

ATM/SAR ASBU ELEMENTS APPLICABLE IN AFI REGION

LEGEND	
Implementation Category	
E	Essential
S	Specific
D	Desirable
O	Optional
Priority	
1	Expedite Implementation
2	Must be implemented

ACDM – Airport Collaborative Decision-Making Block 0

OPERATIONAL							
Element:	ACDM-B0/1 - Airport CDM Information Sharing (ACIS)						
Main Purpose	To generate common situational awareness, which will foster improved decision making within aerodromes, by sharing relevant surface operations data among the local stakeholders involved in aerodrome operations						
Description	This element represents the first collaboration step among stakeholders involved in aerodrome operations. It consists in the definition of common specific milestones for several flight events taking place during surface operations. The stakeholders involved must, based on accurate operational data, achieve the agreed milestones.						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Reference: Manual on Collaborative Air Traffic Flow Management (ATFM) ICAO Doc 9971	AMET-B0/1 AMET-B0/2 SURF-B0/2	E	1	Airport operator ANSP Aircraft operator Ground handling agent	Y
	Ground system infrastructure	A simple A-CDM dialog system to a more advanced A-CDM Information sharing platform (ACISP) to achieve A-CDM information sharing.				Airport operator ANSP Aircraft operator Ground handling agent	
	Training	Training in the operational standards and procedures				Airport operator ANSP ATM network function Aircraft operator Ground handling agent	
	Operational procedures	Phraseology for the implementation of ACIS. References: Procedures for Air Navigation Services-Air Traffic Management (Doc 4444)				ANSP Aircraft operator	



OPERATIONAL							
Element:	ACDM-B0/2 - Integration with ATM Network function						
Main Purpose	Airport CDM operations will be enriched by enhanced arrival information from the ATM network, and, at the same time, network operations will benefit from more accurate departure information from CDM airports.						
Description	This element consists in feeding arrival information from the network into A-CDM and, at the same time, coordinate specific departure milestones. The involved stakeholders must, based on accurate operational data, achieve the agreed milestones.						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures for: integration of aircraft turnaround with ATM/ATFM objectives. References: Manual on Collaborative Air Traffic Flow Management (ATFM) (Doc 9971)	RSEQ-B0/1 RSEQ-B0/2 SURF-B0/2 FICE-B0/1 NOPS-B0/4	E	1	Airport operator ANSP ATM network function Aircraft operator	Y
	Operational procedures	Phraseology for the integration of the turnaround within the network. . References: Procedures for Air Navigation Services-Air Traffic Management (Doc 4444)				ANSP Aircraft operator	
	Ground system infrastructure	Interconnection of ACDM and the network using data exchange models				Airport operator ANSP ATM network function Aircraft operator	
	Training	Training in the operational standards and procedures				Airport operator ANSP ATM network function Aircraft operator Ground handling agent	



ICAO

AAO/SG5 Appendix 3

APTA - Improve arrival and departure operations Block 0

OPERATIONAL							
Element:	APTA-B0/1- PBN Approaches (with basic capabilities)						
Main Purpose	This element represents the use of PBN in design of approach procedures to provide more flexibility to airspace planners to manage the use of airspace, and to facilitate access to airports. It includes the provision of instrument approach procedures with vertical guidance in support of stabilized approaches.						
Description	PBN approaches allow for guided lateral paths and optionally, with associated advisory vertical paths based on Baro-VNAV functionality for aircraft so equipped. Such Baro-VNAV functionality enables stabilized decent operations on the final segment of the approach at airports which do not have ground infrastructure to support precision approaches. These procedures can also be implemented to allow continued approach operations in the case of failure of an existing ILS or traditional non precision approaches that are based on ground navigation aids.						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	These operational procedures should be designed and used (aircraft operation criteria) as specified in ICAO Doc 8168 PANS-OPS Vol II and I or equivalent	NAVS-B0/3 AMET-B0/1 AMET-B0/2	E	1	ANSP	Y
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. References: ICAO Doc 8071 (Volume I – Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				ANSP CAA	
	Operational procedures	Procedures for the crew to follow to fly a PBN approach. Defined in the Ops Manual. Reference: Doc 9613 (PBN Manual)				Aircraft operator	
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Defined in the Ops Manual. Reference: Doc 9613 (PBN Manual)				Aircraft operator	
	Airborne system capability	Aircraft eligible for RNP APCH Navigation specification as defined in Doc 9613 (PBN Manual) and listed in the Aircraft Flight Manual				Aircraft manufacturer Aircraft operator	



	Training	Crew trained to fly PBN approaches (with basic capabilities). References: As defined in Doc 9613 (PBN Manual). PBN approaches (with basic capabilities) training for Air traffic controllers. References: As defined in Doc 9613 (PBN Manual). PBN approaches (with basic capabilities) training for Procedure designers, Airspace planners. References: PANS-OPS Vol II and Doc 9992 Manual on the Use of Performance-Based Navigation (PBN) in Airspace Design				ANSP Aircraft operator	
	Operational Authorization	Aircraft operator flying a PBN approach should have an operational authorization related to the specified performance of the procedure, as described in Doc 9997 (PBN Ops Approval Manual)				CAA Aircraft operator	

OPERATIONAL							
Element:	APTA-B0/2 - PBN SID and STAR procedures (with basic capabilities)						
Main Purpose	Use of PBN capabilities allows more flexible placement of arrival and departure routing without the need for ground based infrastructure to support these routes.						
Description	This element represents the use of PBN in design of arrival and departure procedures to provide more flexibility to airspace planners to manage the use of airspace for enhancing arrival and departures in terminal areas. It provides the basic capability to support the implementation of CDO and CCO operations.						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) or equivalent	AMET-B0/1 AMET-B0/2	E	1	ANSP	Y
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. References: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc				ANSP CAA	



ICAO

AAO/SG5 Appendix 3

		9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				
	Operational procedures	Procedures for the crew to follow to fly a PBN SID/STAR. Reference: Defined in the Ops Manual Reference: Doc 9613 (PBN Manual)				Aircraft operator
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Defined in the Ops Manual Reference: Doc 9613 (PBN Manual)				Aircraft operator
	Airborne system capability	Aircraft eligible for applicable Navigation specification as defined in Doc 9613 (PBN Manual) and listed in the Aircraft Flight Manual				Aircraft manufacturer Aircraft operator
	Operational Authorization	Aircraft operator flying a PBN SID/STAR should have an operational authorization related to the specified performance of the procedure, as described in Doc 9997 (PBN Ops Approval Manual)				CAA Aircraft operator
	Ground system infrastructure	Depending on the navigation specification used, suitable ground based navigational aids will be required. See Doc 9613 (PBN Manual) for details				ANSP
	Training	Crew trained to fly PBN SID/STAR (with basic capabilities). References: As defined in Doc 9613 (PBN Manual). PBN SID/STAR (with basic capabilities) training for Air traffic controllers. References: As defined in Doc 9613 (PBN Manual). PBN SID/STAR (with basic capabilities) training for procedure designers, airspace planners. Ref Doc 8168 (PANS OPS Vol II); Doc 9992 (PBN airspace design Manual); Doc 9906 (Vol 2)				ANSP Aircraft operator

OPERATIONAL	
Element:	APTA-B0/3 - SBAS/GBAS CAT I precision approach procedures
Main Purpose	Introduction of SBAS and GBAS CAT I procedures allow for reduced minima at aerodromes situated in areas of significant terrain, where ILS is not possible



Description	This element represents the use of augmented GNSS systems to allow aircraft operation with a more precise vertical and lateral navigation capability. It also includes the development of SA CAT I operations below existing minima						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) or equivalent.	NAVS-B0/2 NAVS-B0/1 AMET-B0/1 AMET-B0/2	S	1	ANSP	N
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. References: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				ANSP CAA	
	Operational procedures	Procedures for the crew to follow to fly a Cat I Precision Approach. Reference: Ops Manual defines SOPs				Aircraft operator	
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Reference: Ops Manual defines SOPs				Aircraft operator	
	Airborne system capability	TSO C145 or C146 or equivalent required for SBAS avionics. TSO C161A required for GBAS CAT I				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	GBAS Ground Station SBAS Ground stations Ref Annex 10 Vol I				Airport operator ANSP	
	Training	Crew trained to fly Cat I precision approaches. Reference: Doc 8168 (Vol I). Cat I Precision Approach training for ATC. Reference: Doc 8168 (Vol I). Cat I Precision Approach training for procedure designers, airspace planners. Ref: Doc 8168 (PANS OPS Vol II); Doc 9906 (Vol 2)				ANSP Aircraft operator	

OPERATIONAL



Element:	APTA-B0/4 - CDO (Basic)						
Main Purpose	Reduce fuel burn by not requiring application or power during descent						
Description	Arriving aircraft are allowed to descend continuously from top of descent by employing minimum engine thrust, ideally in a low drag configuration, prior to the Initial Approach Fix (IAF)						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) or equivalent, with reference to Doc 9931 (CDO Manual)	APTA-B0/2 RSEQ-B0/3 AMET-B0/1 AMET-B0/2	E	1	ANSP Aircraft operator	N
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. References: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				ANSP CAA	
	Operational procedures	Procedures for the crew to follow to facilitate the flying of a CDO. OPS Manual defines SOPs				Aircraft operator	
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Reference: Ops Manual defines SOPs				Aircraft operator	
	Airborne system capability	Eligibility for the applicable PBN navigation specification (if required) and vertical path capability, as defined in Doc 9613 (PBN Manual) and listed in the Aircraft Flight Manual (AFM)				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	Depending on the navigation specification used, suitable ground based navigational aids will be required. See Doc 9613 (PBN Manual) for details				ANSP	
	Training	Crew trained to fly CDOs (Basic) CDO (Basic) training for Air traffic controllers CDO (Basic) training for procedure				ANSP Aircraft operator	



ICAO

AAO/SG5 Appendix 3

		designers, Airspace planners. References: Doc 9906 (Vol 2); Doc 9992					
--	--	---	--	--	--	--	--



OPERATIONAL							
Element:	APTA-B0/5 - CCO (Basic)						
Main Purpose	Reduce fuel burn by not requiring level-offs during climb						
Description	Departing aircraft are allowed to climb continuously, to the greatest possible extent, by employing optimum engine thrust. An optimal continuous climb should start on take-off and allow the aircraft to climb efficiently using climb profiles that reduce controller pilot communications and segments of level flight until the top of climb						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) or equivalent, with reference to Doc 9993 (CCO Manual)	APTA-B0/2 AMET-B0/1 AMET-B0/2	E	1	ANSP Aircraft operator	Y
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. Ref: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				ANSP CAA	
	Operational procedures	Procedures for the crew to follow to facilitate the flying of a CCO. OPS Manual defines SOPs				Aircraft operator	
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Reference: Ops Manual defines SOPs				Aircraft operator	
	Airborne system capability	Eligibility for the applicable PBN navigation specification (if required) and vertical path capability, as defined in Doc 9613 (PBN Manual) and listed in the Aircraft Flight Manual (AFM)				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	Depending on the navigation specification used, suitable ground based navigational aids will be required. See Doc 9613 (PBN Manual) for details				ANSP	



	Training	Crew trained to fly CCOs (Basic). Reference: Training to support the CCO concept. ATC trained to provides CCOs (Basic). Reference: Training to support the CCO concept. CDO (Basic) training for procedure designers, Airspace planners. References: Doc 9906 (Vol 2); Doc 9992				ANSP Aircraft operator	
--	----------	---	--	--	--	---------------------------	--

OPERATIONAL							
Element:	APTA-B0/6 -PBN Helicopter Point in Space (PinS) Operations						
Main Purpose	Helicopter unique capabilities allow IFR operations that start or terminate from any suitable point in space (PinS), if visual conditions support take-off/landing capability from that point						
Description	PBN PinS operations include arrivals and departure procedures, specific to helicopters, that allow visual landing and take-off operations from heliports or other landing locations						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) or equivalent	AMET-B0/1 AMET-B0/2	S	2	ANSP	N
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should be in accordance with Doc 8168 (PANS OPS Vol II). Ref: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design) The publication of the procedures should be in accordance with Doc 8168 (PANS OPS Vol II)				ANSP CAA	
	Operational procedures	Procedures for the crew to follow to facilitate the flying of a CDO. OPS Manual defines SOPs				Aircraft operator	
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Reference: Ops Manual defines SOPs				Aircraft operator	



AAO/SG5 Appendix 3

	Airborne system capability	Requires applicable PBN Navigation specification, as defined in Doc 9613 (PBN Manual) and listed in the Rotorcraft Flight Manual (RFM)				Aircraft manufacturer Aircraft operator	
	Operational Authorization	Aircraft operator flying a PBN Helicopter Point in Space (PinS) operation should have an operational authorization related to the specified performance of the procedure, as described in Doc 9997 (PBN Ops Approval Manual)				CAA Aircraft operator	
	Training	Crew trained to fly Helicopter PBN Point in Space (PinS) procedures. Ref.: As defined in Doc 8168 (PANS OPS Vol I) Helicopter PBN Point in Space (PinS) training for ATC Helicopter PBN Point in Space (PinS) training for procedure designers, Airspace planners. References: Doc 8168 (PANS OPS Vol II); Doc 9906 (Vol 2)				ANSP Aircraft operator	

OPERATIONAL							
Element:	APTA-B0/7 - Performance based aerodrome operating minima – Advanced aircraft						
Main Purpose	Standard Aerodrome operating minima are predicated upon aircraft equipped with the minimum required equipment (the basic aircraft) for that approach. These aerodrome operating minima relate directly to the established types and categories of operations and the associated infrastructure requirements (e.g. runway lights, approach lights). Aircraft with more advanced equipage can take advantage of existing infrastructure to obtain special authorizations for enhanced approach operations to lower minimums than basic aircraft can use						
Description	For advanced aircraft, Improvements include: <ul style="list-style-type: none"> • EVS operations using existing Type A or Type B CAT I procedures, requiring natural vision from 100 ft, but with significantly reduced RVR • Lower than standard CAT I (SA CAT I) operations by means of HUD or Autoland. CAT II operations with less infrastructure (SA CAT II) by means of HUD or Autoland. • EVS to land operations, using existing CAT I facilities but without the need to have natural visual references before landing. 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Regulatory provisions	Provisions for operational credits to enable lower minima based on advanced aircraft capabilities. Reference: Annex 6 Part I	APTA-B0/3 AMET-B0/1 AMET-B0/2	D	2	CAA	N
	Operational procedures	Procedures for the crew to operate to minima determined by the combination of aircraft equipage and ground				Aircraft operator	



ICAO

AAO/SG5 Appendix 3

		infrastructure. Defined in the Ops Manual. Reference: Doc 9365 (AWO Manual)				
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Defined in the Ops Manual				Aircraft operator
	Operational procedures	Procedures for ATC to use in order to facilitate the use of performance-based minima at aerodromes. Low visibility operating plan for aerodrome ATC				ANSP
	Operational procedures	Procedures for ground operations by aircraft with advanced capabilities				Airport operator
	Airborne system capability	SBAS and GBAS as required EVS and HUD installation Reference: Doc 9365 (AWO Manual)				Aircraft manufacturer Aircraft operator
	Operational Authorization	Aircraft operator conducting PBAOM operations for low visibility operations require a specific approval detailing the operational credit applied Reference: Doc 9365 (AWO Manual)				CAA Aircraft operator
	Ground system infrastructure	Pre threshold terrain information for advanced aircraft operations SBAS/GBAS ground stations (as required)				Airport operator ANSP
	Training	Crew trained to fly using Performance-based Aerodrome Operating Minima (Advanced aircraft). Training on the use of advanced aircraft equipment such as EVS Reference: Doc 9365 (AWO Manual). ATC trained to understand implications of Performance-based Aerodrome Operating Minima (Advanced aircraft). Training for ATC on the application of operational credits for advanced aircraft and the effect on determining minima used by crews				ANSP Aircraft operator



OPERATIONAL							
Element:	APTA-B0/8 - Performance based aerodrome operating minima – Basic aircraft						
Main Purpose	For Basic aircraft, improvements include: <ul style="list-style-type: none"> • Instrument approaches to non-instrument runways, improving airport access • Flexibility to gradually improve the ground infrastructure with consequent improvements in operating minima 						
Description	Aerodrome operating minima are predicated upon the aircraft with the minimum equipment required (the basic aircraft). These aerodrome operating minima relate directly to the established types and categories of operations and the associated infrastructure requirements. An airport operator can choose to upgrade ground based infrastructure to add approach capability and/or to enable lower minimums for increased airport availability for all operations. Examples of such infrastructure upgrades include runway lighting, approach lighting, centreline lights. This also includes upgrade of runway from non-instrument to non-precision						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures should be designed in accordance with published criteria. Reference: Doc 8168 (PANS OPS Vol II)	AMET-B0/1 AMET-B0/2	E	1	ANSP	Y
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. Ref: ICAO Doc 8071 (Volume I – Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				ANSP CAA	
	Operational procedures	Additional requirements for operating crews should be detailed in the Ops Manual				Aircraft operator	
	Operational procedures	Specific contingencies associated with operations to non-instrument runways should be detailed in the Ops manual				Aircraft operator	
	Airborne system capability	Aircraft eligible for applicable Navigation specification as defined in Doc 9613 (PBN Manual) and listed in the Aircraft Flight Manual				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	Minimum requirement is a non-instrument runway for basic aircraft Additional elements may be used to reduce operating minim (lighting, visual aids etc.)				Airport operator	



FRT0 - Improved operations through enhanced en-route trajectories Block 0

OPERATIONAL	
Element:	FRT0-B0/1 - Direct routing (DCT)
Main Purpose	Direct routings are established with the aim of providing airspace users with additional flight planning route options on a larger scale across FIRs such that overall planned leg distances are reduced in comparison with the fixed route network
Description	<p>DCTs could be implemented in a limited way e.g.:</p> <ul style="list-style-type: none"> • time constraint (fixed or depending on traffic/availability); • traffic constraint (based on flow and/or level of traffic); • flight level; • lateral constraints; • entry/exit conditions. • The extension of direct routings within and across the FIR boundaries also requires Network and ANSPs ground system upgrades for airspace management and flight data processing. <p>The following procedures and process might need to be considered:</p> <ul style="list-style-type: none"> • identify the direct routing airspace volume (lateral and vertical) and applicable time; • direct routings may co-exists with ATS route structure; • identify direct routing entry and exit points; • adapt airspace design and ensure direct routing horizontal and vertical connectivity; • ATFM direct routing procedures; • adapt the LoA with adjacent ATS units; • publish relevant data for direct routing in AIP; • airspace management procedure for the implementation of direct routings; • ATC procedures to cover direct routing co-ordination and transfer of control, trajectory change in direct routing, environment, conflict detection. <p>The ATM system upgrades of FDP and CWP, if required, are related to:</p> <ul style="list-style-type: none"> • upgrade of network flight planning and ASM/ATFM system for DCTs; • direct routing clearances; • rerouting capabilities in cases the direct routing traversed the military airspace; differentiation between different traffic type airspaces; • direct route beyond AoR; • calculation of 4D trajectory with AoI; • editing function for 4D trajectories



AAO/SG5 Appendix 3

Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Design and use of operational procedures for direct routes. Reference: EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 1: European Airspace Design Methodology - Guidelines - Edition December 2018 (https://www.eurocontrol.int/publications/european-route-network-improvement-plan-ernip-part-1-european-airspace-design)	NOPS-B0/1 FRTO-B0/2 FRTO-B0/4 FICE-B0/1	E	1	ANSP ATM network function Aircraft operator	Y
	Ground system infrastructure	ATC systems to be upgraded for DCT clearances, notification and co-ordination data exchanges and management of relevant airspace data. Reference: EUROCONTROL specification for the on-line Data exchanges (OLDI) https://eurocontrol.int/sites/default/files/publication/files/EUROCONTROL%20specification%20OLDI%204.3				ANSP	
	Ground system infrastructure	AO-CFSPS systems to be upgraded to enable flight planning of DCTs Reference: EUROCONTROL NM Flight Planning Requirements document December 2018 https://www.eurocontrol.int/publications/nm-flight-planning-requirements-guidelines				Aircraft operator	
	Training	ATCO Training, AO Training, ATM Network Training for DCT Provide training to staff prior to implementation				ANSP ATM network function Aircraft operator	
	Ground system infrastructure	Upgrade ATFM/flight planning systems to support FUA Reference: EUROCONTROL NM Flight Planning Requirements document December 2018 (https://www.eurocontrol.int/publications/nm-flight-planning-requirements-guidelines)				ATM network function	



OPERATIONAL							
Element:	FRTO-B0/2 - Airspace planning and Flexible Use of Airspace (FUA)						
Main Purpose	Establish the Flexible Use of Airspace (FUA) process and improve data exchange between civil and military stakeholders by automation to enable a more efficient use of airspace based on transparency and due regard to national security needs						
Description	This element addresses strategic/long term airspace management, pre-tactical planning and tactical operations. Automated ASM support systems improve airspace management processes and flexible airspace planning including time horizon specifications in all flight phases (strategic, pre-tactical and tactical time horizon) by providing mutual visibility on civil and military requirements. They also support flexible airspace planning according to civil and military ANSPs and airspace user requirements, including permit cross border and use of segregated areas operations regardless of national boundaries						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Regulatory provisions	Follow regulations for regulatory approval Reference: ICAO Circular 330 Civil/Military Coordination European Union Regulation (EC) No 2150/2005 of 23 December 2005 laying down common rules for the flexible use of airspace. https://www.eurocontrol.int/articles/flexible-use-airspace-fua-mandate	FRTO-B0/1 NOPS-B0/1	E	1	CAA ICAO	Y
	Operational procedures	Design and use of operational procedures Reference: EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 1: European Airspace Design Methodology - Guidelines - Edition December 2018 https://www.eurocontrol.int/publications/european-route-network-improvement-plan-ernip-part-1-european-airspace-design EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 3: Airspace Management Handbook - Edition December 2018 https://www.eurocontrol.int/sites/default/files/publication/files/ernip-part-3-asm-handbook-edition-5-v5-5.pdf				ANSP Aircraft operator	



	Ground system infrastructure	Tools to be implemented and existing systems upgraded to conduct FUA operations. Reference European Route Network Improvement Plan (ERNIP) - Part 3: Airspace Management Handbook - Annex 12 Edition December 2018 (https://www.eurocontrol.int/sites/default/files/publication/files/ernip-part-3-asm-handbook-edition-5-v5-5.pdf) EUROCONTROL Local And sub-Regional Airspace Management support system (https://www.eurocontrol.int/services/local-and-sub-regional-airspace-management-support-system-lara)				ANSP
	Training	Training for FUA Provide training to staff prior to implementation				ANSP Aircraft operator
	Ground system infrastructure	Upgrade ATFM/flight planning systems to support FUA Reference: EUROCONTROL NM Flight Planning Requirements document December 2018 (https://www.eurocontrol.int/publications/nm-flight-planning-requirements-guidelines)				ATM network function

OPERATIONAL	
Element:	FRTO-B0/3 - pre-validated and coordinated ATS routes to support flight and flow
Main Purpose	A collection of routes that have been pre-validated and coordinated with impacted air route traffic control centres and airspace users
Description	<p>There are many instances when ATC needs to move air traffic away from, or into, a particular area of airspace. When this happens, traffic managers will typically implement reroutes – a common route, or set of routes, that they want aircraft to use in a particular area. These routes are predetermined and applied to the certain sector/airport accordingly. Routes are available through ANSP database and are published for the airspace users.</p> <p>Preferred routes are the normal, everyday routes that ATC would like operators to file. These routes were developed to increase system efficiency and capacity by having balanced traffic flows among high-density airports, as well as de-conflicting traffic flows where possible. Preferred routes are those that operators will most commonly file.</p> <p>Playbook routes are a set of standard routes that ATC can utilize to fit a particular set of circumstances, when the preferred routes are not available. These routes were created to allow for rapid implementation as needed.</p>



	CDRs are a combination of coded air traffic routings and refined coordination procedures, designed to reduce the amount of information that needs to be exchanged between ATC and flight crews						
Maternity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Design and operational procedures for ANSPs and AOs on how to use flexible routing tools	FRTO-B0/1 FRTO-B0/2 AMET-B0/1 AMET-B0/2 AMET-B0/4	E	1	ANSP Aircraft operator	Y
	Ground system infrastructure	ANSP implemented tools to support preferred, playbook, and CDR routes. Reference: https://www.fly.faa.gov/Products/products.jsp				ANSP	
	Ground system infrastructure	AO-CFSPS systems to be upgraded to enable flight planning of flexible routings. Although AOs can just look up these routes on the weblink, they can also integrate these data into their flight planning system and have it in their tool. Reference: https://www.fly.faa.gov/Products/products.jsp				Aircraft operator	
	Training	Training provided to TMC, ATCO, FOC on how to use flexible routing				ANSP Aircraft operator	

OPERATIONAL							
Element:	FRTO-B0/4 - Basic conflict detection and conformance monitoring						
Main Purpose	Reduction of ATCO's workload via early and systematic conflict detection and conformance monitoring						
Description	<p>MTCDD assists the controller in conflict identification and planning tasks by providing automated early detection of potential conflicts; facilitating identification of flexible routing/conflict free trajectories; identifying aircraft constraining the resolution of a conflict or occupying a flight level requested by another aircraft.</p> <p>The monitoring aids (MONA) function provides the controller with warnings if aircraft deviate from a clearance or planned trajectories and reminders related to the ATCO instructions to be issued. MONA might include the flight progress monitoring as well as the lateral, longitudinal, vertical and Cleared Flight Level (CFL) deviations</p>						
Maternity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N



ICAO

AAO/SG5 Appendix 3

Ready for implementation	Operational procedures	Design and use of operational procedures	FRTO-B0/1	E	1	ANSP	Y
	Ground system infrastructure	<p>ATC systems to be upgraded to ensure conformance monitoring of flights and conflict detection for ATC planning purposes. Reference: EUROCONTROL Monitoring Aids (MONA) specification 3 March 2017. This document provides system requirements for Monitoring Aids (MONA).https://www.eurocontrol.int/standards?page= Reference: EUROCONTROL Medium-Term Conflict Detection (MTCD) specification 3 March 2017. This document provides system requirements for Medium-Term Conflict Detection (MTCD). https://www.eurocontrol.int/standards?page=4 EUROCONTROL Trajectory Prediction Specification Edition 2.0 March 2017 (https://www.eurocontrol.int/publications/trajectory-prediction-specification)</p>				ANSP	
	Training	ATCO Training Provide training to staff prior to implementation				ANSP	



NOPS - Network Operations Block B0

OPERATIONAL							
Element:	NOPS-B0/1 - Initial integration of collaborative airspace management with air traffic flow management						
Main Purpose	Introduce ASM/ATFM techniques, procedures and tools for the initial establishment of an integrated collaborative airspace management and air traffic flow and capacity management process applicable to the strategic through to the tactical phases of operations						
Description	<p>This element represents the initial step to enhancing the common situational awareness supporting optimum availability of airspace and ATC capacity to meet air traffic demands. It will result in a dynamic/rolling process supporting the enhancement of network operations. It will improve the cross-border operations and optimise network operations based on the richest and more accurate information. It requires the implementation of new tools/systems and processes notably:</p> <ul style="list-style-type: none"> • ASM/ATFM process for the provision of the airspace use plan; • Improved ASM/ATFM process for the provision of updated airspace use plan; • System/tools for provision of airspace plan to ATM network function; • Improved notification process for the ASM/ATFM purposes; • Improved accuracy of airspace booking; • Interoperability between local ASM and ATFM systems 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Develop the ASM/ATFM procedures related to dynamic co-operative management of the airspace (improved ASM/ATFM process via e.g., Airspace Use Plan/Updated airspace Use Plan). Reference: ICAO Doc 9971 Manual on Collaborative ATFM	AMET-B0/1 FRTO-B0/2	E	1	ANSP ATM network function	Y
	Operational procedures	Improved ASM/ATFM notification process. References: ICAO Doc 9971 Manual on Collaborative ATFM				ANSP ATM network function	
	Operational procedures	Develop the ASM/ATFM procedures to identify and release previously reserved airspace. References: Doc 9971 Manual on Collaborative ATFM				ANSP ATM network function	
	Operational procedures	Develop the ASM/ATFM procedure for promulgation and notification of receipt of ASM data- Doc 9971 Manual on Collaborative ATFM				ANSP ATM network function	



ICAO

AAO/SG5 Appendix 3

	Ground system infrastructure	Enhance the Airspace Management System and ATFM systems to distribute planned airspace usage information				ANSP ATM network function	
	Ground system infrastructure	Upgrade the Airspace Management System and ATFM system to support an integrated airspace planning process				ANSP ATM network function	
	Ground system infrastructure	Enhancements of Scenario management sub-system equipped with function to support pre-tactical CDM				ANSP ATM network function	
	Ground system infrastructure	Upgrade the Airspace Management Systems to provide airspace status information				ANSP ATM network function Aircraft operator	
	Ground system infrastructure	Interoperability of ATFM systems for ASM zone shapes and timing with local ASM tools				ANSP ATM network function	
	Ground system infrastructure	Enhance to ASM/ATFCM tools to receive information on planned and actual airspace status and support decision-making based on this information				Aircraft operator	
	Training	Collaborative Airspace management training. Training on new procedures and tools				ANSP ATM network function Aircraft operator	



OPERATIONAL							
Element:	NOPS-B0/2 -Collaborative Network Flight Updates						
Main Purpose	Improve ATFM situation awareness in order to facilitate re-routings and coordinated application of ATFM measures						
Description	<p>This element will ensure:</p> <ul style="list-style-type: none"> • Effective interface between ATC and ATFM with regard to deviations from the current flight plan. • Enhanced tactical flow management service based on real-time aircraft position data and flight activation information resulting to more accurate ATFM measures and thus better use of scarce airspace resources. <p>It will require implementation ATFM/ATC systems related to provision, processing and presentation of ATFM messages</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Develop the ATFM procedures to incorporate information received from multiple sources into the Network Planning. - Doc 9971 Manual on Collaborative ATFM	AMET-B0/2	E	1	ATM network function	Y
	Operational procedures	Develop the ATFM/ATC procedures for provision of updated flight plan information. - Doc 9971 Manual on Collaborative ATFM				ANSP ATM network function	
	Ground system infrastructure	Upgrade of ATFM/ATC system related to the provision and reception of correlated position reports for airborne flights				ANSP ATM network function	
	Ground system infrastructure	Enhancement of ATFM/ATC system related to the provision and processing of ATFM messages				ANSP ATM network function	
	Ground system infrastructure	Upgrade of ATFM/ATC system related to the flight activation				ANSP ATM network function	
	Ground system infrastructure	Upgrade the ATFM/ATC system for handling of flight plan info for airborne flights				ANSP ATM network function	



OPERATIONAL							
Element:	NOPS-B0/3 - Network Operation Planning basic features						
Main Purpose	The Network Operation Planning provides an overview of the situation from strategic planning through real time operations with ever increasing accuracy up to and including the day of operations by a common situational awareness for all ATFM actors within and adjacent to the ATFM area and allowing network wide demand and capacity balancing						
Description	Network Operation Planning is based on enhanced participation in a dynamically updated collaborative planning process. This requires the sharing of the latest flight status and intentions; airport and airspace component, associated demand and capacity balancing measures in a frequently updated plan which is aimed to be realised as target by all actors. The elements and formats of the plan need to be established and harmonized, considering the requirements of the users of these plans. It will be possible for them to access and extract data for selected areas to support their operation and, if required, to create their specific operations plan						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Develop the ATFM procedures to modify the Network operations planning in real-time in response to tactical changes to trajectories and airport/airspace capacities. - References: ICAO Doc 9971 Manual on Collaborative ATFM	AMET-B0/2 AMET-B0/3	E	1	ATM network function	Y
	Operational procedures	Develop the ATFM procedures for systematically incorporating changes to capacity balance as revised information enables the updating of the Network operations plan. References: ICAO Doc 9971 Manual on Collaborative ATFM				Airport operator ANSP ATM network function Aircraft operator	
	Operational procedures	Develop the ATFM procedures for coordinating refined plans between ANSP, Airspace Users and Airport Operators				Airport operator ANSP ATM network function Aircraft operator	
	Operational procedures	Develop the ATFM procedures for on-line collaborative determination access/update to the Network Operation Planning and notification of updates				Airport operator ANSP ATM network function Aircraft operator	
	Operational procedures	Develop the ATFM procedures for identifying the appropriate scenario from the catalogue of scenarios through collaborative decision making and initiating its implementation. References: ICAO Doc 9971 Manual on Collaborative ATFM				ATM network function	



ICAO

AAO/SG5 Appendix 3

	Operational procedures	Develop the ATFM procedures for initiating dynamic sectorization responses in collaboration with the ANSPs. References: ICAO Doc 9971 Manual on Collaborative ATFM				ATM network function
	Ground system infrastructure	Tool for exchange, presentation, visualization and update of ATFM related data				Airport operator ANSP ATM network function Aircraft operator
	Ground system infrastructure	Upgrade the capacity planning and scenario management with sector management tool to assist ANSPs in defining sector configurations				ATM network function
	Training	Network Operation Planning (basic features) training. Training on new procedures and tools				Airport operator ANSP ATM network function Aircraft operator



OPERATIONAL							
Element:	NOPS-B0/4 -						
Main Purpose	Initial integration of airports into the ATM network function						
Description	<p>The first objective is the A-CDM (Airport Collaborative Decision Making) integration with ATFM via exchanges of specific messages. The second objective is to ensure ATFM slot adherence and limited ATFM slot swapping in order to meet airline demands in line with capacity declarations.</p> <p>Convergence is ensured between airport slots, and flight plans, together with airport slot monitoring processes in order to improve consistency. That will require the deployment of new systems and processes for A-CDM and ATFM slot swapping:</p> <ul style="list-style-type: none"> • ATFM and airports system modules related to data exchanges for A-CDM • Tools for airport and ATFM slot monitoring post-ops 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Develop procedures for the collection of the Airport slots. References: ICAO Doc 9971 Manual on Collaborative ATFM	ACDM-B0/1 ACDM-B0/2	E	1	ATM network function Aircraft operator	Y
	Operational procedures	Develop the ATFM Collaborative procedures for improving Airport Operations in Adverse Conditions. References: ICAO Doc 9971 Manual on Collaborative ATFM				Airport operator ANSP ATM network function Aircraft operator	
	Ground system infrastructure	Tools supporting Airport Slot Monitoring post ops				Airport operator ATM network function Aircraft operator	
	Ground system infrastructure	Enhance the ATFM system for provision of planned departure information. Enhance the ATC and airport systems for reception and processing of planned departure information				Airport operator ANSP ATM network function	
	Ground system infrastructure	Enhance the ATFM system for provision of real time flight data for airborne flights. Enhance the ATC and airport systems for reception and processing of real time flight data for airborne flights				Airport operator ANSP ATM network function	

OPERATIONAL							
Element:	NOPS-B0/5 - Dynamic ATFM slot allocation						
Main Purpose	Provision of dynamic departure ATFM slot allocation including Calculated Take-off Time (CTOT) for regulated flights to avoid ATFM congestions						
Description	The CTOT is defined as a time at which the aircraft shall take-off. CTOT is sent to AU / ATS when a flight becomes regulated (e.g., new flight entering the system, new period of regulation in the system, change of runway in use) at a system parameter time before the last received EOBT. AU/ATS/Airport need to adhere with the CTOT. The calculation of take-off times takes into account the off-block times and an average taxiing time for the runway in use at the airfield concerned						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Develop the ATFM procedures for slot revision. References: ICAO Doc 9971 Manual on Collaborative ATFM		S	2	Airport operator ANSP ATM network function Aircraft operator	N
	Ground system infrastructure	System upgrade for provision, exchange and processing of CTOT				Airport operator ANSP ATM network function Aircraft operator	

OPFL - Improved access to optimum flight levels in oceanic and remote airspace Block B0

OPERATIONAL							
Element:	OPFL-B0/1 - In Trail Procedure (ITP)						
Main Purpose	To enable aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety						
Description	ITP is primarily intended to help facilitate access to optimum flight levels for aircraft operating in airspace where no ATS surveillance service is available. The ITP aircraft must acquire and process position broadcast (ADS-B) data from up to two non-maneuvring aircraft. Aircraft identification, altitude, position and ground speed of reference aircraft would be assessed by the ITP aircraft's on-board equipment (on-board decision support system) to determine whether an ITP climb, or descent is possible. Based on the processed broadcast data from the reference aircraft(s), a pilot can make an ITP climb or descent request to air traffic control (ATC). Pilots are responsible for using the on-board equipment to evaluate the situation and provide the required information to the controller						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	N/A	N/A	N/A	S	1	Airport operator ANSP	N



RSEQ - Improved traffic flow through runway sequencing Block 0

OPERATIONAL							
Element:	RSEQ-B0/1 - Arrival Management						
Main Purpose	To optimize sequencing for arrivals						
Description	<p>This element represents management of arrival sequences, thereby allowing aircraft to fly more efficiently to the necessary fix and to reduce the use of holding stacks, especially at low altitude.</p> <p>Based on inbound traffic prediction information and decision-making support, ATC operational techniques (metering points, speed-control, Time-To-Gain/Time-To-Lose, etc.) will be used to sequence inbound flights at minimum separation on final approach (time or distance based) to optimise runway utilization. Time-based metering (as opposed to time-based separations) is the practice of planning a sequence of traffic by time rather than distance. Typically, the relevant ATC authorities will assign a time in which a flight must arrive at the aerodrome or at a specific control point, and/or advises subject flights of speed changes as required to achieve the optimal separation on final approach. Besides inbound traffic prediction information, input can include aerodrome capacity, terminal airspace capacity, aircraft capability, wind and other meteorological factors. Time-based metering is the primary mechanism in which arrival sequencing is achieved</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Local ATM procedure for arrival sequencing	AMET-B0/1 AMET-B0/2	S	1	ANSP	N
	Ground system infrastructure	Automation for calculating optimum arrival sequence with presentation to ATCOs	WAKE-B2/1 WAKE-B3/3			ANSP	
	Training	ATCO Arrival Sequencing Training - ATCOs trained to use arrival sequencing automation, supported by arrival sequencing procedure. Pilot Time-Based Metering Training - Pilots trained to use airborne system to arrive at waypoint specified by ATCOs at specific timing	WAKE-B2/2 SURF-B0/2 SURF-B1/4 ACDM-B0/1 ACDM-B0/2			ANSP Aircraft operator	
	Regulatory provisions	Safety assessment of arrival sequencing operation				ANSP	



OPERATIONAL							
Element:	RSEQ-B0/2 - Departure Management						
Main Purpose	To optimize departure operations						
Description	Departure management, like its arrival counterpart, serves to optimize departure operation to ensure the most efficient utilization of aerodrome and terminal resources. Slots assignment and adjustments will be supported by departure management automation like department management or departure flow management. Dynamic ATFM slot allocation will foster smoother integration into overhead streams and help airspace users to better meet metering points and comply with other ATM requirements. It will sequence aircraft, based on the ground and airspace structure, wake turbulence, aircraft capability, en-route and destination ATFM constraints, and airspace users' preferences. This will serve to increase aerodrome throughput and compliance with allotted departure time. Where Airport CDM is implemented, departure management will interface with the associated A-CDM processes (including the pre-departure sequencing of A-CDM) in determining optimal departure sequencing						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Local ATM procedure for departure sequencing	AMET-B0/1 AMET-B0/2	S	1	ANSP	N
	Ground system infrastructure	Automation for calculating an optimum departure sequence with presentation to ATCOs	ACDM-B0/1 ACDM-B0/2 SURF-B1/4			ANSP	
	Training	ATCO Departure Sequencing Training - ATCOs trained to use departure sequencing automation, supported by departure sequencing procedure	WAKE-B2/1 WAKE-B3/3 WAKE-B3/6 SURF-B0/2			ANSP	
	Regulatory provisions	Safety assessment of departure sequencing operation	APTA-B0/2 NOPS-B0/5			ANSP	

OPERATIONAL							
Element:	RSEQ-B0/3 - Point merge						
Main Purpose	To allow merging of arrival flows						
Description	This element represents a procedural concept that uses existing technology to merge arrival flows. Its purpose is to improve and harmonize arrival operations by enabling continuous descent operations (CDO) and increasing arrival predictability, thereby enhancing airport capacity and limiting the environmental impact of aircraft emissions. Point Merge is based on a specific route structure that is made of a point (the merge point) with pre-defined legs (the sequencing legs) equidistant from this point that are used for shortening or stretching the arrival path						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Local ATM procedure to merge traffic during arrivals	WAKE-B2/1 WAKE-B3/3	S	2	ANSP	N



	Training	ATCO Point Merge Arrival Traffic Merging Training - ATCOs trained to merge arrival traffic using point merge procedure	WAKE-B2/2 AMET-B0/1			ANSP	
	Training	Pilots briefed on airport's point merge procedure				Aircraft operator	
	Regulatory provisions	Safety assessment of point merge operation				ANSP	

SNET - Ground-based Safety Nets Block 0

OPERATIONAL							
Element:	SNET-B0/1 - Short Term Conflict Alert (STCA)						
Main Purpose	To assist the air traffic controller in preventing collision between aircraft, using position data from ground surveillance						
Description	<p>Surveillance data from ground radars and ADS-B stations is used to track aircraft. For each pair of aircraft which are sufficiently close, a short-term conflict alert is raised if at least one of the following tests is true:</p> <p>(Current proximity test) their current horizontal separation is lower than a horizontal threshold and their current vertical separation is lower than a vertical threshold; or</p> <p>(Linear prediction test) at any of their future positions within a given amount of time (warning time), as linearly extrapolated from their current track, their horizontal separation will be lower than a horizontal threshold and their vertical separation will be lower than a vertical threshold.</p> <p>The horizontal and vertical thresholds may be different in each test but are equal or lower than the ATC separation standards for the airspace covered by the STCA system. The warning time for the linear prediction may depend on the control unit specificities but is typically equal to or lower than 2 minutes.</p> <p>The above parameters may be configured differently in defined geographic areas of the control unit. Additionally, inhibitions of alerts may be set up for a list of aircraft and for defined geographic areas.</p> <p>On noticing the alert, the controller must analyse the situation and, if deemed necessary, issue an avoiding instruction to one or both aircraft, with the appropriate emergency phraseology</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures for air traffic controllers' reaction to short term conflict alerts. References: Doc 4444 - Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM)	ASUR-B0/1 ASUR-B0/2 ASUR-B0/3	E	1	ANSP	Y
	Airborne system capability	SSR mode S transponder with Ext. Squitter version 0, version 1 and version 2 ADS-B out compliant with ... References: Doc 100xx - Ground-based Safety Nets Manual http://www.eurocontrol.int/publications/e				Airspace user Aircraft manufacturer	



ICAO

AAO/SG5 Appendix 3

		urocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				
	Ground system infrastructure	SSR radar ADS-B in station References: Doc 100xx - Ground-based Safety Nets Manual Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				ANSP Ground systems supplier
	Ground system infrastructure	Capability to indicate alerts on the radar screen of the controller working positions. References: Doc 100xx - Ground-based Safety Nets Manual Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				ANSP Ground systems supplier
	Training	Air traffic controller knowledge and reaction to alerts. References: Indications in Doc 100xx - Ground-based Safety Nets Manual				ANSP



OPERATIONAL							
Element:	SNET-B0/2 - Minimum Safe Altitude Warning (MSAW)						
Main Purpose	To assist the air traffic controller in preventing controlled flight into terrain accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles						
Description	Surveillance data (including tracked pressure altitude), flight data (including cleared flight levels) and environment data (including terrain and obstacle data) are input to the MSAW system to generate the alerts to the controller working position. On noticing the alert, the controller has to analyse the situation and, if deemed necessary, issue an instruction to the aircraft, with the appropriate emergency phraseology						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures for air traffic controllers to react to minimum safe altitude warnings. Reference: Doc 4444 - Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM); Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii	ASUR-B0/1 SNET-B0/1 ASUR-B0/3	E	1	ANSP	Y
	Airborne system capability	SSR transponder compliant with ... ADS-B out compliant with ... Reference: Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				Airspace user Aircraft manufacturer	
	Ground system infrastructure	SSR radar ADS-B in station Reference: Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				ANSP Ground systems supplier	
	Ground system infrastructure	Capability to indicate alerts on the controller working position. Reference: Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				ANSP Ground systems supplier	



		urocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				
	Training	Air traffic controller knowledge and reaction to alerts. Reference: Doc 100xx - Ground-based Safety Nets Manual				ANSP

OPERATIONAL							
Element:	SNET-B0/3 -Area Proximity Warning (APW)						
Main Purpose	APW is designed, configured and used to make a significant positive contribution to the prevention of accidents arising from unauthorized penetration of an airspace volume						
Description	Surveillance data (including tracked pressure altitude), flight data (including cleared flight levels and RVSM status) and environment data (including airspace volumes) are input to the APW system to generate the alerts to the controller working position(s). On noticing the alert, the controller must analyse the situation and, if deemed necessary, issue an instruction to the aircraft, with the appropriate emergency phraseology						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures for air traffic controllers to react to area proximity warnings. Reference: Future amendment of Doc 4444 - Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM); Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii	ASUR-B0/1	E	1	ANSP	Y
	Airborne system capability	SSR transponder compliant with ... ADS-B out compliant with ... Reference: Doc 100xx - Ground-based Safety Nets Manual - http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	SSR radar ADS-B in station Reference: Doc 100xx - Ground-based Safety Nets Manual - http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				ANSP Ground systems supplier	
	Ground system infrastructure	Capability to indicate alerts on the controller working position. Reference: Doc				ANSP Ground systems supplier	



		100xx - Ground-based Safety Nets Manual - http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii					
	Training	Air traffic controller knowledge and reaction to alerts. Reference: Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				ANSP	

OPERATIONAL							
Element:	SNET-B0/4 - Approach Path Monitoring (APM)						
Main Purpose	APM is a ground-based safety net intended to warn the controller about increased risk of controlled flight into terrain accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles during final approach						
Description	Surveillance data (including tracked pressure altitude), flight data (including concerned sectors) and environment data (including terrain and obstacle data) are input to the APM system to generate the alerts to the controller working position(s). On noticing the alert, the controller has to analyse the situation and, if deemed necessary, issue an instruction to the aircraft, with the appropriate emergency phraseology						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures for air traffic controllers to react to approach path monitoring alerts. Reference: Future amendment of Doc 4444 - Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM); Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii	ASUR-B0/1	E	1	ANSP	Y
	Airborne system capability	SSR transponder compliant with ... ADS-B out compliant with ... Reference: Doc 100xx - Ground-based Safety Nets Manual - http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				Aircraft manufacturer Aircraft operator	



ICAO

AAO/SG5 Appendix 3

	Ground system infrastructure	SSR radar ADS-B in station Reference: Doc 100xx - Ground-based Safety Nets Manual - http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				ANSP Ground systems supplier	
	Ground system infrastructure	Capability to indicate alerts on the controller working position. Reference: Doc 100xx - Ground-based Safety Nets Manual - http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-ii				Aircraft manufacturer Aircraft operator	
	Training	Air traffic controller knowledge and reaction to alerts. Reference: Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				ANSP	

SURF - Surface operations Block 0

OPERATIONAL							
Element:	SURF-B0/1 - Basic ATCO tools to manage traffic during ground operations						
Main Purpose	To improve safety and efficiency during ground operations by providing proper indications to pilots and vehicle drivers						
Description	This element represents the provision of guidance and routing information to the pilot in order to manage the traffic in a safe and efficient way by the controller: <ul style="list-style-type: none"> to confirm the routing of all aircraft and vehicles according to the defined identification procedures; to prevent incursions on the runway using visual aids, stop bars in particular. The Controller monitors and commands the lighting systems						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	N/A	N/A	N/A	E	1	ANSP Aircraft operator	N



OPERATIONAL							
Element:	SURF-B0/2 - Comprehensive situational awareness of surface operations						
Main Purpose	To better maintain ATCO awareness of ground operations						
Description	<p>This service represents the provision of surveillance information to the controller in order to manage the traffic in a more efficient way and allows the controller:</p> <ul style="list-style-type: none"> to confirm the identity of all participating vehicles according to the defined identification procedures; to prevent collisions between all aircraft and vehicles especially in conditions when visual contact cannot be maintained; to manually correlate (link a target with a call sign) targets for the rare cases where there is an operational need to, e.g., areas of poor cooperative surveillance coverage and the need to track non-cooperative targets such as towed aircraft; to detect and indicate the position of potential intruders 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	N/A	N/A	ASUR-B0/1 ASUR-B0/2 ASUR-B0/3	S	1	ANSP Aircraft operator	N



OPERATIONAL							
Element:	SURF-B0/3 - Initial ATCO alerting service for surface operations						
Main Purpose	Detection by the ATCO of potentially unsafe situations regarding runway operations						
Description	<p>This element represents the first step of A-SMGCS alerting service and is based on A-SMGCS surveillance. It considers elements such as:</p> <ul style="list-style-type: none"> the runway configuration of the airport (e.g., one, two or more runways); the associated procedures (e.g., multiple line ups and reduced separation on the runway when approved by the ATS authorities); the position and type of the aircraft and vehicles (e.g., arrival, departure or vehicle) according to the set time parameters and their relative speeds and positions when within or about to enter a predefined area around the runway; aircraft in the vicinity of the runway (e.g., on final approach, climb out and helicopters crossing); meteorological conditions 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	N/A	N/A	ASUR-B0/1 ASUR-B0/2 ASUR-B0/3 SURF-B0/1	S	1	ANSP Aircraft operator	Y

TBO - Trajectory-based operations Block 0

OPERATIONAL							
Element:	TBO-B0/1 - Introduction of time-based management within a flow centric approach						
Main Purpose	Provides for more efficient flight operation by using time-based scheduling versus more tactical measures such as holding to manage tactical synchronization						
Description	Individual time-based initiatives are available in decision making processes related to network operations or flight sequencing. The individual time-based initiatives are not synchronized, and any synchronization of individual time advisories is left to the tactical ATCO. The focus is on the traffic flow activity without consideration to individual flights or gate-to gate focus						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	N/A	N/A	N/A	E	1	ANSP Aircraft operator	N



OPERATIONAL							
Element:							
Main Purpose							
Description							
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
g							Y

BLOCK 1

Airborne Collision Avoidance System (ACAS) Block 1

OPERATIONAL							
Element: ACAS-B1/1 - ACAS Improvements							
Main Purpose To provide airborne collision avoidance as a last resort safety net for pilots							
Description TCAS systems selectively interrogate nearby aircraft to determine their position and velocity (using Mode C/S replies); this information is passed through “threat logic” to determine proximate traffic, issue traffic alerts, and issue collision avoidance “resolution advisories” to flight crews. Resolution advisories provide flight crews with vertical guidance (climb, descend, remain level, do not descend/climb) as appropriate to avoid collisions. Modern “hybrid surveillance” TCAS systems use ADS-B information to reduce the interrogations needed to perform some of these functions – however, resolution advisories are only issued based on interrogation/reply information (ADS-B data is not used)							
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Regulatory provisions	SARPs for TCAS version 7.1, which provides short-term improvements to previous airborne collision avoidance systems (ACAS). Reference: ICAO Annex 6, ICAO Annex 10 Volume IV technical requirements (amendment 85 to Annex 10, Volume IV)	ASUR-B0/1			CAA Aircraft manufacturer	Y



ICAO

AAO/SG5 Appendix 3

	Operational procedures	Procedures for the operation of ACAS including phraseology. References: ICAO Doc 4444 (PANS-ATM), ICAO Doc 8168 (PANS-OPS), ICAO Doc 9863 Airborne Collision Avoidance System (ACAS) Manual				ANSP Aircraft operator	
	Airborne system capability	TCAS II version 7.1 avionics. References: EUROCAE ED-143 or RTCA DO-185B				Aircraft manufacturer	
	Regulatory provisions	Responsibility of State of the operator. References: ICAO Annex 6 Part I				CAA	
	Airborne system capability	Avionics standards for Extended Hybrid Surveillance. References: EUROCAE ED-221A or RTCA DO-300A, Change 1				Aircraft manufacturer	
	Training	Pilot training for TCAS version 7.1, which provides information on new TCAS RA alert wording				Aircraft operator	

APTA - Improve arrival and departure operations Block 1

OPERATIONAL							
Element:	APTA-B1/1- PBN Approaches (with advanced capabilities)						
Main Purpose	PBN approaches with advanced functionality allow for the introduction of more flexible approaches including the use of RF legs within the Final Approach Segment (FAS) and RNP						
Description	This element represents the use advanced features of PBN in design of approach procedures to provide more access to airports in challenging environments, where conventional procedures are unsuitable. Advanced RNP is the navigation specification which encompasses all elements of PBN (but excluding RNP AR APCH). It requires an FMS based on a TSO-C. With A-RNP Ops approval, an operator can conduct any PBN operation except RNP AR APCH. RNP AR APCH requires a Specific Approval						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	These instrument flight procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) and Doc 9905 (Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual)	APTA-B0/1 AMET-B0/1 AMET-B0/2	E	1	ANSP	N
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. Ref:				ANSP CAA	



ICAO

AAO/SG5 Appendix 3

		ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				
	Operational procedures	Procedures for the crew to follow to fly a PBN approach. Defined in the Ops Manual Reference: Doc 9613 (PBN Manual)				Aircraft operator
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Defined in the Ops Manual Reference: Doc 9613 (PBN Manual)				Aircraft operator
	Airborne system capability	Aircraft eligible for RNP AR APCH Navigation specification, Advanced-RNP navigation specification as required. Defined in Doc 9613 (PBN Manual) and listed in the Aircraft Flight Manual				Aircraft manufacturer Aircraft operator
	Operational Authorization	Operations based on RNP AR APCH require a specific approval. Advanced-RNP requires an operational authorization Reference: Doc 9997 (PBN Ops Approval Manual)				CAA Aircraft operator
	Training	Training for ATCOs, procedure designers, airspace planners and crew to fly PBN Approaches (with advanced capabilities). References: Doc 9613 (PBN Manual). Additional training on the use of advanced capabilities in procedure design: PANS-OPS Vol II Doc 9905 (Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual) Doc 9992 (Manual on the Use of Performance-Based Navigation (PBN) in Airspace Design) Doc 9906 (Vol 2)				ANSP Aircraft operator



OPERATIONAL							
Element:	APTA-B1/2 - PBN SID and STAR procedures (with advanced capabilities)						
Main Purpose	Advanced PBN functionality further supports flexibility of route placements in airspace design.						
Description	<p>This element represents the use advanced features of PBN in design of arrival procedures to provide more flexibility in airspace design, leading to greater efficiency in the terminal area and increased capacity.</p> <p>Advanced RNP is the navigation specification which encompasses all elements of PBN (but excluding RNP AR APCH). It requires an FMS based on a TSO-C115d.</p> <p>With A-RNP Ops approval, an operator can conduct any PBN operation except RNP AR APCH. RNP AR APCH requires a separate Ops approval</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) or equivalent	APTA-B0/2 AMET-B0/1 AMET-B0/2	S	1	ANSP	Y
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. References: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				ANSP CAA	
	Operational procedures	Procedures for the crew to follow to fly a PBN SID/STAR. Reference: Defined in the Ops Manual Reference: Doc 9613 (PBN Manual)				Aircraft operator	
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Defined in the Ops Manual Reference: Doc 9613 (PBN Manual)				Aircraft operator	
	Airborne system capability	Aircraft eligible for applicable Navigation specification as defined in Doc 9613 (PBN Manual) and listed in the Aircraft Flight Manual				Aircraft manufacturer Aircraft operator	
	Operational Authorization	Aircraft operator flying a PBN SID/STAR should have an operational authorization related to the specified performance of the				CAA Aircraft operator	



		procedure, as described in Doc 9997 (PBN Ops Approval Manual)					
	Ground system infrastructure	Depending on the navigation specification used, suitable ground based navigational aids will be required. See Doc 9613 (PBN Manual) for details				ANSP	
	Training	Crew trained to fly PBN SID/STAR (with basic capabilities). References: As defined in Doc 9613 (PBN Manual). PBN SID/STAR (with basic capabilities) training for Air traffic controllers. References: As defined in Doc 9613 (PBN Manual). PBN SID/STAR (with basic capabilities) training for procedure designers, airspace planners. Ref Doc 8168 (PANS OPS Vol II); Doc 9992 (PBN airspace design Manual); Doc 9906 (Vol 2)				ANSP Aircraft operator	

OPERATIONAL							
Element:	APTA-B1/4 - CDO (Advanced)						
Main Purpose	Increase the ability CDO operations to contribute to terminal airspace efficiency						
Description	<p>This element builds on the basic CDO capabilities and adds advanced vertical path management. This gives the ability to more precisely define the path flown by arriving aircraft, which allows for more flexible and efficient use of airspace. Compromise between aircraft optimal performance and airspace optimal efficiency can be achieved.</p> <p>PBN with vertical navigation (VNAV) which is an altimetry-based capability is used and allows an equipped aircraft to precisely descend on a vertical path, as computed by avionics equipment, while providing the flight crew with navigation performance information through avionics. To this end, vertical windows in procedure design enable CDOs, particularly where SID/STARs cross each other.</p> <p>Initially the benefits will be realised for airspace outside of the TMA, and for less congested environments</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS Vol II and I) or equivalent, with reference to Doc 9931 (CDO Manual)	APTA-B0/4 APTA-B0/2 RSEQ-B0/3 AMET-B0/1 AMET-B0/2	S	1	ANSP Aircraft operator	N
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. Ref: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems)				ANSP CAA	



		Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				
	Operational procedures	Procedures for the crew to follow to facilitate the flying of a CDO. OPS Manual defines SOPs				Aircraft operator
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Reference: Ops Manual defines SOPs				Aircraft operator
	Airborne system capability	Eligibility for the applicable PBN navigation specification with vertical navigation (VNAV) capability Reference: Doc 9613 (PBN Manual)				Aircraft manufacturer Aircraft operator
	Ground system infrastructure	Depending on the navigation specification used, suitable ground based navigational aids will be required. Reference Doc 9613 (PBN Manual)				ANSP
	Training	Crew trained to fly CDOs (advanced) CDO (advanced) training for Air traffic controllers CDO (advanced) training for procedure designers. References: Doc 9906 (Vol 2) Doc 8168 (PANS OPS Vol II)				ANSP Aircraft operator

OPERATIONAL							
Element:	APTA-B1/5 - CCO (Advanced)						
Main Purpose	Increase the ability CCO operations to contribute to terminal airspace efficiency						
Description	<p>This element builds on the basic CCO capabilities and adds advanced vertical path management. This gives the ability to more precisely define the path flown by departing aircraft, which allows for more flexible and efficient use of airspace. Compromise between aircraft optimal performance and airspace optimal efficiency can be achieved.</p> <p>PBN with vertical navigation (VNAV) which is an altimetry-based capability is used and allows an equipped aircraft to precisely ascend on a vertical path, as computed by avionics equipment, while providing the flight crew with navigation performance information through avionics. To this end, vertical windows in procedure design enable CCOs, particularly where SID/STARs cross each other.</p> <p>Initially the benefits will be realised for airspace outside of the TMA, and for less congested environments</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	These procedures should be designed and used as specified in Doc 8168 (PANS-OPS	APTA-B0/5 APTA-B0/2	S	1	ANSP Aircraft operator	N



ICAO

AAO/SG5 Appendix 3

		Vol II and I) or equivalent, with reference to Doc 9993 (CCO Manual)	AMET-B0/1 AMET-B0/2			
	Operational procedures	A flight inspection and/or validation of the procedures might be required before publication. The publication of the procedures should follow Annex 4. Ref: ICAO Doc 8071 (Volume I — Testing of Ground-based Radio Navigation Systems) Doc 9906 (Quality Assurance Manual for Flight Procedure Design). Doc 9906 Vol 6 (Quality Assurance Manual for Flight Procedure Design)				ANSP CAA
	Operational procedures	Procedures for the crew to follow to facilitate the flying of a CCO. OPS Manual defines SOPs				Aircraft operator
	Operational procedures	Procedures for the crew to follow in case of abnormal events. Reference: Ops Manual defines SOPs				Aircraft operator
	Airborne system capability	Eligibility for the applicable PBN navigation specification with vertical navigation (VNAV) capability Reference: Doc 9613 (PBN Manual)				Aircraft manufacturer Aircraft operator
	Ground system infrastructure	Depending on the navigation specification used, suitable ground based navigational aids will be required. See Doc 9613 (PBN Manual) for details				ANSP
	Training	Crew trained to fly CCOs (advanced). Training to support the CCO concept. ATC trained to provides CCOs (advanced). Training to support the CCO concept. CCO (advanced) training for procedure designers. Reference: Doc 9906 (Vol 2)				ANSP Aircraft operator

CSEP - Cooperative Separation Block 1

OPERATIONAL							
Element:	CSEP B1/1 - Basic airborne situational awareness during flight operations (AIRB)						
Main Purpose	To improve traffic situational awareness in all phases of flight						
Description	The use of cockpit displays to provide the flight crew with a graphical depiction of traffic using relative range and bearing, supplemented by altitude, flight ID and other information. This element represents the use of the cockpit display traffic information (CDTI) with appropriate ADS-B data filtered for traffic situational awareness. The CDTI is capable of merging data with TCAS. It is recommended to use the display where ACAS information is already provided (if ACAS-equipped)						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Regulatory provisions	References: ICAO Annex 10 Volume IV basic technical requirements ICAO Doc 9994 ADS-B IN equipment/function compliant with DO-317B/ED194A (2015)	ASUR-B0/1 ACAS-B1/1	E	1	CAA Aircraft manufacturer Aircraft operator	Y
	Operational procedures	References: PANS-OPS (Doc 8168) operation of ADS-B IN traffic display (2016) Standard Operating Procedures				Aircraft operator	
	Airborne system capability	ADS-B IN equipment/function compliant with DO-317B/ED194A (2015)				Airspace user Aircraft manufacturer	
	Airborne system capability	Cockpit Display of Traffic Information (CDTI). The CDTI may be shared with ACAS information traffic display, but we should not assume this capability is only for ACAS-equipped aircraft. References				Aircraft manufacturer Aircraft operator	
	Training	The appropriate use of the traffic display could be evaluated during recurrent training on ACAS. The equipage of AIRB capability is unknown to ATC. The use of AIRB must remain transparent to ATC. References:				Aircraft operator	

OPERATIONAL							
Element:	CSEP B1/2 - Visual Separation on Approach (VSA)						
Main Purpose	To assist pilots in maintaining own separation during successive visual approach procedures. VSA is defined to support aircraft performing successive visual approach and landing operations						
Description	This element is used to support existing procedures, i.e., the pilot can use the traffic display to support his visual scan of the preceding aircraft during the approach procedure if the preceding aircraft is transmitting ADS-B OUT surveillance data						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Regulatory provisions	References: ICAO Annex 10 Volume IV basic technical requirements ICAO Doc 9994 ADS-B IN equipment/function compliant with DO-317B/ED194A (2015)	ASUR-B0/1 ACAS-B1/1	D	1	CAA Aircraft manufacturer Aircraft operator	Y
	Airborne system capability	ADS-B IN equipment/function compliant with DO-317B/ED194A (2015)				Airspace user Aircraft manufacturer	
	Airborne system capability	Cockpit Display of Traffic Information (CDTI). The CDTI may be shared with ACAS information traffic display, but we should not assume this capability is only for ACAS-equipped aircraft. References:				Aircraft manufacturer Aircraft operator	
	Training	Training should be developed and given for the system functions, indications and interactions for each application/capability. The equipage of ADS-B IN is unknown to ATC. The use of ADS-B IN must remain transparent to ATC				Aircraft operator	
	Operational procedures	References: ICAO Doc 8168 - PANS-OPS; operation of ADS-B IN traffic display (2016)				Aircraft operator	
	Airborne system capability	ADS-B OUT capability required for the reference aircraft				Aircraft operator	



OPERATIONAL							
Element:	CSEP B1/3 - Performance Based Longitudinal Separation Minima						
Main Purpose	Reduced separation allowing more flights to operate in their optimum flight levels						
Description	50 NM, 30 NM and 5 minutes longitudinal separation have been made conditional on Required Communication Performance 240 (RCP 240) and Required Surveillance Performance 180 (RSP 180). Application of the separation may also require an RNP approval						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Regulatory provisions	PBN, PBCS (when required)	COMI-B0/3 COMI-B0/4 COMS-B0/1 COMS-B1/1 COMS-B0/2 COMS-B1/2 NAVS-B0/3	S	1	CAA	N
	Operational procedures	Design and use of operational procedures shall be designed and used for the application of reduced longitudinal separation minima Reference: ICAO PBN, PBCS and GOLD manual				ANSP	
	Ground system infrastructure	To support RSP 180				ANSP	
	Ground system infrastructure	To support RNP 2, 4 or 10				ANSP	
	Ground system infrastructure	To support RCP 240				ANSP	
	Training	ATCO Training and Flight Crew Training Train for PBN Reduced Longitudinal Separation Minima Provide training to staff prior to implementation				ANSP Aircraft operator	
	Airborne system capability	Aircraft and crew approvals for appropriate RNP specifications Reference: Aircraft and crew approvals for RCP 240 and ADS-C/CPDLC				Aircraft manufacturer Aircraft operator	
	Airborne system capability	Aircraft and crew approvals for appropriate RNP specifications				Aircraft manufacturer Aircraft operator	
	Airborne system capability	Aircraft and crew approvals for appropriate RNP specifications Reference: Aircraft and crew approvals for RSP 180				Aircraft manufacturer Aircraft operator	



OPERATIONAL							
Element:	CSEP B1/4 - Performance Based Lateral Separation Minima						
Main Purpose	To increase airspace capacity and allow optimum utilization of available airspace						
Description	This element describes the application of lateral separation of 23 NM between any combination of RNP 4 and RNP 2 approved aircraft operating on parallel or non-intersecting tracks						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
	Regulatory provisions	Approval of PBN, PBCS	COMI-B0/3 COMI-B0/4 COMS-B0/1 COMS-B1/1 COMS-B0/2 COMS-B1/2 NAVS-B0/3	S	1	CAA	N
	Operational procedures	Design and use of operational procedures for the application of reduced lateral separation minima Reference: ICAO PBN, PBCS and GOLD manual				ANSP	
	Training	ATCO training ATCO and Flight Crew training Performance Based Lateral Separation Minima Provide training to staff prior to implementation				ANSP Aircraft operator	
	Airborne system capability	Aircraft and crew approvals for RCP 240				Aircraft manufacturer Aircraft operator	
	Airborne system capability	Aircraft and crew approvals for appropriate RNP specifications				Aircraft manufacturer Aircraft operator	
	Airborne system capability	Aircraft and crew approvals for RSP 180				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	To support the specified RCP				ANSP	
	Ground system infrastructure	To support the specified RNP				ANSP	
	Ground system infrastructure	To support the specified RSP				ANSP	

DATS - Digital Aerodrome Air Traffic Services Block 1

OPERATIONAL							
Element:	RATS B1/1 -						
Main Purpose	To provide ATS at aerodromes not from a traditional on-site tower, but remotely from either a local or a distant location. The service provided may be a control service or flight information service as appropriate						
Description	This element represents the provision of Aerodrome Control or Aerodrome Flight Information Services (AFIS) at aerodromes from other than an on-site facility. This could be achieved by utilizing either video surveillance, digital surveillance, procedural processes, or a combination thereof, which is commensurate with the complexities and traffic demands at the aerodrome. A Remote Tower Centre (RTC) will be remotely connected to one or more aerodromes and consist of one or more Controller Working Positions (CWP), dependent on the requirements of the connected aerodrome(s)						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Regulatory provisions	Depending on existing state regulations, new provisions on remotely operated ATS may be required, based on ICAO Annex 10, 11 and/or PANS-ATM	ASUR-B0/1 ASUR-B0/2 ASUR-B0/3 SURF-B0/1 AMET-B1/1 AMET-B1/2 AMET-B1/4	D	1	CAA	N
	Operational procedures	Procedures may be required for the operation depending on the capabilities of the implementation				ANSP	
	Operational procedures	Contingency procedures in case of full or partial failure of the RTC based on ICAO PANS-ATM				ANSP	
	Training	ATCO Training in the RTC operational standards, limitations and procedures. ATSEP training on the RTC Equipment and Datalink Systems				ANSP	
	Ground system infrastructure	At the remote facility: Visual reproduction of the out-of-the window view on data/monitor screens, projectors or similar technical solutions or Procedural Systems. References:				ANSP	
	Ground system infrastructure	At the aerodrome where ATS are provided: visual surveillance cameras, surface movement radar, surveillance radar, multilateration or other positioning and surveillance implementations as required				ANSP	



ICAO

AAO/SG5 Appendix 3

	Ground system infrastructure	Suitable communication and data transfer capabilities between the airports and the RTC including suitable redundancies for technical infrastructure at the aerodrome, remote facility and data links				ANSP	
	Regulatory provisions	Operational Approval required for Remote Tower Facility and associated equipment and system components linking the RTC to the aerodrome				ANSP	
	Regulatory provisions	ATS Unit Certification to include level of service to be provided by the RTC				ANSP	



FRTO - Improved operations through enhanced en-route trajectories Block 1

OPERATIONAL	
Element:	FRTO-B1/1 - Free Route Airspace (FRA)
Main Purpose	The Free Route Airspace (FRA) concept brings significant flight efficiency benefits and a choice of user preferred routes to airspace users. As a step to full trajectory-based operations, the FRA concept brings increased flight predictability, reduced uncertainty for the ATM network function, which in turn can lead to potential capacity increases for ATM, which will also benefit the user
Description	<p>FRA implementation can be customized for instance:</p> <ul style="list-style-type: none"> • laterally and vertically; • during specific periods; • with a set of entry/exit conditions; • with initial system upgrades. • The extension of FRA within and across the FIR boundaries also requires upgrades of the ATM network function system and the ANSPs ground system for airspace management and flight data processing. <p>The following procedures and process might need to be considered:</p> <ul style="list-style-type: none"> • FRA airspace volume (lateral and vertical) and applicable time (not necessary H24 7/7); • FRA entry and exit points, arrival transition point and departure transition point, and intermediate points; • adapt airspace design and ensure FRA horizontal and vertical connectivity; • ATFM FRA procedures; • adapt the LoA with adjacent -and military- ATS units; • publish relevant data for FRA in AIP; • charts for FRA operations; • airspace management procedure for the implementation of free routes operation; • ATC procedures to cover free route co-ordination and transfer of control, trajectory change in a free route environment, conflict detection. <p>The upgrades of ATM systems for flight data processing and controller working position, if required, are related to:</p> <ul style="list-style-type: none"> • ATC clearances beyond AoR; • differentiation between different traffic type airspaces; • calculation of 4D trajectory with Aol; • editing function for 4D trajectories; • coordination point management for FRA; • coordination with military agencies; • enhance conflict management and controller HMI functions to support conflict detection and resolution



AAO/SG5 Appendix 3

Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Design and use of operational procedures. Reference: EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 1: European Airspace Design Methodology - Guidelines - Edition December 2018 https://www.eurocontrol.int/publications/european-route-network-improvement-plan-ernip-part-1-european-airspace-design	NOPS-B1/5 FRTO-B1/4 FRTO-B1/3 FICE-B0/1 FRTO-B1/5 DAIM-B2/2 FRTO-B0/1	E	1	ANSP ATM network function	Y
	Ground system infrastructure	AATM system upgrades for MTCD and MONA functions. ATC systems to be upgraded to ensure conformance monitoring of flights and conflict detection for ATC planning purposes Reference: EUROCONTROL Monitoring Aids (MONA) specification 3 March 2017. This document provides system requirements for Monitoring Aids (MONA). https://www.eurocontrol.int/standards?page=3 Reference: EUROCONTROL Medium-Term Conflict Detection (MTCD) specification 3 March 2017. This document provides system requirements for Medium-Term Conflict Detection (MTCD). https://www.eurocontrol.int/standards?page=4 EUROCONTROL Trajectory Prediction Specification Edition 2.0 March 2017 https://www.eurocontrol.int/publications/trajectory-prediction-specification				ANSP	
	Ground system infrastructure	AO-CFSPS systems to be upgraded to enable flight planning of FRA operations. Reference: EUROCONTROL NM Flight Planning Requirements document December 2018 https://www.eurocontrol.int/publications/				Aircraft operator	



		nm-flight-planning-requirements-guidelines				
	Training	ATCO Training: FRA Training Provide training to staff prior to implementation Reference: EUROCONTROL European Free Route Airspace Developments 2016 https://www.eurocontrol.int/sites/default/files/publication/files/free-route-airspace-brochure-20161216.pdf AO and ATM Network Function Training: FRA Training Provide training to staff prior to implementation Reference: EUROCONTROL European Free Route Airspace Developments 2016 https://www.eurocontrol.int/sites/default/files/publication/files/free-route-airspace-brochure-20161216.pdf				ANSP ATM network function Aircraft operator
	Ground system infrastructure	Upgrade ATFM/flight planning systems to support FRA				ATM network function

OPERATIONAL							
Element:	FRTO-B1/2 - Required Navigation Performance (RNP) routes						
Main Purpose	RNP routes should be deployed within en-route airspace where Free Route Airspace (FRA) is not planned or if FRA is deployed the RNP routes should ensure the connectivity between FRA and TMAs. The objective is to provide consistent navigation using the most appropriate PBN type, infrastructure and navigation applications						
Description	With the introduction of a RNP navigation specification, the advantages gained from RNAV will be further enhanced by on-board performance monitoring and alerting and the execution of more predictable aircraft behaviour. Design of optimized routes which may include closely spaced parallel routes, Fixed Radius Transition (FRT) and Tactical Parallel Offset (TPO) functionality in en-route, supported by infrastructure and system improvements to support PBN routes. The adequate navigation infrastructure is required. GNSS or DME ground infrastructure needs to be optimised to support RNP operations and main reversionary capability in case of GNSS outages. PBN requires a full digital chain, to critical data quality levels, for aeronautical data provided to the airborne systems. The system improvements for controller support tools which might be required are covered by other FRTO elements (MTCD, monitoring aids) or other threads (Safety Nets)						
Maturity level	Enablers: Infrastructure/Systems/Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Regulatory provisions	Provide appropriate terrestrial navigation infrastructure to support RNP operations -		E	1	CAA ICAO	Y



		ground based stations Reference: ICAO Docs, 9613 (Ed 5 – when it is released), Airspace Design – 9992, Operation Approval – 9997. Annexes 6, 11 and 15 (for the data) and the PANS, 4444, 8168 and the new PANS AIM				
	Operational procedures	Design and use of operational procedures Reference: EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 1: European Airspace Design Methodology - Guidelines - Edition December 2018 https://www.eurocontrol.int/publications/european-route-network-improvement-plan-ernip-part-1-european-airspace-design European Airspace Concept Handbook for PBN Implementation Edition 3.0 2013 https://www.eurocontrol.int/sites/default/files/publication/files/handbook-pbn-implement-2013-ed-3a.pdf				ANSP
	Airborne system capability	Equip aircraft eligible for RNP operations as defined in ICAO DOC 9613				Aircraft manufacturer Aircraft operator
	Ground system infrastructure	Upgrade HMI to provide presentation of PBN equipage to ATC				ANSP
	Training	Flight Crew Training: Train flight crews in RNP Provide training to staff prior to implementation ATCO Training: Train ATCOs in RNP Provide training to staff prior to implementation				ANSP Aircraft operator

OPERATIONAL							
Element:	FRTO-B1/3 - Advanced Flexible Use of Airspace (FUA) and management of real time airspace data						
Main Purpose	FUA and airspace management (ASM) need to be enhanced with collaborative airspace data sharing between all ATM actors, negotiation procedures, system support and real time ASM data integration						
Description	<p>Automated ASM systems to ensure uninterrupted data flow between ATM Network functions and the neighbouring ASM systems from the pre-tactical planning to the real time airspace status.</p> <p>ASM is enhanced by automated data exchange services during the pre-tactical and tactical execution phases continuously in real time. ASM information is shared between ASM systems and ATS units/systems and communicated to the ATM network function in the tactical and execution phases. These data, consisting of pre-notification of activation, notification of activation, de-activation, modification and release are collected, saved and processed. Furthermore, these data need to be exchanged between ASM stakeholders and made available to other actors and relevant airspace users not involved in ASM processed</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Regulatory provisions	Follow regulations for regulatory approval Reference: ICAO Circular 330 Civil/Military Coordination European Union Regulation (EC) No 2150/2005 of 23 December 2005 laying down common rules for the flexible use of airspace. https://www.eurocontrol.int/articles/flexible-use-airspace-fua-mandate	FRTO-B0/2 FRTO-B1/1 NOPS-B1/5	E	1	CAA ICAO	Y
	Operational procedures	Design and use of operational procedures. Reference: EUROCONTROL Centralised Advanced Flexible Use of Airspace Support Service Concept of Operations (CONOPS) Edition 2.1 October 2014 EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 3: Airspace Management Handbook - Edition December 2018 https://www.eurocontrol.int/sites/default/files/publication/files/ernip-part-3-asm-handbook-edition-5-v5-5.pdf ICAO Guidance for Civil/Military Cooperation Reference: 10088 ICAO Doc Civil Military co-operation				ANSP ATM network function Aircraft operator	



AAO/SG5 Appendix 3

	Ground system infrastructure	Upgrade systems for partners to exchange real time data Reference: EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 3: Airspace Management Handbook - Annex 12 Edition December 2018 https://www.eurocontrol.int/sites/default/files/publication/files/ernip-part-3-asm-handbook-edition-5-v5-5.pdf				ANSP ATM network function	
	Ground system infrastructure	Upgrade systems to handle real time data in ATM systems and AU flight planning systems Reference: EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 3: Airspace Management Handbook - Annex 12 Edition December 2018 https://www.eurocontrol.int/sites/default/files/publication/files/ernip-part-3-asm-handbook-edition-5-v5-5.pdf EUROCONTROL Local And sub-Regional Airspace Management support system https://www.eurocontrol.int/services/local-and-sub-regional-airspace-management-support-system-lara				ANSP	
	Training	Training for the real time ASM data exchanges Provide training to staff prior to implementation				ANSP ATM network function Aircraft operator	
	Ground system infrastructure	Upgrade systems to handle real time data in AU flight planning systems Reference: EUROCONTROL European Route Network Improvement Plan (ERNIP) - Part 3: Airspace Management Handbook - Annex 12 Edition December 2018 https://www.eurocontrol.int/sites/default/files/publication/files/ernip-part-3-asm-handbook-edition-5-v5-5.pdf				Aircraft operator	



OPERATIONAL							
Element:	FRTO-B1/4 - Dynamic sectorization						
Main Purpose	Dynamically adapt ATC sectorization to respond to traffic demand without increasing the number of controllers working position in use						
Description	The sectorization tool enables the dynamic management of many possible sector configurations. Based on the volume of pre-defined ATC sector configurations, the automated system continuously evaluates traffic demand and complexity in the future and proposes optimum sectorization solutions. This tool supports real-time shaping of the airspace volumes allocated to the physical controller working position by adding/removing elementary sectors in order to respond to the predicted traffic demand and complexity						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Design and use of operational procedures		0	2	ANSP	N
	Ground system infrastructure	ATC system Upgrade relevant to dynamic handling of airspace volumes				ANSP	
	Training	ATCO/Operational Supervisor Training for Dynamic Sectorization Provide training to staff prior to implementation				ANSP	



OPERATIONAL							
Element:	FRTO-B1/5 - Enhanced Conflict Detection Tools and Conformance Monitoring						
Main Purpose	Enhancements of basic mid-term conflict detection (MTCD)/ monitoring alert (MONA) functions and thus further improving the ATCO productivity and reducing the workload						
Description	<p>CDT provides real-time assistance to the en-route controllers (both planning and tactical) in conflict detection and resolution. It is based on new approaches that enhance and refine the existing tools yielding more efficient and usable services.</p> <p>MTCD aids the planning ATCO by showing only the most probable conflicts within the predefined look-ahead time, discarding detected conflicts with lower probabilities. The MTCD includes the what if probe function showing the problems that would occur if the given clearances were applied and identify the contextual traffic that may impair the manual identified conflict resolution.</p> <p>The tactical tool is based on the tactical trajectories and identifies the conflicts within the sectors, including the what-if capabilities.</p> <p>MONA provides the en-route controller with warnings if aircraft deviate from the calculated ground system trajectory or the ATCOs tactical clearances (e.g., heading, vertical rate)</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Design and use of operational procedures	FRTO-B0/4 FRTO-B1/1 FRTO-B1/6	E	1	ANSP	Y
	Ground system infrastructure	Upgrade ATC systems to provide enhanced monitoring capabilities as well as detection of planned/tactical conflicts Reference: EUROCONTROL Monitoring Aids (MONA) specification 3 March 2017. This document provides system requirements for Monitoring Aids (MONA). https://www.eurocontrol.int/standards?page= Reference: EUROCONTROL Medium-Term Conflict Detection (MTCD) specification 3 March 2017.This document provides system requirements for Medium-Term Conflict Detection (MTCD). https://www.eurocontrol.int/standards?page=4 EUROCONTROL Trajectory Prediction Specification Edition 2.0 March 2017 https://www.eurocontrol.int/publications/trajectory-prediction-specification				ANSP	
	Training	ATCO Training for CDT and MONA Provide training to staff prior to implementation				ANSP	



OPERATIONAL							
Element:	FRTO-B1/6 - Multi-Sector Planning						
Main Purpose	<p>This element is applicable only to en-route sectors that are currently staffed by two ATCOs (planning and tactical). The multi-sector planning (MSP) function defines a new organization of controller team(s) and new operating procedures to enable the planning controller to provide support to several tactical controllers operating in different adjacent sectors.</p> <p>This function might reduce the ATCO workload related to intra/inter centre coordination. The workload conversion to potential capacity gains might vary considerably depending on the sector configurations</p>						
Description	<p>The ATM system functions are enhanced to allow a single planner role to be associated to multiple sector tactical roles and the planner and tactical roles to be combined on a controller work position. The multi-sector planner needs to have access to flight data, system tracks, trajectory, warnings and tools for the airspace of several ATC sectors allocated to him.</p> <p>The multi-sector planner needs to provide an extended planner functions within the sectors allocated to this role, including the coordination function</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Design and use of operational procedures	FRTO-B1/3 FRTO-B1/5	S	2	ANSP	N
	Ground system infrastructure	Upgrade ATC systems with the capabilities to support the planning controller taking the responsibility of more than one sector. The tactical responsibilities are distributed to several tactical controllers. Reference: EUROCONTROL Medium-Term Conflict Detection (MTCD) specification 3 March 2017. This document provides system requirements for Medium-Term Conflict Detection (MTCD). https://www.eurocontrol.int/standards?page=4 EUROCONTROL Trajectory Prediction Specification Edition 2.0 March 2017 https://www.eurocontrol.int/publications/trajectory-prediction-specification				ANSP	
	Training	ATCO Training Provide training to staff prior to implementation				ANSP	



OPERATIONAL							
Element:	FRTO-B1/7 - Trajectory Options Set (TOS)						
Main Purpose	To give airspace users greater flexibility and control over their trajectory with respect to airspace constraints						
Description	Trajectory Options Sets (TOS) are used when airspace users are participating in Collaborative Option Programs (CTOP). These work as follows: <ul style="list-style-type: none"> • ATFM creates an airspace boundary and establishes flow control on any air traffic that crosses that boundary. (This is a NOPS action). • Airspace Users based on the notice of the airspace constraint develop and submit in advance of the issuance of the program, a set of desired reroute options (called a Trajectory Options Set or TOS) that is the operator's preference for routing around the constraint. • CTOP uses the preferred options to automatically assign delays or reroutes to flights in order to dynamically manage the demand as conditions change 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Regulatory provisions	Guidance to customers how to manage flights in the constrained area Reference: FAA AC 90-115	FRTO-B1/3 FRTO-B1/5	S	2	CAA	N
	Operational procedures	Operational guidelines on CTOP usage				ANSP Aircraft operator	
	Ground system infrastructure	Tools and systems in place at ANSP to support CTOP operations Reference: https://cdm.fly.faa.gov/?page_id=983				ANSP	
	Ground system infrastructure	Tools and systems in place at AOs to support CTOP operations Reference: https://cdm.fly.faa.gov/?page_id=983				Aircraft operator	
	Training	ATM Training, Flight Dispatcher training. Training is provided on how to use CTOP system to increase flight operation efficiency				ANSP Aircraft operator	

GADS - Global Aeronautical Distress and Safety System (GADSS) Block 1

OPERATIONAL							
Element:	GADS B1/1 - Aircraft Tracking						
Main Purpose	To provide support to the ATSU Alerting Service in areas without ATS surveillance with an update rate of the aircraft position of at least once per 15 mins. The objective is to assist the relevant stakeholders in the timely identification and location of aircraft in distress, to reduce reliance on the procedural methods for determining aircraft position and helping to ensure the availability and sharing of aircraft position data						
Description	Aircraft tracking is one of the Global Aeronautical Distress and Safety System (GADSS) functions (ref, GADSS ConOPS V6). Aircraft tracking is a process, established by the operator, that maintains and updates, at standardised intervals, a ground-based record of the four-dimensional position of individual aircraft in flight. (ICAO Annex 6)						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Operator aircraft tracking policy, process and procedures. References: ICAO Annex 6 – Aircraft Tracking and ICAO Circular 347 - Aircraft Tracking Implementation Guidelines	GADS-B1/2 COMS-B0/2 ASUR-B0/1 ASUR-B1/1 COMI-B0/5 COMI-B1/3 COMS-B1/2	E	1	Aircraft operator	Y
	Airborne system capability	Airborne aircraft tracking capability. Note: copy table in the circular. Reference: ICAO Annex 6 – Aircraft Tracking and ICAO Circular 347 - Aircraft Tracking Implementation Guidelines				Aircraft operator	
	Ground system infrastructure	Airborne aircraft tracking capability. Note: copy table in the circular. Reference: ICAO Annex 6 – Aircraft Tracking and ICAO Circular 347 - Aircraft Tracking Implementation Guidelines				Aircraft operator	
	Ground system infrastructure	System with capability to process and monitor aircraft tracking data. Airborne aircraft tracking capability. Note: copy table in the circular. Reference: ICAO Annex 6 – Aircraft Tracking and ICAO Circular 347 - Aircraft Tracking Implementation Guidelines				Aircraft operator	
	Training	Aircraft Operator procedures for detecting missing position reports and notifying ATSU's				Aircraft operator	



ICAO

AAO/SG5 Appendix 3

OPERATIONAL							
Element:	GADS B1/2 - Contact directory service						
Main Purpose	To ensure that Point of Contact (PoC) information is available and can be accessed by Rescue Coordination Centres (RCCs), ATSU's and aircraft operators in support of emergency situations						
Description	Point of Contact repository is part of the Global Aeronautical Distress and Safety System (GADSS) and is used to enable timely contact between the persons relevant to an emergency involving an aircraft in a specified area						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
	Operational procedures	Procedures for maintaining PoC information and making PoC updates available. Procedures for using PoC repository. Reference: ICAO Annex 11 – Air Traffic Services; Annex 12 – Search and Rescue; ICAO Circular 347 - Aircraft Tracking Implementation Guidelines	N/A	E	1	ANSP Aircraft operator RCC	Y



NOPS - Network Operations Block 1

OPERATIONAL							
Element:	NOPS B1/1 - Short Term ATFM measures						
Main Purpose	Short Term ATFM Measures (STAM) intends to smooth sector workloads by reducing traffic peaks through short-term applications of minor ground delays, appropriate flight level capping, timing and modalities of ATC re-sectorisation. These measures can reduce the traffic complexity for ATC with minimum curtailing impact on the airspace users.						
Description	<p>The rigid application of ATFM measures based on standard capacity thresholds as the pre-dominant tactical capacity measure needs to be replaced by a close working relationship between ANSP, AU and ATM Network function, which monitors both the real demand and the effective capacity of sectors having considered the complexity of expected traffic situation.</p> <p>In order to close the gap between ATC and ATFM, new tools and local operational procedures need to be developed. The aim is to improve the efficiency of the system using flow management techniques close to the real time operations with direct impact on tactical capacity management and tactical action on traffic.</p> <p>The target of the Short Term ATFM Measures is to replace en-route measures for situations where the capacity is nominal. These measures can reduce the traffic complexity for ATC with minimum constraints for the airspace users. STAM tools and procedures are based on accurate short-term occupancy counts. The tactical capacity management procedures can be supported by the ATFM Tools (system based STAM with the hot-spot detections in the network view, the “what-if” function and capabilities of promulgation and implementation of STAM measures, including CDM). This will require the introduction of:</p> <ul style="list-style-type: none"> • Pre-tactical and Tactical Demand Capacity Balancing (DCB) evaluation tools; • DCB tool based on occupancy counts; • Enhanced monitoring techniques; • DCB Coordination tools; • DCB What-if function; • DCB Network impact assessment; • ATFM procedures to enable application of flow management closer to real time 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Develop the ATFM procedures to respond to change of demand/ capacity balance. References: ICAO Doc 9971 Manual on Collaborative ATFM	NOPS-B0/3	D	2	ANSP ATM network function Aircraft operator	N
	Operational procedures	Develop the ATFM procedures for demand/ capacity balance optimization. References: ICAO Doc 9971 Manual on Collaborative ATFM				ATM network function	
	Operational procedures	Develop the ATFM procedures to enable application of flow management techniques on traffic streams closer to real-				ANSP ATM network function Aircraft operator	



		time. References: ICAO Doc 9971 Manual on Collaborative ATFM				
	Ground system infrastructure	Strategic and pre-tactical demand-capacity balancing evaluation, simulation and display tools				ATM network function
	Ground system infrastructure	Upgrade the Capacity planning and scenario management with tools to identify the most beneficial routings and flows changes implemented within the Collaborative Decision-Making processes				ANSP ATM network function Aircraft operator
	Ground system infrastructure	Demand capacity balancing tool base on occupancy counts				ANSP ATM network function
	Ground system infrastructure	Integration of ANSPs sector configuration into ATFM Systems				ANSP ATM network function
	Ground system infrastructure	Enhanced STAM tool (Coordination, what-if, network impact assessment)				ATM network function
	Ground system infrastructure					Local tool and interface with ATFM tools
	Training	Staff training				ANSP ATM network function Aircraft operator

OPERATIONAL	
Element:	NOPS B1/2 - Enhanced Network Operations Planning
Main Purpose	The Network Operations Planning needs to be enhanced to achieve collaborative planning with the support of services which can be automated (B2B interfaces/SWIM services)
Description	<p>The Network Operations Planning process will be enhanced to continuously provide up-to-date situational information on all components of the network. Furthermore, it will provide access to initial network performance objectives and support to network performance assessment in post-operations.</p> <p>The required technological platform will use the state-of-the-art technologies for creation of a virtual operations room for the physically distributed network operations, in support of collaborative Network Operations Planning. These interfaces will support the network collaborative dynamic/rolling processes from strategic to real-time operations, including capabilities for online performance monitoring integrated and feeding back into the collaborative network planning.</p> <p>The information and dialogue tools shall be accessed via different interfaces. Access to information is done in a secure way, tailored according to stakeholders needs and subject to access control rules, so that only those who have an operational need to access information can do so. A common interface to all stakeholders needs to be developed to enable the collaborative decision-making processes used to build and execute the Network Operations Planning.</p> <p>The following new features will be introduced:</p> <ul style="list-style-type: none"> • Enhanced Network Operations Planning interfaces (B2B/SWIM based); • Initial steps related to the Network Operations Planning extended functions (crisis management and network disruption); • Tools for on-line performance monitoring; • Tools for network impact assessments



ICAO

AAO/SG5 Appendix 3

Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Develop the ATFM procedures for communicating refined Network plans to ANSP, Airspace Users and Airport Operators...- Doc 9971 Manual on Collaborative ATFM	NOPS-B0/3 AMET-B1/3 FICE-B2/4 SWIM-B2/1 SWIM-B2/2	D	2	Airport operator ANSP ATM network function Aircraft operator	Y
	Operational procedures	Develop the ATFM procedures for on-line access/update to the Network Plan and notification of updates. References: ICAO Doc 9971 Manual on Collaborative ATFM				Airport operator ANSP ATM network function Aircraft operator	
	Operational procedures	Develop the ATFM procedures for handling of a critical event				ATM network function	
	Operational procedures	Develop the ATFM procedures to ensure that Network is constantly updated to reflect all changes to the airspace availability and airspace users' requests. References: ICAO Doc 9971 Manual on Collaborative ATFM				Airport operator ANSP ATM network function Aircraft operator	
	Operational procedures	Real-time technical support procedures for B2B (2019)/SWIM (2020) services. References: ICAO Doc 9971 Manual on Collaborative ATFM				Aircraft operator	
	Ground system infrastructure	Enhance the ATFM technical platform				ATM network function	
	Ground system infrastructure	Upgrade the ATFM system with extended function (crisis management, impact assessment, performance monitoring)				ATM network function	
	Ground system infrastructure	B2B (2019)/ SWIM (2020) Network system interfaces with concerned stakeholders				Airport operator ANSP ATM network function Aircraft operator	
	Training	Training in new operational procedures and ground systems				Airport operator ANSP ATM network function Aircraft operator	



OPERATIONAL							
Element:	NOPS B1/3 - Enhanced integration of Airport operations planning with network operations planning						
Main Purpose	Integrate the airport operations planning into the network operations planning						
Description	<p>The airport operations plan will contain all data and information related to the different status of planning phases and will be a dynamic/rolling plan, which naturally evolves over time. The integration of airport operations planning within the network operations planning provides a dynamic/rolling picture of the network situation to be used by all operational stakeholders to prepare their plans and their inputs to the network CDM processes.</p> <p>The data exchanges are based on the subset of B2B/SWIM services that are most widely available to all stakeholders, communicating with local airport A-CDM systems to exchange relevant operational information.</p> <p>This element is a step prior to the full integration of the airport operations planning to the network operations planning</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Develop the ATFM/Airport procedures for AOP/Network Operation Planning integration. References: ICAO Doc 9971 Manual on Collaborative ATFM	NOPS-B0/4 ACDM-B2/1 NOPS-B1/2 SWIM-B2/1 SWIM-B2/2	D	2	Airport operator ATM network function	Y
	Ground system infrastructure	Develop the Airport Operations Plan module				Airport operator	
	Ground system infrastructure	Develop the Airport Operations/ /Network Operations Planning interfaces				Airport operator ATM network function	

OPERATIONAL							
Element:	NOPS B1/4 - Dynamic Traffic Complexity Management						
Main Purpose	Enhanced traffic complexity assessment by automation						
Description	<p>The rigid application of ATFM measures based on standard capacity thresholds as the pre-dominant tactical capacity measure needs to be replaced by a close working relationship between ANSPs and ATM Network function, which would monitor both the real demand and the effective capacity of sectors having considered the complexity of expected traffic situation. The local traffic complexity assessment continuously monitors sector demand and evaluate traffic complexity (by applying predefined complexity metrics) according to a predetermined qualitative scale. It provides support in the determination of solutions in order to plan airspace, sectors and staff to handle the predicted traffic. The local complexity assessment would benefit by receiving processing and integrating the ATM Network function information in order to supplement the local traffic counts with the relevant flight plan data. This will improve the quality of the planned trajectory and further enhance the traffic complexity management</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Complexity management procedures. References: ICAO Doc 9971 Manual on Collaborative ATFM	N/A	S	1	ANSP ATM network function	N



	Ground system infrastructure	Local Traffic Load Management tool				ANSP	
	Ground system infrastructure	Local Traffic Complexity tools				ANSP	
	Ground system infrastructure	Provision and integration of ATFM Planned Trajectory				ANSP ATM network function	
	Ground system infrastructure	Upgrade the ATFM systems with the Planned Trajectory improvements				ATM network function	
	Ground system infrastructure	Enhancements related to ATFM Traffic complexity assessment				ATM network function	

OPERATIONAL							
Element:	NOPS B1/5 - Full integration of airspace management with air traffic flow management						
Main Purpose	Ensure a continuous, seamless and iterative airspace management and air traffic flow management approach						
Description	<p>The full dynamic/rolling ASM/ATFM process focuses on improving airspace planning. It will ensure a continuous, seamless and iterative airspace planning and management/allocation based on airspace requests at any time period within strategic, pre-tactical and tactical ASM levels. It will result in a rolling process, supporting the enhancement of dynamic Network Operations Planning. The real time ASM data exchanges relate to the automated exchange services of ASM data during the tactical phase continuously in real time. ASM information (real-time Airspace Reservation status) is shared between different systems and Stakeholders and communicated to ATFM in the tactical phase.</p> <p>Several new improvements are introduced as:</p> <ul style="list-style-type: none"> • Process/system modules supporting a full rolling ASM/ATFM and dynamic ASM/ATFM process allowing data sharing to all operational stakeholders, • Process/System changes for initial Collaborative Decision Making (CDM) between ATFM function and the local designated authorities and between neighbouring ASM actors. • ASM information sharing addresses requirements aiming to improve the notification to airspace users based on automated data exchange processes • Procedural and system modules for exchange of real time airspace status data; • The Flexible Use of Airspace (FUA) process is improved with more dynamic airspace management enabling dynamic responses to airspace requests (or very short-term changes) • Real-time ASM coordination is further enhanced through "what-if" functionalities and automated support to airspace booking and airspace management. • Real-time ASM data are exchanged between ASM support systems and ATC systems • Integration and management of ASM real-time data into ANSPs' ATM systems and into AUs flight planning systems; <p>The full dynamic/rolling ASM/ATFM process will be supported by the sharing of civil-military airspace data and by continuously updating Airspace Reservation information with other demand information among the authorized operational stakeholders in order to enhance the coordination of Cross-Border Operations, and to optimise the whole network operations based on the most timely and correct information. The process is enhanced with "what-if" functionalities enabling a better use of available capacity. ASM real-time data exchanges consisting of pre-notification of activation, notification of activation, de-activation, modification and release of airspace are collected, saved and processed in order to be exchanged between stakeholders and be made available to ATM actors, including Airspace Users (AUs). ATM systems need to be upgraded to exchange real-time ASM data messages containing real time activation status of predefined airspace structures with local ASM support systems and to display airspace status data at the Controller Working Position (CWP)</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Develop the Procedures and processes for a dynamic/rolling ASM/ATFM process.	NOPS-B0/1 FRTO-B1/1	S	1	ANSP ATM network function	N



ICAO

AAO/SG5 Appendix 3

		References: ICAO Doc 9971 Manual on Collaborative ATFM	FRTO-B1/2 FRTO-B1/3 FRTO-B1/4			
	Operational procedures	Develop the Procedures in support of ASM data sharing. References: ICAO Doc 9971 Manual on Collaborative ATFM				ATM network function Aircraft operator
	Operational procedures	Develop the Procedures related to real-time ASM data exchanges. References: ICAO Doc 9971 Manual on Collaborative ATFM				ANSP ATM network function
	Operational procedures	Develop the advanced FUA procedures. References: ICAO Doc 9971 Manual on Collaborative ATFM				ANSP
	Operational procedures	Procedures to respond to changes submitted by Airspace users resulting from changes in airspace availability. References: ICAO Doc 9971 Manual on Collaborative ATFM				ANSP ATM network function
	Ground system infrastructure	Adapt ASM/ATFM/AUs systems to support a rolling ASM/ATFM process				ANSP ATM network function Aircraft operator
	Ground system infrastructure	Upgrade the ATFM System modules for improved ASM notification process				ATM network function
	Ground system infrastructure	Upgrade the ATC systems for real-time ASM data exchanges				ATM network function
	Ground system infrastructure	Adapt ASM system, ATFM and AU systems for real-time ASM data exchanges				ANSP ATM network function Aircraft operator
	Training	Rolling ASM/ATFCM process training. Training in new operational procedures and ground system changes				ANSP ATM network function Aircraft operator



OPERATIONAL							
Element:	NOPS B1/6 - Initial Dynamic Airspace configurations						
Main Purpose	ASM solutions and initial dynamic airspace configurations for ATFM planning, synchronisation of traffic flows and demand/capacity balancing						
Description	<p>This element addresses the following ASM/ATFM improvements:</p> <p>Airspace solutions Pre-defined airspace configurations ANSPs/ ATM Network function data exchanges pertinent to pre-defined airspace configurations</p> <p>The ASM solutions process is aimed at delivering ASM options/solutions that can help reducing or even alleviate the ATFM measures and address capacity issues identified in any area as well as to improve flight efficiency assessing impact on capacity and ensuring the synchronised availability of optimized airspace structures based on traffic demand and dynamic sectors management.</p> <p>The Airspace configurations are pre-defined and coordinated airspace structures and ATC dynamic sectorisation, to meet the ATFM and airspace needs in terms of capacity and/or flight efficiency. The implementation of pre-defined airspace configuration exchange covers the improvements of ATFM systems, to allow exchange of predefined airspace configurations information.</p> <p>The decisions required for dynamic sectorisation could benefit from real time exchanges with ATM Network function for ATFM planning, synchronisation of traffic flows and demand/capacity balancing. The notification of Airspace Configurations will be based on automatic flows of information between the different stakeholders supported by the ATM Network function. The airspace configurations and flexible sector configurations are already used when the flows and constraints can be predicted well in advance (e.g., weekend routes or seasonal flows of traffic).</p> <p>A more efficient and dynamic process involving the ATM Network function, ATC would require new functionalities and procedures and well-defined collaborative decision-making processes at pre-tactical level. The ANSPs systems needs to support the dynamic sectorisation by dynamic resizing and change of sector shapes and volumes based on pre-defined airspace configurations</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Develop the ASM/ATFM procedures for airspace solution. References: ICAO Doc 9971 Manual on Collaborative ATFM	FRTO-B0/1 FRTO-B0/2 FRTO-B0/3 FRTO-B1/1 FRTO-B1/2 FRTO-B1/3 FRTO-B1/4	E	1	ANSP ATM network function	N
	Operational procedures	Develop the ASM/ATFM procedures for pre-defined airspace configurations. References: ICAO Doc 9971 Manual on Collaborative ATFM				ANSP ATM network function	
	Operational procedures	Develop the ASM/ATFM procedures for dynamic sectorization and constrain management. References: ICAO Doc 9971 Manual on Collaborative ATFM				ANSP	
	Ground system infrastructure	Upgrade the ATFM system modules related to the airspace solution				ATM network function	
	Ground system infrastructure	Upgrade the ATFM system modules related to the pre-defined airspace configurations				ATM network function	



	Ground system infrastructure	Enhance the ATC system capabilities with dynamic sectorization and constraint management				ANSP	
	Ground system infrastructure	SWIM data exchanges for pre-defined airspace configurations				ANSP ATM network function	

OPERATIONAL							
Element:	NOPS B1/7 - Enhanced ATFM slot swapping						
Main Purpose	Improve the Airspace Users driven ATFM slot swapping process						
Description	ATFM slot swapping allows Airspace Users (AU) to request a rearrangement of their own flights subject to an ATFM measure in order to better suit their needs. The enhanced ATFM Slot Swapping improves the slot swapping currently used by Airspace Users (AU), by allowing the function to be extended gradually to all airspace users, by re-prioritizing their flights during the pre-departure part of operations. The Enhanced Slot swapping increases flexibility for Airspace Users; and provides a wider range of possibilities, by facilitating the identification of possible swaps for an ATFM Measure impacted flight (through B2B/SWIM-based Network Operations Planning interfaces) and by reducing the rate of rejection of swap requests by refining current processes. The AUs requests for these changes in flight priority will be introduced at the initiative of the AUs themselves, airport authorities or the ATM Network function						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Develop the Procedures for ATFM slot swapping. References: ICAO Doc 9971 Manual on Collaborative ATFM	NOPS-B0/4 NOPS-B1/2 SWIM-B2/1 SWIM-B2/2	D	2	ATM network function Aircraft operator	N
	Ground system infrastructure	Upgrade the Flight Operations Centre (FOC) system modules with interfaces, automation, and decision-support for ATFM slot swapping				Aircraft operator	
	Ground system infrastructure	Enhance the ATFM systems with ATFM slot swapping capabilities supporting the Airport Slot Monitoring as well in real time				ATM network function	
	Training	Slot swapping training. Train Flight Operation Centre personnel				ATM network function Aircraft operator	



OPERATIONAL							
Element:	NOPS B1/8 - Extended Arrival Management supported by the ATM Network function						
Main Purpose	ATM Network function contributions to extended Arrival Management						
Description	<p>The ATM Network function involvement in extended Arrival Management process is addressed by this element. It does include the following elements: Enhancements of ATFM Planned Trajectory about the accuracy/predictability of estimates to meet the extended arrival management operational requirements; Provision of ATFM Planned Trajectory to ANSPs; Reception and processing of ANSPs extended Arrival Management info by ATM Network function; ATFM assessment tool for extended Arrival Management. Bilateral agreements need be established between the sectors involved that can be in different ATC units and in different countries, including the ATM Network function for the notification purposes. The ATFM procedures need to be revised for the management of the extended Arrival Management information</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	Define the data exchanges and operational procedures with ANSP. References: ICAO Doc 9971 Manual on Collaborative ATFM	RSEQ-B1/1	o	1	ANSP ATM network function	N
	Operational procedures	Develop the ATFM procedures for management of extended Arrival Management information. References: ICAO Doc 9971 Manual on Collaborative ATFM				ATM network function	
	Ground system infrastructure	Upgrade the ATFM system modules to support extended Arrival Management				ATM network function	

OPERATIONAL							
Element:	NOPS B1/9 - Target Times for ATFM purposes						
Main Purpose	Use of Target Times for ATFM purposes including an initial level of arrival sequencing in case of an arrival ATFM measure						
Description	<p>In order to improve the flight predictability at the entry of the congested area, a target time of entry at the congested area (most penalised measure) will be provided by ATM Network function. At this stage, the target times will be applied for ATFM purpose only, including an initial level of arrival sequencing in case of an arrival ATFM measure. The ATM Network function will provide the calculated Target Time (TT) at the most penalising measure reference point in addition to Calculated Take-Off Time (CTOT) to all concerned users. TT will be distributed by data exchanges with the concerned Stakeholders. Stakeholders using TTs should be able to receive, extract and present the target times delivered by ATM Network function. ANSPs have access to the relevant information on flights that are subject to a Target Time to manage these flights as required in accordance with local procedures that need to be developed. The Flight Operating centres should provide Target Times to pilots prior to departure; pilots should endeavour to adhere to the Target Times to the extent possible</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N



ICAO

AAO/SG5 Appendix 3

Standardization	Operational procedures	Develop the ATFM Target Times procedures and processes. References: ICAO Doc 9971 Manual on Collaborative ATFM	RSEQ-B1/1	O	2	ANSP ATM network function Aircraft operator	Y
	Ground system infrastructure	Upgrade the ATFM Systems to support Target Time processing and sharing				ATM network function	
	Ground system infrastructure	AUs Operation Centre systems to extract and distribute Target Times				Aircraft operator	
	Training	Target Time training. Target Time training				ANSP Aircraft operator	

OPERATIONAL							
Element:	NOPS B1/10 - Collaborative Trajectory Options Program (CTOP)						
Main Purpose	Collaborative Trajectory Options Programs are Traffic Management Initiatives (TMI) that allow ATFM to choose the best possible balance between ATFM delay and rerouting by using airspace user provided Trajectory Option Sets (TOS) to mitigate the operational impact of weather or traffic demand airspace constraints						
Description	CTOP works as follows: <ol style="list-style-type: none"> 1. ATFM creates an airspace boundary and establishes flow control on any air traffic that crosses that boundary. 2. Airspace Users based on the notice of the airspace constraint develop and submit in advance of the issuance of the program, a set of desired reroute options (called a Trajectory Options Set or TOS) that is the operator's preference for routing around the constraint. 3. CTOP uses the preferred options to automatically assign delays or reroutes to flights in order to dynamically manage the demand as conditions change 						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Regulatory provisions	Guidance to customers how to manage flights in the constrained area Reference: FAA AC 90-115	FRTO-B1/7	S	1	CAA	N
	Operational procedures	Operational guidelines on CTOP usage				ANSP Aircraft operator	
	Ground system infrastructure	Tools and systems in place at ANSP to support CTOP operations Reference: https://cdm.fly.faa.gov/?page_id=983				ANSP	
	Ground system infrastructure	Tools and systems in place at AOs to support CTOP operations Reference: https://cdm.fly.faa.gov/?page_id=983				Aircraft operator	
	Training	ATM Training, Flight Dispatcher training is provided on how to use CTOP system to increase flight operation efficiency				ANSP Aircraft operator	



OPFL - Improved access to optimum flight levels in oceanic and remote airspace Block 1

OPERATIONAL							
Element:	OPFL B1/1- Climb and Descend Procedure (CDP)						
Main Purpose	The CDP was designed to improve service to appropriately equipped aircraft by providing an air traffic controller with another option for initiating an altitude change when existing separation minima do not allow an aircraft to climb or descend through the altitude of a blocking aircraft						
Description	The CDP utilizes existing ADS-C aircraft equipage and air traffic control (ATC) capabilities to allow more flights to achieve their preferred vertical profiles. Integral to the CDP is the use of advanced communication and surveillance capabilities (i.e., ADS-C and CPDLC). The CDP is conceptually modelled after existing in-trail distance measuring equipment (DME) rules set forth in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444), paragraph 5.4.2.3.4. Aircraft pair distance verification is performed by the ground automation system using simultaneous ADS-C demand contract reports						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	N/A	N/A	N/A	S	1	ANSP Aircraft operator	Y

RSEQ - Improved traffic flow through runway sequencing Block 1

OPERATIONAL							
Element:	RSEQ B1/1 - Extended arrival metering						
Main Purpose	To enhance predictability and ATM decision compliance						
Description	Extended metering will enhance predictability and ATM decision compliance. The ATS units will be able to meter across FIR boundaries. Extended metering will enable ATS units to continue metering during high volume traffic and will improve metering accuracy. This will also facilitate synchronization between adjacent FIRs. With extended metering, delays can be shifted to higher altitudes or even to the departure gate, where it can be more efficiently absorbed by incoming flights. This metering will provide extended arrival management, increasing arrival management effectiveness and benefits (e.g., in terms of reduced holding time) while reducing approach ATC workload. Extended metering may set requirements on flights pre-departure, if departing within the arrival metering range of the destination airport						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	Operational procedures	ATM procedure for extended arrival metering including exchange of metering information with affected neighbouring ATC units	RSEQ-B0/1 NOPS-B1/8 AMET-B1/1 AMET-B1/2	O	2	ANSP	N



	Operational procedures	Letter of Agreement or equivalent document outlining procedure to exchange metering information with affected neighbouring ATC units	APTA-B1/4 SWIM-B2/1 FICE-B3/1			ANSP	
	Operational procedures	ATM procedure for reconciling ATFM constraints with Extended Arrival Metering requirements				ANSP	
	Ground system infrastructure	ATM automation for calculation and presentation of extended arrival metering to ATCOs and exchange metering information with affected neighbouring ATC units				ANSP	
	Training	ATCO Extended Arrival Metering Training - ATCOs trained to use extended arrival metering automation, supported by extended arrival metering procedure and Letter of Agreement with affected neighbouring ATC units, along with Procedure to Reconcile ATFM Constraint with Extended Metering Requirements. Pilot Time-Based Metering Training - Pilots trained to use airborne system to arrive at waypoint specified by ATCOs at specific timing				ANSP Aircraft operator	
	Regulatory provisions	Safety assessment of extended arrival metering operation				ANSP	

SNET - Ground-based Safety Nets Block 1

OPERATIONAL							
Element:	SNET B1/1 - Enhanced STCA with aircraft parameters						
Main Purpose	Assist the air traffic controller in preventing collision between aircraft, using position data from ground surveillance and flight intent reported by aircraft						
Description	This enhanced STCA works the same as the basic STCA system in Block 0, but stops the linear extrapolation of the vertical position of an aircraft when it reached the Selected Flight Level information reported from ADS-B or downlinked from Mode S transponders						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures for air traffic controllers' reaction to short term conflict alerts. References: Doc 4444 - Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM)	ASUR-B0/1 ASUR-B0/3 SNET-B0/1	E	1	ANSP	Y
	Airborne system capability	SSR transponder compliant with ... ADS-B out compliant with ... References: Doc 100xx - Ground-based Safety Nets Manual http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	SSR radar ADS-B in station References: Doc 100xx - Ground-based Safety Nets Manual Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				ANSP Ground systems supplier	
	Ground system infrastructure	Capability to indicate alerts on the radar screen of the controller working positions. References: Doc 100xx - Ground-based Safety Nets Manual Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				ANSP Ground systems supplier	
	Training	Air traffic controller knowledge and reaction to alerts. Reference: Doc 100xx -				ANSP	



		Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii					
--	--	---	--	--	--	--	--

OPERATIONAL							
Element:	SNET B1/2 - Enhanced STCA in complex TMAs						
Main Purpose	Assist the air traffic controller in preventing collision between aircraft, using position data from ground surveillance and considering possible crew intents linked to traffic patterns and ATC practices in complex TMAs						
Description	<p>This enhanced STCA works the same as the basic STCA system in Block 0, but, in addition of the current proximity test and the linear prediction test, performs the following tests:</p> <ul style="list-style-type: none"> (Level-off prediction test) The vertical positions of aircraft in vertical evolution are extrapolated to level-off at the next reasonable FL. (Turn prediction test) The horizontal positions of aircraft in proximity of a final approach path are extrapolated to turn in alignment with this final approach path. <p>Care is also taken to setup a specific set of alerting parameters (horizontal threshold, vertical threshold and warning time) for each approach area within the TMAS, where unnecessary alerts could affect runway throughputs</p>						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	Operational procedures	Procedures for air traffic controllers' reaction to short term conflict alerts. References: Doc 4444 - Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM)	ASUR-B0/1 ASUR-B0/3 SNET-B0/1	S	1	ANSP	Y
	Airborne system capability	SSR transponder compliant with ... ADS-B out compliant with ... References: Doc 100xx - Ground-based Safety Nets Manual http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				Aircraft manufacturer Aircraft operator	
	Ground system infrastructure	SSR radar ADS-B in station References: Doc 100xx - Ground-based Safety Nets Manual Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii				ANSP Ground systems supplier	
	Ground system infrastructure	Capability to indicate alerts on the radar screen of the controller working positions. References: Doc 100xx - Ground-based				ANSP Ground systems supplier	



		Safety Nets Manual Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-short-term-conflict-alert-stca-part-i-iii					
	Training	Air traffic controller knowledge and reaction to alerts. Reference: Doc 100xx - Ground-based Safety Nets Manual - Details in Eurocontrol documents at http://www.eurocontrol.int/publications/eurocontrol-guidelines-minimum-safe-altitude-warning-msaw-part-i-iii				ANSP	

SURF - Surface operations Block 1

OPERATIONAL							
Element:	SURF B1/1 - Advanced features using visual aids to support traffic management during ground operations						
Main Purpose	To improve surface operations with the aim to reduce taxi time and fuel burn, potential mistakes						
Description	Advanced features including FTG, and Variable Message Panels are used to optimize routing during taxi operations. The lighting system is used to direct the aircraft, making the guidance safer, as errors are minimized. Lighting system for other vehicles than aircraft is connected to the SMGCS in order to optimize ground circulation and prevent collision						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	N/A	N/A	SURF-B0/1 ACDM-B0/1	S	1	Airport operator ANSP Aircraft operator Aircraft manufacturer Ground handling agent	Y



OPERATIONAL							
Element:	SURF B1/2 - Comprehensive pilot situational awareness on the airport surface						
Main Purpose	To improve ground operations based on increasing pilot's situational awareness and safety especially at taxiway and runway intersections, as well as for aircraft landing and taking off						
Description	The pilot can visualize surrounding traffic to be presented on traffic computer and display. Different technologies enable this capability, among which ADS-B OUT/ADS-B IN. In order to maximize the benefits, it is suitable that all aircraft be equipped in a homogeneous manner. However, a transition period can be observed, and a partial equipage will result in the display of only the appropriately equipped aircraft						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Ready for implementation	N/A	N/A	ASUR-B0/1 CSEP-B1/1	D	1	Airport operator ANSP Aircraft operator	Y

OPERATIONAL							
Element:	SURF B1/3 - Enhanced ATCO alerting service for surface operations						
Main Purpose	The enhanced A-SMGCS alerting service anticipates potential runway conflicts, runway incursion and other hazardous situations on the aerodrome surface						
Description	The A-SMGCS Alerting service for controllers is complemented with the detection of conflicting ATC Clearances (CATC) given by the controller (e.g., Line-up versus Land on same runway) and with the detection of non-conformance to procedures or instructions (e.g., route deviation). An electronic clearance input means is used by the controller to make the clearances known to the system. Surveillance data and routing information are also used by the logic to generate alerts to the controller						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	N/A	N/A	SURF-B0/2 SURF-B0/3 SURF-B1/4	S	1	Airport operator ANSP Aircraft operator	Y



OPERATIONAL							
Element:	SURF B1/4 - Routing service to support ATCO surface operations management						
Main Purpose	To improve pre-departure and departure sequencing by provision of accurate taxi times and efficient routing service						
Description	The A-SMGCS routing service calculates individual routes for mobiles based on known airport parameters and constraints or following an interaction by the controller. The controller is presented with planned or cleared routes and has means to modify these routes or to create new route if necessary. Information is updated in real time in order to improve predictability of surface operations						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	N/A	N/A	SURF-B0/2 RSEQ-B0/1 RSEQ-B0/2	S	1	Airport operator ANSP Aircraft operator	Y

OPERATIONAL							
Element:	SURF B1/5 - Enhanced vision systems for taxi operations						
Main Purpose	Allow for improved navigation by visual reference, even during conditions of low-light or weather obscuration such as fog						
Description	Additional avionics add electromagnetic sensors outside the visible light spectrum (e.g., infrared cameras, millimetre wave radar). These sensors will allow for improved navigation by visual reference, even during conditions of low-light or weather obscuration such as fog. Presentation to the flight crew may be through an instrument panel display or via heads-up display (HUD), etc						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	N/A	N/A	AMET-B0/1	S	1	Airport operator ANSP Aircraft operator	Y

TBO - Trajectory-based operations Block 1

OPERATIONAL							
Element:	TBO B1/1 - Initial Integration of time-based decision-making processes						
Main Purpose	Provides initial support to network operations by integrating network applied constraints into local arrival and departure management. Overall operations are still locally conducted with time-based decision-making tools						
Description	Information about individual and some sets of flights are available for time-based decision-making tools. Some pre-departure and in-flight synchronization are conducted locally via ATCO and automation. Flights are subject to local/regional initial synchronization processes						
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
Standardization	N/A	N/A	N/A	S	1	ANSP Airport operator Aircraft operator	Y

Spare Template

OPERATIONAL							
Element:							
Main Purpose							
Description							
Maturity level	Enablers: Infrastructure/Systems/ Procedures/Training	Description / References	DEPENDENCIES AND RELATIONS	Implementation Category	Priority	Entity	SAR Y/N
							Y