU module	Phase 1 (12 Nov. 2015)	Phase 2 (08 Nov. 2019)
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 navaids joint provision	Regional	√	
410 (7.42)	√	√	√	Civil Military common training	Regional	√	
420 (7.42)	√	√	√	Civil Military common procedures	Regional	√	
(*)430	√	√	√	Air Traffic Situational Awareness	B0-ASEP		√
(*)440	√			Improved Access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B	B0-OPFL		√
(*)450	√	√		Optimized wake turbulence separation	B0-WAKE		√
460	√			Optimized Airport Operations through Airport -CDM	B1-ACDM		√

ICAO Asia/Pacific Seamless ATM Implementation Guidance Material

Version 5.0 – January 2016 ~~ICAO Asia/Pacific Seamless ATM Implementation Guidance Material~~

Seamless ATM Plan reference, paragraph	Aerodrome	Terminal	En-route	Specification title	ASBU module	Phase 1 (12 Nov. 2015)	Phase 2 (08 Nov. 2019)
470	√			Improved Airport Operations through Departure, Surface and Arrival Management	B1-RSEQ		√
480	√			Enhanced Safety and Efficiency of Surface Operations – SURF, SURF 1A and Enhanced Vision Systems (EVS)	B1-SURF		√
490	√	√	√	Initial trajectory-based Operations	B1-TBO		√
500	√	√		Continuous descent Operations using VNAV	B1-CDO		√
510			√	Rocket launches coordination	Regional		√
520	√	√	√	Human performance – language proficiency	Regional		√
530	√	√	√	SAR Regulatory and Coordination Mechanisms (B1-SAR)	Regional		√
540	√	√	√	SAR Facilities and Assets (B1-SAR)	Regional		√
550	√	√	√	SAR Information (B1-SAR)	Regional		√
560	√	√	√	SAR Improvement (B1-SAR)	Regional		√
570	√			Airport Master Plans	Regional		√
580	*√	*√	√	Common aeRonautical Virtual private network (CRV)	Regional		√
590	*√		√	Voice communications over IP between ATS units (VoIP)	Regional		√

Table 1: List of Seamless ATM Plan specifications

(*) Not adopted as seamless ATM elements; included only for data collection and monitoring of the corresponding ABSU B0 modules.

Preparing the projects

1.2 At the State level, the implementation of each element should be structured as a program or a project, divided into a number of stages and major tasks/actions, and coordinated with the other projects at the regional level when needed. **Appendix** ~~A provides~~**A provides** full traceability to the ASBU framework for ease of reference.

1.3 In order to share a common vocabulary and give some related regional guidelines, it is considered necessary to utilise a formal step by step planning system.

1.4 The table at the bottom left of **Figure A** provides a simple way of indicating the 'customised' actions that may be necessary for each project to be implemented effectively. Note that there are several blank spaces, which have in this case have been recommended as unnecessary for this particular element. This should not preclude a State from adding extra steps if this is deemed necessary.
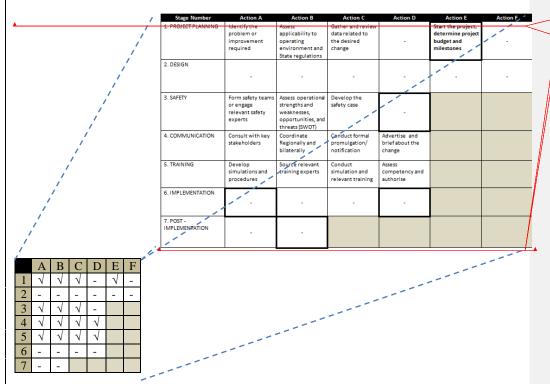
Stage Number	Action A	Action B	Action C	Action D	Action E	Action F
1. PROJECT PLANNING	Identify the problem or improvement required	Assess applicability to operating environment and State regulations	Gather and review data related to the desired change	-	Start the project; determine project budget and milestones	-
2. DESIGN	-	-	-	-	-	-
3. SAFETY	Form safety teams or engage relevant safety experts	Assess operational strengths and weaknesses, opportunities, and threats (SWOT)	Develop the safety case	-		
4. COMMUNICATION	Consult with key stakeholders	Coordinate Regionally and bilaterally	Conduct formal promulgation/ notification	Advertise and brief about the change		
5. TRAINING	Develop simulations and procedures	Source relevant training experts	Conduct simulation and relevant training	Assess competency and authorise		
6. IMPLEMENTATION	-	-	-	-		
7. POST - IMPLEMENTATION	-	-				

	A	B	C	D	E	F
1	√	√	√	-	√	-
2	-	-	-	-	-	-
3	√	√	√	-		
4	√	√	√	√		
5	√	√	√	√		
6	-	-	-	-		
7	-	-				

Figure A: Mapping between a Planning Grid and the Implementation ~~Guidance~~ Matrix

1.5   **Figure B** provides the meaning of the signs used in the Implementation Guidance Matrix, to indicate if the considered action item is applicable or not, and if it is related to a key milestone or not.

	A	B	C	D	E	F
1	√	√	√	-	√	-
2	-	-	-	-	-	-
3	√	√	-	-		
4	√	√	√	-		
5	√	-	-	-		
6	-	-	√	√		
7	-	-				

Value	Meaning
√	applicable, Key milestone
√	applicable
-	not applicable for the considered item
	never applicable

Figure B: Meaning of the signs used in an implementation matrix

1.6   Most importantly, States need to ensure they have the right preliminary assessment to determine if any particular elements are applicable to them. For many States, there will be cost or other resource implications, so there may need to be a degree of economic evaluation before deciding to go ahead with any particular implementation.

1.7   None of the project steps were compulsory for any particular element, but should be taken as a guide to optimal implementation change management. The steps may also be taken in any particular order or done concurrently (i.e.: at the same time) if necessary. States need to determine the best change management fit for their individual circumstances. In this regard, the implementation guidance is provided as a starting resource for those States that find this beneficial, but is not intended to replace change management processes already in place if these are appropriate and robust. States should refer to the Safety Management Manual (Doc 9859) for an overview of optimal change management processes.

1.8   One action, *Action 6D- Implement and monitor*, as outlined in in solid red border in **Table 2**, is a key milestone. It is considered to be essential for reporting in terms of the Regional Seamless ATM Reporting Form.

1.9   The Regional Seamless ATM Reporting Form Scheme needs a consistent approach from States, as the implementation data needs to be comparable between States, and it is also part of a larger global reporting system.

1.10   **Table 2** provides the complete Implementation Guidance Matrix. An example of an implementation process might be Seamless ATM element 60: ATC sector Capacity, which might require only 1(a, b, c, e), 3(a, b, c), 4(a, b, c, d), and 5(a, b, c, d), while 1(e) was a key milestone.

1.11   **Table 3** entitled 'Recommended Implementation Actions and Guidance' are provided as early planning assistance for States.

1.12   A State Seamless ATM Implementation Plan Template is provided (http://www.icao.int/_layouts/download.aspx?SourceUrl=/APAC/Documents/edocs/State Seamless ATM Implementation Plan Template v3.0.doc) . The State Seamless ATM Implementation Plan is primarily intended for internal use within the State concerned, to aid its own planning. However the document may be useful on occasions for regional planning, although the Regional Seamless ATM Reporting Form process is the primary source of information for ICAO.

1.13   The State Seamless ATM Implementation Plan Template format is not mandatory and States may choose to use their own planning documents instead of the template. Similar to the Recommended

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Implementation Actions and Guidance in Table 3, States may choose to add or delete elements, or steps of any element's implementation plan to suit their own needs.

Stage Number	Action A	Action B	Action C	Action D	Action E	Action F
1. PROJECT PLANNING	Identify the problem or improvement required	Assess applicability to operating environment and State regulations	Gather and review data related to the desired change	Assess economic feasibility and cost/benefit	Start the project, determine project budget and milestones	Plan tendering and maintenance contract process
2. DESIGN	Determine initial design of the desired change, including alternatives	Determine Key Performance Indicators and/or success criteria	Design backup and transition procedures/ steps, including reversion	Determine maintenance considerations	Refine and agree on final design	Define system validation and verification (FAT, SAT)
3. SAFETY	Form safety teams or engage relevant safety experts	Assess operational strengths and weaknesses, opportunities, and threats (SWOT)	Develop the safety case	Prepare and apply for regulatory approval or certification		
4. COMMUNICATION	Consult with key stakeholders	Coordinate Regionally and bilaterally	Conduct formal promulgation/ notification	Advertise and brief about the change		
5. TRAINING	Develop simulations and procedures	Source relevant training experts	Conduct simulation and relevant training	Assess competency and authorise		
6. IMPLEMENTATION	Conduct operational trials and testing	Assess stability and performance	Make a Go/No-Go decision	**Implement and monitor**		
7. POST - IMPLEMENTATION	Develop review -Lessons learnt -KPI achievement -Report	Monitor medium and long term performance and safety				

Table 2: Implementation ~~Guidance~~ **Matrix**

Recommended Implementation Actions and Guidance

No	Element	Phase I (expected implementation by 12 November 2015)	Phase II (expected implementation by 08 November 2018 2019)	Implementation actions (Refers to Table 2, implementation matrix)	Main impacts / Main requirements and guidance references
10	**Apron Management REGIONAL**	7.1.a All high density aerodromes should provide an appropriate apron management service in order to regulate entry of aircraft into and coordinate exit of aircraft from the apron		(see matrix below)	**Main impacts** • People: Airport development and maintenance planners, Airport Operators, ANSP Capacity and safety Managers and procedure designers
20	**ATM-Aerodrome Coordination - REGIONAL**	7.1.b All high density should have appropriate ATM coordination (including meetings and agreements) related to: • airport development and maintenance planning; • coordination with local authorities regarding environmental, noise abatement, and obstacles; • ATM/PBN procedures affecting the aerodrome		(see matrix below)	**Main impacts** • People: Airport development and maintenance planners, Airport Operators, ANSP Capacity and safety Managers and procedure designers, Airspace users
30	**Aerodrome capacity - REGIONAL**	7.1.c All high density aerodromes (100,000 scheduled movements per annum or more) should conduct regular airport capacity analysis, which includes a detailed assessment of passenger, airport gate, apron, taxiway and runway capacity	7.13 All high density aerodromes should have a declared airport terminal and runway capacity based on a capacity and efficiency analysis, to ensure the maximum possible efficiency of aircraft and passenger movement.	(see matrix below)	**Main impacts** People: Airport development and maintenance planners, Airport Operators, ANSP Capacity and safety Managers and procedure designers, Airspace users

Implementation matrix – No 10 (Apron Management)

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Implementation matrix – No 20 (ATM-Aerodrome Coordination)

	A	B	C	D	E	F
1	√	√	√	-	√	-
2	√	√	-	-	-	-
3	√	√	-	-		
4	√	√	√	√		
5	√	-	-	-		
6	-	-	√	√		
7	-	-				

Implementation matrix – No 30 (Aerodrome capacity)

	A	B	C	D	E	F
1	√	√	√	-	√	-
2	-	-	-	-	-	-
3	√	√	-	-		
4	√	√	√	-		
5	√	-	-	-		
6	-	-	√	√		
7	-	-				

40	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2) (B0-SURF)	7.1.d All high density aerodromes (100,000 scheduled movements per annum or more) should provide electronic surface movement guidance and control.	(shaded)	(table)	(content)

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts:
- People: ATCO, ATSEP
- Procedures: ANSP (configuration and use of A-SMGCS), Airport Operators
- Systems: Avionics, Vehicles, ANSP Ground System

Main requirements/guidance:

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Annex 14, Volume I, Chapter 9
- ICAO Annex 11
- ICAO Doc 4444
- ICAO Doc 9476 SMGCS Manual
- ICAO Doc 9830 A-SMGCS Manual
- Eurocae ED-87B   MASPS for SMGCS
- Eurocae ED-116   MOPS for Surface Movement Radar Sensor Systems for Use in A-SMGCS
- Eurocae ED-117   MOPS for Mode S Multilateration Systems for Use in A-SMGCS
- Eurocae ED-128   Guidelines for Surveillance Data Fusion in Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Levels 1 and 2

Note: T*he provision of A-SMGCS should be subject to economic analysis*

#	Area											Info
50	**Arrival Manager/ Departure Management (AMAN/DM AN) (B0-RSEQ)**	7.25 All high density aerodromes should have AMAN/DMAN facilities.	7.45 All AMAN systems should take into account airport gates for runway selection and other aircraft departures from adjacent gates that may affect arriving aircraft		A	B	C	D	E	F		**Main impacts** • People: ATCO, ATSEP • Procedures: ANSP (configuration and use of AMAN/DMAN) • Systems: ANSP Ground System, Avionics **Main requirements/guidance** **1. ICAO Roadmap of Regulatory Operational Improvements ;** • http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf **2. Other:** • ICAO Annex 10, Volume II • ICAO Doc 9705 Note: Refer to Airport CDM and: Coordination of ANSP ground systems for extension of AMAN horizon
				1	√	√	√	√	√	√		
				2	√	√	√	√	√	√		
				3	√	√	√	√				
				4	√	-	√	√				
				5	√	√	√	√				
				6	√	√	√	√				
				7	√	√						
60	**ATC Sector Capacity - REGIONAL**		7.44 All terminal ATC Sectors should have a nominal aircraft capacity figure based on a scientific capacity study and safety assessment, to ensure safe and efficient aircraft operations. 7.50 To ensure the safety and efficiency of aircraft operations, a nominal aircraft capacity figure based on a scientific capacity study and safety assessment should be available for all enroute ATC sectors		A	B	C	D	E	F		**Main impacts** • People: ANSP Capacity and safety Managers
				1	√	√	√	-	√	-		
				2	-	-	-	-	-	-		
				3	√	√	√	-				
				4	√	√	√	√				
				5	√	√	√	√				
				6	-	-	-	-				
				7	-	-						

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| 70 | **Airport Collaborative Decision-Making (ACDM) (B0-ACDM)** | 7.2 All high density aerodromes should operate an A-CDM system serving the MTF and busiest city pairs, with priority implementation for the busiest Asia/Pacific aerodromes (ASBU Priority 2). | |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: ANSP and airport managers (as part of CDM), airport designers, ATCO, Flight crew
- Procedures: ANSP, Airport Operators, Airspace users
- Systems: Avionics, ANSP and Airport Ground Systems, Vehicles

Main requirements/guidance

1. ICAO Roadmap of Regulatory Operational Improvements :

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Doc 4444
- ICAO CDM Manual
- ICAO Doc 9868 (PANS training)
- US TBFM and EUROCONTROL A-CDM
- Eurocae ED-141 Minimum technical specifications for airport collaborative decision making (airport-CDM) systems

| 80 | **Air Traffic Flow Management / Collaborative Decision-Making (ATFM/CDM) (B0-NOPS)** | 7.27 High density FIRs supporting the busiest Asia/Pacific traffic flows and high density aerodromes should implement ATFM incorporating CDM to enhance capacity, using bi-lateral and multi-lateral agreements. | 7.47 All FIRs supporting Major Traffic Flows should implement ATFM incorporating CDM to enhance capacity, using bi-lateral and multi-lateral agreements. | (matrix) | (impacts) |

Matrix:

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	-	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: Flow Managers, ATCO, Dispatchers
- Procedures: ANSP
- Systems: ANSP Ground Systems

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements :

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Manual on ATFM available in draft version.
- US/Europe experience enough to help initiate applications in other regions
- New procedures required to link much closer ATFM with ATS in case of using miles-in-trail or AMAN or DMAN

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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.	

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	√	-	√	-
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts

- People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO
- Procedures: ANSP, Airspace users
- Systems: Avionics, Ground Systems, Navaid infrastructure

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Continuous Descent Operations (CDO) Manual (Doc 9931)
- ICAO Performance Based Navigation Manual (ICAO Doc 9613)

- ICAO PBN operational approval guidance material
- ICAO Doc 9868 (PANS training)

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.

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| 100 | **Continuous Climb Operations (B0-CCO)** | 7.3 CCO operations should be considered for implementation at all high density international aerodromes after analysis, based on a performance-based approach. | |

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	√	-	√	-
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO
- Procedures: ANSP, Airspace users
- Systems: Avionics, Ground Systems, Navaid infrastructure

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Continuous Climb Operations (CCO) (ICAO Doc. 9993)
- ICAO Continuous Descent Operations (CDO) Manual (Doc 9931)
- ICAO Performance Based Navigation Manual (ICAO Doc 9613)
    - ICAO PBN operational approval guidance material
- ICAO Doc 9868 (PANS training)

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.

| 110 | **Performance-based Navigation (PBN) Approach (B0-APTA)** | 7.5 Where practicable, all high density aerodromes with instrument runways serving aeroplanes should have approaches with vertical guidance (APV). should have:
a) precision approaches; or
b) approaches with vertical guidance (APV), either RNP APCH with Barometric Vertical Navigation (Baro–VNAV) or augmented GNSS (SBAS or GBAS; or
c) when an APV was not practical, straight-in RNP APCH with Lateral Navigation (LNAV) | 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.

7.16 Where practicable, all aerodromes with instrument runways serving aeroplanes should have (ASBU Priority 2):
a) precision approaches; or
b) APV, either RNP APCH with Barometric Vertical Navigation (Baro–VNAV) or augmented GNSS (SBAS or GBAS); or
c) when an APV is not practical, straight-in RNP APCH with LNAV | (table below) | (impacts below) |

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	√	-	√	-
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

Main impacts
- People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO
- Procedures: ANSP, Airspace users
- Systems: Avionics, ANSP Ground Systems, SBAS and GBAS infrastructure

Main requirements/guidance

1. ICAO Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Annex 11
- ICAO Annex 10
- ICAO PANS-OPS Volume 1
- ICAO PBN Manual
  - ICAO GNSS Manual
- ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II
- ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)
- ICAO Doc 9868 (PANS training)
- ICAO ASIA/PAC Checklist for Introduction of GNSS based operations

Notes:
- 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.
- 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)

| 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 below) | (impacts below) |

	A	B	C	D	E	F
1	√	√	√	-	√	-
2	√	√	√	-	√	-
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

Main impacts
- People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO
- Procedures: ANSP, Airspace users
- Systems: Avionics, ANSP Ground Systems, SBAS and GBAS infrastructure

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Annex 11
- ICAO Annex 10
- ~~ICAO PANS-OPS Volume 1~~
- ~~ICAO~~ PBN Manu~~al~~
- ICAO GNSS Manual
- ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II
- ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)
- ICAO Doc 9868 (PANS training)

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.

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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. |

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	√	-	√	-
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

Main impacts
- People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO
- Procedures: ANSP, Airspace users
- Systems: Avionics, ANSP Ground Systems, SBAS and GBAS infrastructure

Main requirements/guidance
- ICAO Annex 11
- ICAO Annex 10
- ICAO PANS-OPS Volume 1
- ICAO PBN Manual
- ICAO GNSS Manual
- ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II
- ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)
- ICAO Doc 9868 (PANS training)

| 140 | **Performance-based Navigation (PBN) Routes (B0-FRTO)** | 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:
• Category R airspace – RNP 4, RNP 10 (RNAV 10) (other acceptable navigation specifications – RNP 2 oceanic); and
• Category S airspace – RNP 2 or RNAV 2 (other acceptable navigation specifications – RNAV 5). | 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:
• Category R and S airspace – RNP 2. | (grid below) | (impacts below) |

Grid:

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	-	√	-	√	-
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

Main impacts
- People: Flight crew, ATCO, Airspace Planners, Airspace users
- Procedures: ANSP (letters of agreement, airspace, AIP/AIC), Airspace users
- Systems: Avionics (Flight following/monitoring), ANSP Ground Systems (support of Flexible Routing)

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Annex 11
- ICAO Annex 10
- ICAO PANS-OPS Volume 1
- ICAO PBN Manual
- ICAO GNSS Manual
- ICAO Manual on Testing of Radio Navigation Aids (Doc 8071), Volume II
- ICAO Quality Assurance Manual for Flight Procedure Design (Doc 9906)
- ICAO Doc 9868 (PANS training)
- ICAO PBN iKit
- PBN in a page: http://www.icao.int/APAC/Documents/edocs/APX-1A%20-%20PBN%20in%20a%20page.pdf
- Checklists:
  - http://www.icao.int/APAC/Documents/edocs/APX-1B%20-%20PBN%20Pre-implementation%20checklist.pdf
  - http://www.icao.int/APAC/Documents/edocs/APX-1C%20-%20PBN%20Record%20of%20Hazard%20Template.pdf

Note: The possibility of a regional mandate of PBN should be considered

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| 150 | **Performance-based Navigation (PBN) airspace - REGIONAL** | 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. | | | |

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	√	-	-	-
3	√	√	√	√		
4	√	√	√	√		
5	-	-	√	√		
6	√	-	√	√		
7	√	-				

Main impacts
- People: Flight crew, Airspace users, Civil aviation authorities, ANSP
- Procedures: ANSP
- Systems: Avionics, ANSP Ground Systems

Main requirements/guidance
- ICAO Annex 11
- ICAO Annex 2

| 160 | **Safety Nets (B0-SNET)** | 7.54 ATS surveillance systems should enable STCA, APW and MSAW. Route Adherence Monitoring (RAM) should be utilised when monitoring PBN route separations. Cleared Level Adherence Monitoring (CLAM) should be utilised to monitor RVSM airspace

7.52 ATM systems providing services within Category R airspace should enable appropriate ATC capabilities including CPAR, which is a key enabler for UPR and DARP operations. | | | |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√			
7	√	√				

Main impacts
- People: ATCO, ATSEP
- Procedures: ANSP (configuration and use of safety nets/monitoring aids, recovery techniques)
- Systems: Avionics (support of cooperative surveillance using Mode C/S transponder or ADS-B OUT), ANSP Ground Systems

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Doc 4444
- Gold Edition 1 and draft Edition 2 documents For RAM and CLAM, UPR and DARP in CPDLC/ADS-C/WPR serviced airspaces

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170	**Airborne Safety Systems - B0-ACAS**	7.7 All Category R and S upper controlled airspace, and Category T airspace supporting high density aerodromes should require the mandatory carriage of an operable mode S transponder within airspace where Mode S radar services are provided, ACAS and Terrain Awareness Warning Systems (TAWS), unless approved by ATC.	7.21 All Category R and S upper controlled airspace, and Category T airspace should require the mandatory carriage of an operable mode S transponder within airspace where Mode S radar services are provided, ACAS and Terrain Awareness Warning Systems (TAWS), unless approved by ATC.	(matrix)							(impacts)

Matrix:

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	√	-	-	-
3	√	√	√	√		
4	√	√	√	√		
5	-	-	√	√		
6	√	-	√	√		
7	√	-				

Main impacts
- People: Flight crew, Airspace users, Civil aviation authorities
- Procedures: Airspace users
- Systems: Avionics

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Annex 11
- ICAO Annex 10
- ~~ICAO Doc 9863 Airborne Collision Avoidance System (ACAS) Manual~~

- Eurocae ED-143 Change 1

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| 180 | ~~Ground-based~~ATSAD S-B Airspace ~~surveillance~~ (B0-ASUR) | 7.6 All Category S upper controlled airspace and Category T airspace supporting high density aerodromes should be designated as non-exclusive or exclusive as appropriate ADS-B airspace requiring operation of ADS-B using 1090ES with DO-260/260A and 260B capability, with priority implementation for the following high density FIRs | 7.23 All Category S upper controlled airspace and Category T airspace should be designated as non-exclusive or exclusive as appropriate ADS-B airspace requiring operation of ADS-B using 1090ES with DO-260/260A and 260B capability.

7.24 In areas where ADS-B based separation service was provided, the mandatory carriage of ADS-B OUT using 1090ES with DO260/60A and 260B should be prescribed. |

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	-	√	-	-	-
3	√	√	√	√		
4	√	√	√	√		
5	-	-	√	√		
6	√	√	√	√		
7	√	-				

Main impacts
- People: ATCO, ATSEP, Flight crew
- Procedures: ANSP (configuration and use of ADS-B traffic display and separation standards)
- Systems: Avionics (ADS-B OUT), ANSP Ground Systems (Implementation of ADS-B and integration with ATC automation) and infrastructure

Main requirements/guidance:
- ICAO Annex 11
- ICAO Annex 10
- ICAO Annex 2
- ICAO Cir 326, Assessment of ADS-B and MLAT services to supports ATS
- ICAO Doc 4444
- ICAO Doc 9871 Technical Provisions for Mode S Services and Extended Squitter
- ICAO ADS-B Implementation and Operations Guidance Document Ed. 6
- ICAO Guidance Material on Building Safety Case for ADS-B separation V1
- AMC2024, RTCA/ Eurocae DO-260A/DO-260B -ED102A
- Eurocae ED-126/RTCA DO-303 SPI ADS-B-NRA Application
- Eurocae ED-161/RTCA DO-318 SPI ADS-B-RAD Application
- ICAO APAC Guidance Security issues associated with ADS-B
- Baseline ADS-B Service Performance parameters Adopted by APANPIRG/18 – September 2007

Notes:
- Particular attention should be given to the training of General Aviation Flight crews regarding appropriate use of AIRB & VAS application
- Approval Plans: Operational Approval Guidance/Criteria may be needed based on regional application for ATSA
- Procedure for use of ADS-B traffic display being proposed for inclusion in PAN-OPS (Doc 8168) for applicability in Nov. 2013

190	**Airspace classification - REGIONAL**	7.28 Harmonization of upper airspace classification should be as follows: a) Category R controlled airspace– Class A; and b) Category S controlled airspace– Class A, or if there are high level general aviation or military VFR operations: Class B or C.			A	B	C	D	E	F	**Main impacts** • People: Flight crew, Airspace users, Civil aviation authorities, ANSP • Procedures: ANSP • Systems: Avionics, ANSP Ground Systems **Main requirements/guidance** • ICAO Annex 11 • ICAO Annex 2
				1	√	√	√	-	√	-	
				2	√	-	-	-	√	-	
				3	√	-	√	√			
				4	√	√	√	√			
				5	-	-	√	√			
				6	-	-	√	√			
				7	√	-					
200	**Flight Level Orientation Schemes (FLOS) - REGIONAL**	7.10 The ICAO Table of Cruising Levels based on feet as contained in Appendix 3a to Annex 2 should be used.			A	B	C	D	E	F	**Main impacts** • People: Flight crew, Airspace users, Civil aviation authorities, ANSP • Procedures: ANSP • Systems: Avionics, ANSP Ground Systems **Main requirements/guidance** • ICAO Annex 11 • ICAO Annex 2
				1	√	√	√	√	√	-	
				2	√	√	-	-	-	-	
				3	√	√	√	-			
				4	√	√	√	√			
				5	-	-	√	-			
				6	-	-	√	-			
				7	√	-					
210	**Flight Level Allocation Schemes (FLAS) - REGIONAL**	7.36 Priority for FLAS level allocations should be given to higher density ATS routes over lower density ATS routes. FLAS should comply with Annex 2, Appendix 3a unless part of an OTS. FLAS other than OTS should only be utilised for safety and efficiency reasons within R and S airspace. 7.40 Where a minimum aircraft equipage is specified, any aircraft that does not meet specified equipage requirements should receive a lower priority, except as prescribed (such as for State aircraft). States should require State aircraft to comply with equipage requirements as far as practicable.			A	B	C	D	E	F	**Main impacts** • People: Flight crew, Airspace users, Civil aviation authorities, ANSP • Procedures: ANSP • Systems: Avionics, ANSP Ground Systems **Main requirements/guidance** • ICAO Annex 11 • ICAO Annex 2, Appendix 3a
				1	√	√	√	√	√	-	
				2	√	√	-	-	-	-	
				3	√	√	√	-			
				4	√	√	√	√			
				5	√	√	√	√			
				6	-	-	√	√			
				7	√	√					

| 220 | **ATS Inter-facility Data-link Communications (AIDC) (B0-FICE)** | 7.35 ATM systems should enable AIDC (version 3 or later) between ATC units where transfers of control are conducted (ASBU Priority 1). As a minimum, the following AIDC messages types should be implemented:
• Advanced Boundary Information (ABI);
• Coordinate Estimate (EST);
• Acceptance (ACP);
• TOC; and
• Assumption of Control (AOC) | 7.49 ATM systems should enable AIDC, or an alternative process that achieves at least the same level of performance as AIDC, between en-route ATC units and terminal ATC units where transfers of control are conducted (ASBU Priority 1). | (table below) | **Main impacts**
• People: ATCO, ATSEP
• Procedures: ANSP (configuration and use of automatic coordinations)
• Systems: ANSP Ground Systems, ground/ground communications infrastructure

Main requirements/guidance

1. ICAO Roadmap of Regulatory Operational Improvements :

• http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

• ICAO Annex 10
• ICAO Doc 4444
• APAC AIDC ICD
• When endorsed by APANPIRG: PAN AIDC ICD
• Guidance Material for the Asia/Pacific Region for ADS/CPDLC/AIDC Ground Systems Procurement and Implementation, v2, May 2008
• ICAO APAC Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Datalink systems in the Asia/Pacific Region, Version 4.0, February 2011 |

Table for item 220:

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	-	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

| 230 | **Automated Transfer of Control - REGIONAL** | 7.29 Where practicable, all ATC Sectors within the same ATC unit with ATS surveillance capability should have automated hand-off procedures that allow the transfer of control of aircraft without the necessity for voice communications, unless an aircraft requires special handling. | 7.46 Where practicable, all ATC Sectors with adjacent ATC Centres using ATS surveillance capability should have automated hand-off procedures that allow the transfer of control of aircraft without the necessity for voice communications, unless an aircraft requires special handling. | (table below) | **Main impacts**
• People: ATCO, ATSEP
• Procedures: ANSP (configuration and use of automatic coordinations)
• Systems: ANSP Ground Systems, ground/ground communications infrastructure

Main requirements/guidance
• ICAO Annex 11
• ICAO Annex 10
• ICAO Doc 4444 |

Table for item 230:

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	-	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

| 240 | ATS Surveillance data sharing - REGIONAL | 7.34 Subject to appropriate filtering, ATS surveillance data, particularly from ADS-B, should be shared with neighbouring ATC units within high density FIRs. Direct speech circuits and appropriate handoff procedures should be implemented between controllers providing ATS surveillance in adjacent airspace. | 7.48 Subject to appropriate filtering, ATS surveillance data, particularly from ADS-B, should be shared with all neighbouring ATC units. | | | |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	-	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

Main impacts
- People: ATSEP
- Procedures: ANSP
- Systems: ANSP Ground Systems, ground/ground communications infrastructure

Main requirements/guidance
- ICAO Annex 10
- ICAO ADS-B Implementation Guidance Document (AIGD) Ed.6
- ICAO APAC Guidance Security issues associated with ADS-B
- Baseline ADS-B Service Performance parameters Adopted by APANPIRG/18 – September 2007

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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. | (see table below) | (see content below) |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: ATCO, ANSP system engineers and industry stakeholders
- Procedures: ANSP (design and maintenance of ATS systems)
- Systems: ANSP Ground Systems

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- guidance on the performance of datalink communication and surveillance systems guidance on the performance of ATS communication and surveillance systems is available in the Global Operational Data-link Document Ed.2

- Eurocae ED-109A for Software Integrity Assurance Considerations for CNS/ATM Systems
- Eurocae ED-153: Guidelines for ANS Software Safety Assurance

Notes:
- 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.
- The ATM systems should deal particularly with:
  - Flight plan provisions related to PBN,
  - Support of free routes (FDPS, conflict detection algorithm, and degraded cases)
  - Coordination and transfer on non-published points
  - Electronic dialogue
  - Level of safety assurance to be met by the system

260	**ATC Horizontal separation - REGIONAL**	7.30 The delivery of CNS/ATM services should be based primarily on the CNS/ATM capability. All ATC units should authorise the use of the horizontal separation minima stated in ICAO Doc 4444 (PANS ATM), or as close to the separation minima as practicable, taking into account such factors as: a) the automation of the ATM system; b) the capability of the ATC communications system; c) the performance of the ATS surveillance system, including data-sharing or overlapping coverage at TOC points; and d) ensuring the competency of air traffic controllers to apply the full tactical capability of ATS surveillance systems.		Main impacts

Table for 260:

	A	B	C	D	E	F
1	√	√	√	-	√	-
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: ANSP: ATCO, ATSEP, and Flight crew
- Procedures: ANSP, CAA
- Systems: Avionics, ANSP Ground Systems (FDPS, conflict detection algorithm, and degraded cases)

Main requirements/guidance
- ICAO Annex 11
- ICAO Annex 2
- ICAO PANS-ATM (Doc 4444)

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270 — Situation display integrating surveillance data (B0-ASUR)

7.32 ADS-B (using 1090ES) or MLAT or radar surveillance systems should be used to provide coverage of all Category S-capable airspace as far as practicable. Data from ATS surveillance systems should be integrated into operational ATC aircraft situation displays (standalone displays of ATS surveillance data should not be used operationally).

Table for 270:

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√			
6	√	√	√	√		
7	√	-				

Main impacts
- People: Flight crew, ATCO (separation provisions, information service, SAR based on ADS-B/MLAT/WAM), ATSEP
- Procedures: Avionics, ANSP (ADS-B to ADS-B and ADS-B to radar separation and fused targets)
- Systems: Avionics (ADS-B OUT), ANSP Ground Systems (fusion and display of MLAT/ADS-B data) and infrastructure

Main requirements/guidance
- ICAO PANS-ATM (Doc 4444)
- ICAO Doc 9924_Aeronautical Surveillance Manual
- ICAO Doc 9871 Technical Provisions for Mode S Services and Extended Squitter
- ICAO Doc 9868 (PANS training)
- WAM: Eurocae ED-142

| 280 | **ADS-C, CPDLC (B0-TBO)** | 7.33 Within Category R airspace, ADS-C surveillance and CPDLC should be enabled to support PBN-based separations. | | (grid) | (impacts) |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: ATCO, ATSEP, Flight crew
- Procedures: ANSP
- Systems: Avionics, ANSP Ground Systems

Main requirements/guidance

1. ICAO, Roadmap of Regulatory Operational Improvements :

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

- ICAO Doc 4444
- ICAO Manual of Air Traffic Services Data Link Applications (Doc 9694)
- ICAO Manual on datalink performance
- APAC communication and surveillance strategy
- ICAO Doc 9925 - Manual on the Aeronautical Mobile Satellite (Route) Service Edition 1
- Global Operational Data Link Document (GOLD) Edition 2
- RTCA DO-258A/Eurocae ED-100A, RTCA DO-306/Eurocae ED-122
- Guidance Material for the Asia/Pacific Region for ADS/CPDLC/AIDC Ground Systems Procurement and Implementation, v2, May 2008
- ICAO APAC Guidance Material for End-to-End Safety and Performance Monitoring of Air Traffic Service (ATS) Datalink systems in the Asia/Pacific Region, Version 4.0, February 2011
- For reporting the performance: ICAO APAC Data Link Performance Data Reporting Template - (MS Word)

Notes:
- Provisions regarding Performance Based Communications and Surveillance including Post-Monitoring Analysis are to be found in GOLD Ed. 2
- Regarding regulatory requirements, it should be noted that new ICAO OPLINK and SASP Ops documentation is under development

290	**UPR and DARP (B0-FRTO)**	7.33 Within Category R airspace, UPR and DARP should be enabled to support PBN-based separations		A	B	C	D	E	F	**Main impacts** • People: ATCO, ATSEP • Procedures: ANSP • Systems: Avionics, ANSP Ground Systems
			1	√	√	√	√	√	√	
			2	√	√	√	√	√	√	
			3	√	√	√	√			
			4	√	√	√	√			
			5	√	√	√	√			
			6	√	√	√	√			
			7	√	√					

Main requirements/guidance

1. ICAO **Roadmap of Regulatory Operational Improvements ;**

* http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

* ICAO Doc 4444
* ICAO Manual of Air Traffic Services Data Link Applications (Doc 9694)
* ICAO Manual on datalink performance
* APAC communication and surveillance strategy
* Global Operational Data Link Document (GOLD) Edition 2
* RTCA DO-258A/Eurocae ED-100A, RTCA DO-306/Eurocae ED-122

Notes:
* Provisions regarding Performance Based Communications and Surveillance including Post-Monitoring Analysis are to be found in GOLD Ed. 2
* regarding regulatory requirements, it should be noted that new ICAO OPLINK and SASP Ops documentation is under development

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300	**Aeronautical Information Management (B0-DATM)**	7.38 ATM systems should be supported by digitally-based AIM systems (using Aeronautical Information Exchange Model version 5.1 or later) through implementation of Phase 1 and 2 of the AIS-AIM Roadmap in adherence with ICAO and regional AIM planning and guidance material	7.51 ATM systems should be supported by complete implementation of AIM Phase 3.							**Main impacts** • People: AIS/AIM personnel, ATCO, ATSEP • Procedures: ANSP (data users to retrieve information digitally), Airspace users (Electronic Flight Bag) • Systems: ANSP Ground Systems (Automation of national XML aeronautical data, NOTAM and MET) and infrastructure **Main requirements/guidance** **1. ICAO, Roadmap of Regulatory Operational Improvements ;** • http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf **2. Other:** •

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	-	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	-				

				A	B	C	D	E	F	
310	**Meteorological Information (B0-AMET)**	7.26 All high density aerodromes should provide meteorological forecasts, aerodrome warnings and alerts that support efficient terminal operations. 7.39 ATM systems should be supported by implementation of appropriate meteorological information reporting systems, providing, inter-alia, observations, forecasts, warnings and alerts, and also provide for information to meteorological authorities or offices where required.	1	√	√	√	√	√	√	**Main impacts** • People: Airport operators, airspace users, meteorological authorities, MET services • Procedures: ANSP, MET services, airspace users • Systems: ANSP Ground Systems (including future integration of SWIM) **Main requirements/guidance** **1. ICAO, Roadmap of Regulatory Operational Improvements ;** • http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf **2. Other:** • ICAO Annex 3, including Amendment 76 • Asia and Pacific regions air navigation plan • ICAO Manual of Aeronautical Meteorological Practices (Doc 8896) • ICAO Manual on Coordination between Air Traffic Services, Aeronautical Information Services & Aeronautical Meteorological Services (Doc 9377) • Handbook on the International Airways Volcano Watch – Operational Procedures and Contact List (Doc 9766) • Manual on Low Level Wind Shear (Doc 9817) • Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds (Doc 9691) • Regional guidance material including the Regional SIGMET Guide, ROBEX Handbook and OPMET Data Banks Interface Control Document. Note: • Amendment 76 to Annex 3 applicable on 14 Nov. 2013 • Draft manual on the Digital Exchange of Aeronautical Meteorological Information http://www.icao.int/safety/meteorology/MARIE-PT/Documents/Forms/AllItems.aspx • • Airspace users may use AOC data-link to send information to aircraft
			2	√	√	√	√	√	√	
			3	√	-	√	√			
			4	√	√	√	√			
			5	√	√	√	√			
			6	√	√	√	√			
			7	√	-					

| 320 | **ATM Managers' Performance - REGIONAL** | 7.41 The following should be established to support human performance in the delivery of a Seamless ATM service. The systems should consider all the elements of the SHEL Model (Software, Hardware, Environment and Liveware – humans), in accordance with the ICAO Human Factors Digest No. 1 and related reference material: a) human performance training for all ANSP managers, including: human performance training for all ANSP managers, including: • assessment and management of risks related to human capabilities and limitations; • effective participation in a team and team management • effective safety reporting systems; • human factors in air safety investigation; fatigue management approaches;ms comprising multidisciplinary operational staff and managers which review safety performance and assess significant proposals for change to ATM syst | Prevention of fatigue systems should be established to support human performance in the delivery of a Seamless ATM service. The systems should be consistent with guidance within ICAO Doc 9966 *FRMS – Fatigue Risk Management System.* | (table below) | (impacts below) |

	A	B	C	D	E	F
1	√	-	-	-	√	-
2	√	√	-	-	-	-
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	-	-	√	√		
7	√	√				

Main impacts
- People: all ANSP staff, particularly: managers, operators, safety managers and teams
- Procedures: ANSP (initial/continuous training on human performance, reporting, operational team management)
- Systems: tool for safety reporting

Main requirements/guidance
- ICAO Annex 1 *Personnel Licensing*
- ICAO Circular 214 *Fundamentals on Human Factors*
- ICAO Circular 227 *Training of Operational Personnel on Human Factors*
- ICAO Circular 241 *Human Factors in ATC*
- ICAO Circular 249 *Human Factors in CNS and ATM Systems*
- ICAO Circular 302 Cross-cultural factors in aviation safety
- ICAO Circular 318 *Language Testing Criteria for Global Harmonization*
- Circular 323 *Guidelines for Aviation English Training Programmes*
- ICAO Doc 9835 *Manual on the Implementation of ICAO Language Proficiency Requirements*
- ICAO Doc 9966 *Fatigue Risk Management Systems*
- ICAO *Human Factors Digest No. 1*
- For recording of data (for history and analysis purposes): ED-111 Functional specifications for CNS/ATM Recording

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| 330 | **ATC simulators performance - REGIONAL** | 7.41 The following should be established to support human performance in the delivery of a Seamless ATM service. The systems should consider all the elements of the SHEL Model (Software, Hardware, Environment and Liveware – humans), in accordance with the ICAO Human Factors Digest No. 1 and related reference material: b) enhancement and improved application of ATC simulators; | | (table below) | Refer to item 320 |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	-	-	-		
4	-	-	-	-		
5	√	√	√	√		
6	-	-	-	√		
7	-	-				

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| 340 | **Safety assessment of changes - REGIONAL** | 7.41 The following should be established to support human performance in the delivery of a Seamless ATM service. The systems should consider all the elements of the SHEL Model (Software, Hardware, Environment and Liveware – humans), in accordance with the ICAO Human Factors DigestNo. 1 and related reference material:
c) safety teams comprising multidisciplinary operational staff and managers which review safety performance and assess significant proposals for change to ATM systems; | |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	-	-	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	-	-	√	√		
7	√	√				

Main impacts
- People: all ANSP staff, particularly: managers, operators, safety managers and teams
- Procedures: ANSP (initial/continuous training on human performance, reporting, operational team management)
- Systems: tool for safety reporting

Main requirements/guidance
- ICAO Annex 19 Safety management
- ICAO Doc 9859 Safety Management Manual (SMM)

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| 350 | **ATM Operators' performance - REGIONAL** | 7.41 The following should be established to support human performance in the delivery of a Seamless ATM service. The systems should consider all the elements of the SHEL Model (Software, Hardware, Environment and Liveware – humans), in accordance with the ICAO Human Factors Digest No. 1 and related reference material:

d) human performance-based training and procedures for staff providing ATS,

including:

• the application of tactical, surveillance-based ATC separation;

• control techniques near minimum ATC separation;

• responses to ATM contingency operations and safety net alerts; and

• the importance of an effective safety reporting culture. | |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Refer to item 320

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| 360 | **Civil Military Use of SUA (B0-FRTO)** | 7.11 SUA should only be established after due consideration of its effect on civil air traffic by the appropriate Airspace Authority to ensure it will used for the purpose that it is established;
• used regularly;
• as small as possible, including any internal buffers, required to contain the activity therein;
• if applicable, operated in accordance with FUA principles; and
• activated only when it is being utilised:

SUA should be regularly reviewed to ensure the activities that affect the airspace, and size and timing of such activity are accurately reflected by the SUA type, dimensions, activation notice and duration of activation. | |

Table (360):

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	-	-	-	-
3	√	√	√	√		
4	√	√	√	√		
5	√	-	-	-		
6	-	-	√	√		
7	√	√				

Main impacts
- People: Airspace planners
- Procedures: ANSP (Airspace Planning, letters of agreement) and MIL
- Systems: ANSP ground systems, MIL ground systems

Main requirements/guidance material
- ICAO Circular 330 AN/189 Civil/Military Cooperation in ATM offers guidance & examples of civil/military cooperation

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| 370 | **Strategic Civil Military coordination (Regional)** | 7.42 a) a national civil/military body should be formed to coordinate strategic civil-military activities (military training should be conducted in locations and/or at times that do not adversely affect civilian operations, particularly those associated with major aerodromes); | |

Table (370):

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	-	-	-	-
3	√	√	-	-		
4	√	√	√	√		
5	√	√	√	√		
6	√	-	√	√		
7	√	√				

Main impacts
- People: Airspace planners
- Procedures: ANSP (Airspace Planning, letters of agreement) and MIL

Main requirements/guidance material
- ICAO Circular 330 AN/189 Civil/Military Cooperation in ATM offers guidance & examples of civil/military cooperation

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| 380 | **Tactical Civil Military coordination (Regional)** | Formal civil-military liaison should take place for tactical responses by encouraging military participation at civil ATM meetings and within ATC Centres. | |

Table (380):

	A	B	C	D	E	F
1	√	√	√	√	√	-
2	√	√	-	-	-	-
3	√	√	-	-		
4	√	√	√	√		
5	√	√	√	√		
6	√	-	√	√		
7	√	√				

Main impacts
- People: Airspace planners
- Procedures: ANSP (Airspace Planning, letters of agreement) and MIL
- Systems: ANSP ground systems, MIL ground systems

Main requirements/guidance material
- ICAO Circular 330 AN/189 Civil/Military Cooperation in ATM offers guidance & examples of civil/military cooperation

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390 — Civil Military system integration (Regional)

Integration of civil and military ATM systems using joint procurement, and sharing of ATS surveillance data (especially from ADS-B systems) should be provided as far as practicable

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: Airspace planners
- Procedures: ANSP (Airspace Planning, letters of agreement) and MIL
- Systems: ANSP ground systems, MIL ground systems

Main requirements/guidance material
ICAO Circular 330 AN/189 Civil/Military Cooperation in ATM offers guidance & examples of civil/military cooperation

400 — Civil Military navaids joint provision (Regional)

Joint provision of civil/military navigation aids should be encouraged

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√			
4	√	√	√			
5	√	√	√			
6	√	√	√	√		
7	√	√				

Main impacts
- People: Airspace planners
- Procedures: ANSP (Airspace Planning, letters of agreement) and MIL
- Systems: ANSP ground systems, MIL ground systems

Main requirements/guidance material
ICAO Circular 330 AN/189 Civil/Military Cooperation in ATM offers guidance & examples of civil/military cooperation

410 — Civil Military common training (Regional)

Common training should be conducted between civil and military ATM units in areas of common interest

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: Airspace planners
- Procedures: ANSP (Airspace Planning, letters of agreement) and MIL
- Systems: ANSP ground systems, MIL ground systems

Main requirements/guidance material
ICAO Circular 330 AN/189 Civil/Military Cooperation in ATM offers guidance & examples of civil/military cooperation

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420	Civil Military common procedures (Regional)	Civil and military ATM units should utilize common procedures as far as practicable				A	B	C	D	E	F	Main impacts • People: Airspace planners • Procedures: ANSP (Airspace Planning, letters of agreement) and MIL • Systems: ANSP ground systems, MIL ground systems **Main requirements/guidance material** ICAO Circular 330 AN/189 Civil/Military Cooperation in ATM offers guidance & examples of civil/military cooperation
					1	√	√	√	√	√	√	
					2	√	√	√	√	√	√	
					3	√	√	√	√			
					4	√	√	√	√			
					5	√	√	√	√			
					6	√	√	√	√			
					7	√	√					

430	Air Traffic Situational Awareness (B0-ASEP)					A	B	C	D	E	F	ICAO Roadmap of Regulatory Operational Improvements : • http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf
					1	√	√	√	√	√	√	
					2	√	√	√	√	√	√	
					3	√	√	√	√			
					4	√	√	√	√			
					5	√	√	√	√			
					6	√	√	√	√			
					7	√	√					

440	Improved Access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B (B0-OPFL)					A	B	C	D	E	F	ICAO Roadmap of Regulatory Operational Improvements : • http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf
					1	√	√	√	√	√	√	
					2	√	√	√	√	√	√	
					3	√	√	√	√			
					4	√	√	√	√			
					5	√	√	√	√			
					6	√	√	√	√			
					7	√	√					

450	**Increased Runway Throughput through Optimized Wake Turbulence Separation (B0-WAKE)**				A	B	C	D	E	F	**ICAO₎ Roadmap of Regulatory Operational Improvements :**
				1	√	√	√	√	√	√	• http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf
				2	√	√	√	√	√	√	
				3	√	√	√	√			
				4	√	√	√	√			
				5	√	√	√	√			
				6	√	√	√	√			
				7	√	√					

460	**Optimized Airport Operations through Airport – CDM (B1-ACDM)**		7.XX All the high density international aerodromes should implement collaborative Airport Operations Planning (AOP) and where practicable an Airport Operations Centre (APOC).		A	B	C	D	E	F	**Main impacts**
				1	√	√	√	√	√		• People: ANSP and airport managers (as part of CDM), airport designers, ATCO, Flight crew, Handling Services
				2	√	√	√				• Procedures: ANSP, Airport Operators, Airspace users, Handling Operations Procedures
				3	√	√	√				• Systems: ANSP and Airport Ground Systems, Vehicles
				4	√	√	√				
				5	√	√	√				**Main requirements/guidance material**
				6	√	√	√	√			**1. ICAO₎ Roadmap of Regulatory Operational Improvements :**
				7	√	√					• http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:

• EUROCAE ED-141: Minimum Technical Specifications for Airport Collaborative Decision Making (Airport-CDM) Systems

470	**Improved Airport Operations through Departure, Surface and Arrival Management (B1-RSEQ)**		**7.XX** All high density international aerodromes should integrate arrival/departure management (AMAN/DMAN) with the surface management systems: A-SMGCS with SMAN or ASDE-X.		A	B	C	D	E	F	**Main impacts** • People: ATCO, ATSEP, Airlines, • Procedures: ANSP (configuration and use of AMAN/DMAN and : A-SMGCS with SMAN or ASDE-X) • Systems: ANSP Ground System, Avionics **Main requirements/guidance material** **1. ICAO, Roadmap of Regulatory Operational Improvements;** • http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf **2. Other:**
				1	√	√	√	√	√	
				2	√	√	√	√		√
				3	√	√	√	√		
				4	√	√	√			
				5	√	√	√			
				6	√	√	√	√		
				7	√	√				

| 480 | Enhanced Safety and Efficiency of Surface Operations – SURF, SURF 1A and Enhanced Vision Systems (EVS) (B1-SURF) | | 7.XXAll high density international aerodromes and aircraft operator operating from there aerodromes should implement the EVS and runway safety alerting logic (SURF-1A) in accordance with EUROCAE document EUROCAE/RTCA documents ED-159/DO-312/ **ED-165**. |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√		√
3	√	√	√			
4	√	√	√			
5	√	√	√			
6	√	√	√			
7	√	√				

Main impacts

- People: Pilots, ATCO, ATSEP
- Procedures: ANSP (configuration and use of A-SMGCS), Airport Operators
- Systems: Avionics, Vehicles, ANSP Ground System

Main requirements/guidance material

1. ICAO, Roadmap of Regulatory Operational Improvements ;

- http://www.icao.int/airnavigation/IMP /Documents/ASBU%20modules%20m apped%20to%20Work%20Programme %202015-01-08.pdf

2. Other:

- FAA Advisory Circular AC120-28D Criteria for Approval of Category III Weather Minima for Take-off, Landing, and Rollout

- FAA Advisory Circular AC120-57A Surface Movement Guidance and Control System.

| 490 | **Initial trajectory-based Operations (B1-TBO)** | | **7.XX** All the high density FIRs should implement DCL compliant with EUROCAE WG78/RTCA SC 214 standards |

	A	B	C	D	E	F
1	√	√	√	√	√	√
2	√	√	√	√		√
3	√	√	√	√		
4	√	√	√	√		
5	√	√	√	√		
6	√	√	√	√		
7	√	√				

Main impacts
- People: Flight crew, ATCO, ATSEP
- Procedures: ANSP
- Systems: Avionics, ANSP Ground Systems

Main requirements/guidance material

1. ICAO, Roadmap of Regulatory Operational Improvements :

- http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf

2. Other:
- EUROCAE ED-100A/RTCA DO-258A, Interoperability requirements for ATS applications using ARINC 622 data communications

- EUROCAE ED-122/RTCA DO-306, Safety and performance standard for air traffic data link services in Oceanic and remote airspace (Oceanic SPR Standard)

- EUROCAE ED-154/RTCA DO-305, Future Air Navigation System 1/A – Aeronautical telecommunication network interoperability standard (FANS 1/A – ATN B1 Interop Standard)

- EUROCAE WG-78/RTCA SC-214 Safety and performance requirements and

				7.XX All high density international aerodromes should implement approaches with the Continuous Descent Operations (CDOs) using VNAV as far as practicable. *Note: refer to RTCA DO-236CB, Minimum Aviation System Performance Standards: Required Navigation*		A	B	C	D	E	F	**Main impacts** - People: Airspace designers, ANSP procedures designers, Flight Procedures designers, Flight crew, ATCO - Procedures: ANSP, Airspace users - Systems: Avionics, ANSP Ground Systems, SBAS and GBAS infrastructure **Main requirements/guidance material** **1. ICAO Roadmap of Regulatory Operational Improvements ;** - http://www.icao.int/airnavigation/IMP/Documents/ASBU%20modules%20mapped%20to%20Work%20Programme%202015-01-08.pdf **2. Other:** - EUROCAE ED-75D, MASPS Required Navigation Performance for Area Navigation - RTCA DO-236C, Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation
500	**Continuous descent Operations using VNAV (B1-CDO)**					1	√	√	√	√	√	√	
						2	√	√	√	√		√	
						3	√	√	√	√			
						4	√	√	√	√			
						5	√	√	√	√			
						6	√	√	√	√			
						7	√	√					

| 510 | **Rocket launch/space re-entry management** **REGIONAL** | | 7.XX All States with Agencies that conduct ballistic launch or space re-entry activities should ensure:

 • the development of written coordination agreements between the State civil aviation authority and the launch/re-entry agency concerned;

 • that strategic coordination is conducted between the State civil aviation authority and any States affected by the launch/re-entry activity at least 14 days prior to the proposed activity, providing notice of at least:

 o three days for the defined launch window; and

 o 24 hours for the actual planned launch timing;

 • that consideration of affected airspace users and ANSPs is made after consultation, so that the size of the airspace affected is minimized and the launch window is optimized for the least possible disruption to other users ; and that communication is established with affected ANSPs to provide accurate and timely information on the launch/re-entry activity to manage tactical responses (for example, emergencies and activity completion). |

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Main impacts
- People: Space Agencies, CAAs, ANSPs, ATC, Airlines, AIS providers, ATC, Pilots
- Procedures: ANSP, Space Agencies
- Systems: N/A

Main requirements/guidance material:
- Annex 11 (paragraph 2.18)
- Annex 15 (paragraph 5.1.1.4)
- ICAO Circular 330 Civil/Military Cooperation in Air Traffic Managemen
- Asia/Pacific Seamless ATM Plan

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520	**Human performance – language proficiency** **REGIONAL**		7.XX English language proficiency testing should be conducted to ensure Level 5 for all operational controllers to ensure they can respond appropriately to irregular occurrences (e.g.: emergencies), and Level 4 for Assistants, Flight Dispatchers, etc. Such testing should be by use of an internationally recognised system Note: as at 2014 the EUROCONTROL ELPAC was the only ICAO endorsed system) and should not be conducted by staff members of the ANSP itself.		A	B	C	D	E	F	**Main impacts** • People: ~~ANSP~~ Flight crew, ATCO • Procedures: ANSP, Airspace users • Systems: N/A **Main requirements/guidance material** • Circular 318 Language Testing Criteria for Global Harmonization • Circular 323 Guidelines for Aviation English Training
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530	**SAR Regulatory and Coordination Mechanisms** **REGIONAL (B0-SAR)**		7.XX All States should develop statutes and related provisions for a SAR organization and its framework, resources, policies and procedures, including a State SAR Plan, international SAR agreements and SAR exercises (SAREX).		A	B	C	D	E	F	**Main impacts** • People: States, CAAs, ANSPs, RCCs, JRCCs, ATC, Pilots • Procedures: ANSP, RCCs, JRCCs • Systems: 406 MHz Emergency Locator Transmitters (ELTs), Cospas-Sarsat system, **Main requirements/guidance material** • Annex 12 • Asia Pacific Search and Rescue (SAR) Plan • ICAO Doc.7300 • ICAO Doc.9672 Regional Air Navigation Plan (RANP) • International Aeronautical and Maritime Search and Rescue (IAMSAR)
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| 540 | **SAR Facilities and Assets**

REGIONAL
(B0-SAR) | | 7.XX All States should establish Rescue Coordination Centres (RCCs) of sufficient size with facilities, tools, and access to SAR Units (SRU) commensurate with the State's responsibilities, or delegate the function as appropriate (all States should investigate the feasibility of establishing Joint Rescue Coordination Centres (JRCCs) and implement where beneficial). |

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Main impacts

- People: States, CAAs, ANSPs, RCCs, JRCCs, ATC, Pilots
- Procedures: ANSP, RCCs, JRCCs
- Systems: 406 MHz Emergency Locator Transmitters (ELTs), Cospas-Sarsat system,

Main requirements/guidance material

- Annex 12
- Asia Pacific Search and Rescue (SAR) Plan
- ICAO Doc.7300
- ICAO Doc.9672 Regional Air Navigation Plan (RANP)
- International Aeronautical and Maritime Search and Rescue (IAMSAR)

| 550 | **SAR Information**

REGIONAL
(B0-SAR) | | 7.XX All States should establish a centralised SAR information source, which includes data supporting the Aeronautical Information Publication (AIP), SAR Library, 24 hour Contacts database of SAR facilities, assets and lists of SRUs. |

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Main impacts

- People: States, CAAs, ANSPs, RCCs, JRCCs, ATC, Pilots
- Procedures: ANSP, RCCs, JRCCs
- Systems: 406 MHz Emergency Locator Transmitters (ELTs), Cospas-Sarsat system,

Main requirements/guidance material

- Annex 12
- Asia Pacific Search and Rescue (SAR) Plan
- ICAO Doc.7300
- ICAO Doc.9672 Regional Air Navigation Plan (RANP)
- International Aeronautical and Maritime Search and Rescue (IAMSAR)

| 560 | SAR Improvement

REGIONAL
(B0-SAR) | | 7.XX All States should implement Quality Assurance (QA) programmes that include continuous improvement and audit processes, gap and safety/quality indicator analysis, and SAR promotion activities. | grid below | **Main impacts**

• People: States, CAAs, ANSPs, RCCs, JRCCs, ATC, Pilots
• Procedures: ANSP, RCCs, JRCCs
• Systems: 406 MHz Emergency Locator Transmitters (ELTs), Cospas-Sarsat system,

Main requirements/guidance material

• Annex 12
• Asia Pacific Search and Rescue (SAR) Plan
• ICAO Doc.7300
• ICAO Doc.9672 Regional Air Navigation Plan (RANP)
• International Aeronautical and Maritime Search and Rescue (IAMSAR) |

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| 570 | Airport Master Plans

REGIONAL | | 7.XX All high density aerodromes should develop and regularly update the Airport Master Plan to align the airport infrastructure future planning with the Seamless ATM needs. | grid below | **Main impacts**

• People: Airport development and maintenance planners, Airport Operators, ANSP Capacity and safety Managers and procedure designers, Airspace users, Airlines

Main requirements/guidance material
• Annex 14 |

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| 580 | **Common aeRonautical Virtual private network (CRV)**

 REGIONAL | | | 7.XX All ACC serving high density FIR should be connected to CRV (Common aeRonautical Virtual private network) and CRV interconnected with EUR, MID and AFI regions. |

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Main impacts

- People: ANSP , ATCOSEP
- Procedures: ANSP, Airspace users
- Systems: IP network compliant with safety and performance requirements ; IPV6 protocol ; Analog/digital VoIP converter where Analog Voice is implemented

- **Main requirements/guidance material**

- Annex 10
- ICAO Doc. 9896 Manual for the ATN using IPS standards and Protocols
- ICAO Doc. 9880 Manual on detailed technical specifications for the Aeronautical Telecommunication Network (ATN) using the ISO/OSI standards and protocols
- EUROCAE VoIP ATM System Operational and Technical Requirements (ED136)
- EUROCAE Interoperability Standards for VoIP ATM Components (ED137B) EUROCAE Network Requirements and Performance for VoIP ATM Systems (ED 138)
- CRV documentation (CONOPS, preliminary safety assessment, cost benefit analysis, tender package, implementation plan)

| 590 | **Voice communications over IP between ATS units (VoIP)**

REGIONAL | | 7.XX In preparation of phase III, all States should upgrade their ATM voice communication systems or implement analog/digital VoIP converters in compliance with the EUROCAE ED-137 standards (interoperability standards for VOIP ATM components). | | **Main impacts**

- People: ~~ANSP,~~ATCO, ATSEP
- Procedures: ANSP~~, Airspace users~~
- Systems: Voice Communications Switches, ATM systems, Analog/digital VoIP converter where Analog Voice is implemented~~CRV procurement, Network Address Translation (NAT)~~

Main requirements/guidance material
- Annex 10
- ICAO Doc.9896 ATN Manual for The ATN Using Internet Protocol Suite (IPS)
- ICAO Doc. 9880 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols
- ICAO Doc.7030 Supplementary Provisions
- ICAO Doc.9673 Regional Air Navigation Plan
~~CRV documentation (CONOPS, preliminary safety assessment, cost benefit analysis, tender package, implementation plan)~~ |

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Tabl e 3: Implementation Actions and Guidance

~~Regional~~ Seamless ATM Reporting

2.1 ~~Whilst guidance is provided for each and every action of the Seamless ATM Plan, only a very limited subset of actions needs a periodic implementation report from Asia/Pacific States at the regional level to keep all stakeholders coordinated.~~ Through ~~the Seamless ATM Reporting Form, available as a spreadsheet in Excel format (http://www.icao.int/APAC/Documents/edocs/Regional%20Seamless%20ATM%20Reporting%20Form%20-%20v4.xlsx) and soon as a~~the web-based reporting ~~form~~process, States are invited to report their progress on implementation and issues encountered at least once a year. In this way, potential delays may be anticipated and managed.

2.2 The Seamless ATM Reporting ~~Form enables a formalised~~ process ~~for regional planning that~~ can identify areas where greater support for States is required. In this regard, the scope of support and desired timeframe should be specified in the column "Remarks" of the Seamless ATM Reporting Form.

2.3 The Regional Seamless ATM Reporting ~~Form~~ process is used for collecting and analysing data from States from a global perspective. This allows planning that supports the Global Air Navigation Plan, and reporting of the overall progress of Asia/Pacific Seamless ATM implementation to appropriate bodies.

~~2.3~~2.4 The regional picture built upon the data collected is available here: http://www.icao.int/APAC/Pages/ATMReport.aspx