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PBN and ASBU in MID Region

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ICAO

PBN SG/4 meeting

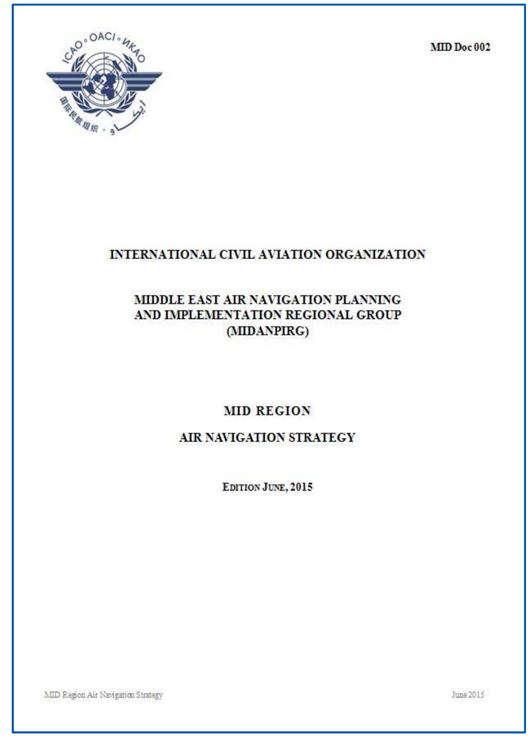
Cairo, Egypt, 19-21 January 2020

Outline

- Background
- Status of Implementation
- MID ASBU Block 0 – APTA, CCO and CDO
- GANP ASBU Coverage Area
- ASBU Block 1 – APTA and CDO (2016)
- GANP ASBU 2019
- ASBU Block 1 – APTA, CCO, CDO (2019)
- Action by the meeting

Background

- The Strategy was endorsed by MSG/4 meeting (Cairo, 24-26 November 2014), based on the outcome of the relevant MIDANPIRG subsidiary bodies and inputs received from stakeholders.
- The Strategy was further reviewed and updated by MIDANPIRG/15 meeting (Bahrain, 8-11 June 2015) and endorsed as ICAO MID Doc 002,
- The current version was updated by MSG/6 (Cairo, Egypt, 3-5 December 2018)
- MID Doc 002 is available on the MID Office website.


MID Doc 002

INTERNATIONAL CIVIL AVIATION ORGANIZATION

MIDDLE EAST AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (MIDANPIRG)

MID REGION

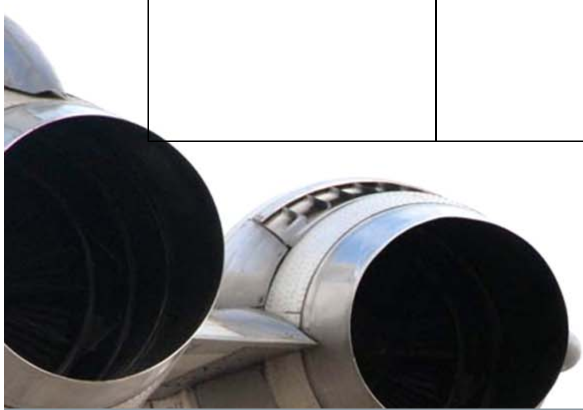
AIR NAVIGATION STRATEGY

EDITION JUNE, 2015

MID Region Air Navigation Strategy June 2015

MID ASBU Block 0 – APTA, CCO and CDO

B0 – APTA: Optimization of Approach Procedures including vertical guidance				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
LNAV	All RWYs Ends at International Aerodromes	Indicator: % of runway ends at international aerodromes with RNAV(GNSS) Approach Procedures (LNAV) Supporting metric: Number of runway ends at international aerodromes with RNAV (GNSS) Approach Procedures (LNAV)	100% (All runway ends at Int'l Aerodromes, either as the primary approach or as a back-up for precision approaches)	Dec. 2016
LNAV/VNAV	All RWYs ENDs at International Aerodromes	Indicator: % of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV) Supporting metric: Number of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV)	100% (All runway ends at Int'l Aerodromes, either as the primary approach or as a back-up for precision approaches)	Dec. 2017



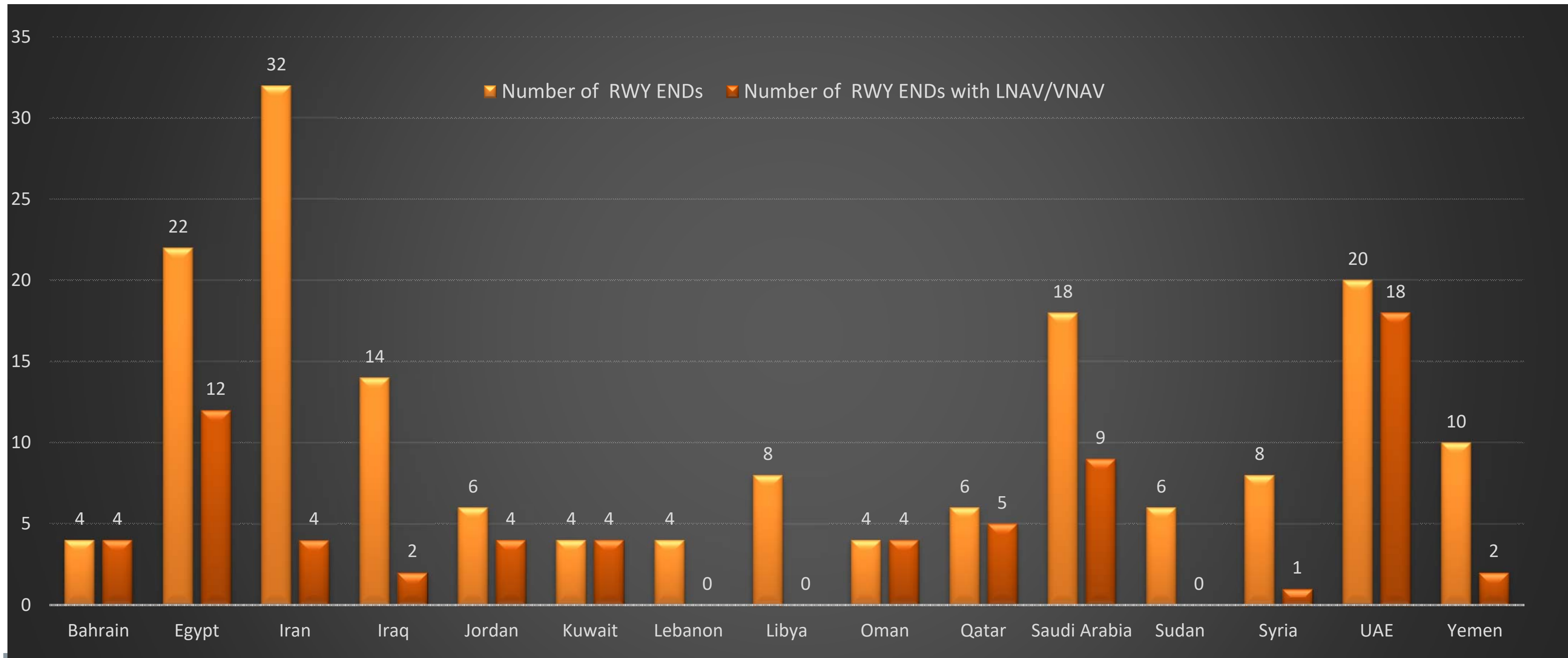
B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)			
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**
PBN SIDs	OBBI, HESN, HESH, HEMA, HEGN, HELX, OIIE, OISS, OIKB, OIMM, OIFM, ORER, ORNI, OJAM, OJAI, OJAQ, OKBK, OLBA, OOMS, OOSA, OTHH, OEJN, OEMA, OEDF, OERK, HSNN, HSOB, HSSS, HSPN, OMAA, OMAD, OMDB, OMDW, OMSJ	Indicator: % of International Aerodromes/TMA with PBN SID implemented as required. Supporting Metric: Number of International Aerodromes/ TMAs with PBN SID implemented as required.	100% by Dec. 2018 for the identified Aerodromes/TMAs
International aerodromes/TMAs with CCO	OBBI, HESN, HESH, HEMA, HEGN, HELX, OIIE, OIKB, OIFM, ORER, ORNI, OJAM, OJAI, OJAQ, OKBK, OLBA, OOMS, OOSA, OTHH, OEJN, OEMA, OEDF, OERK, HSNN, HSOB, HSSS, HSPN, OMAA, OMDB, OMDW, OMSJ	Indicator: % of International Aerodromes/TMA with CCO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CCO implemented as required.	100% by Dec. 2018 for the identified Aerodromes/TMAs

MID ASBU Block 0 – APTA, CCO and CDO

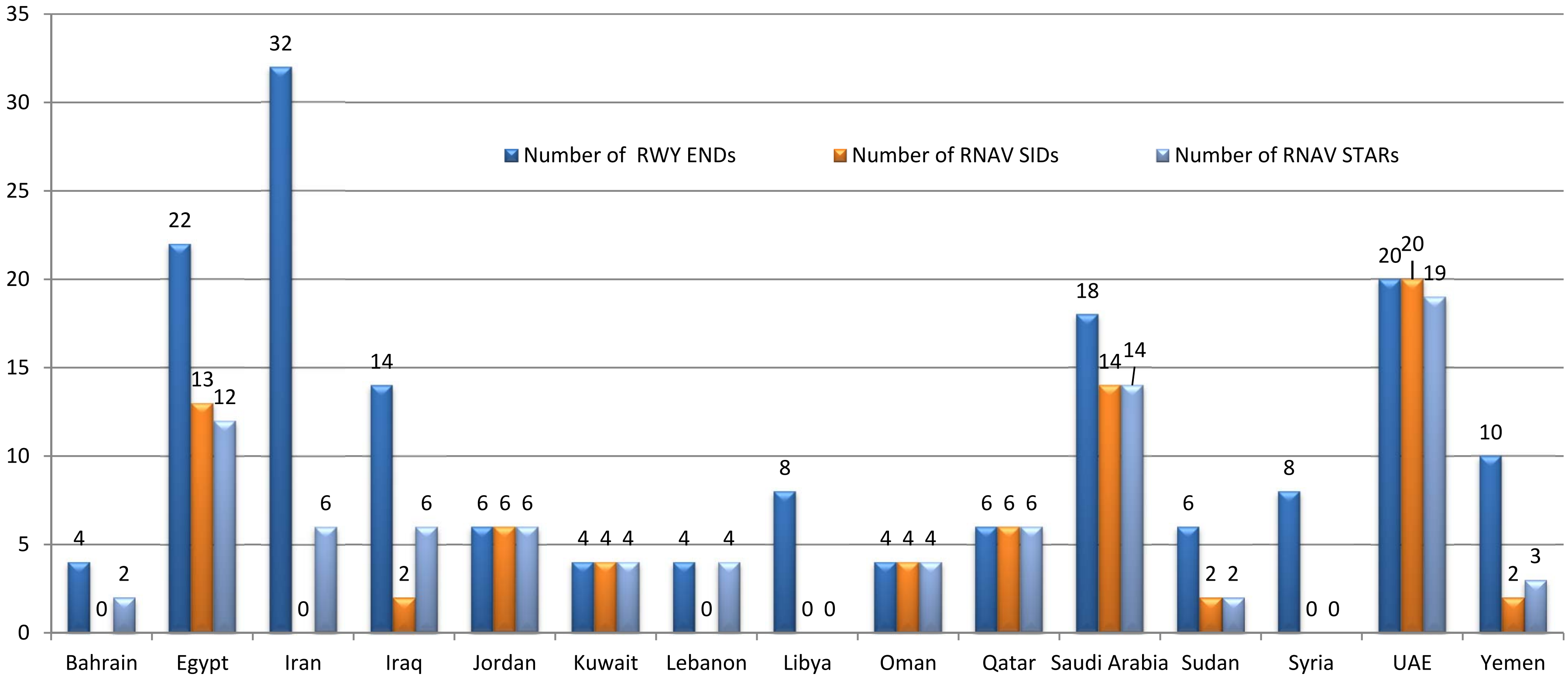
B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)			
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**
PBN STARs	OBBI, HESN, HESH, HEMA, HEGN, HELX, OIIE, OISS, OIKB, OIMM, OIFM, ORER, ORNI, OJAM, OJAI, OJAQ, OKBK, OLBA, OOMS, OOSA, OTHH, OEJN, OEMA, OEDF, OERK, HSNN, HSOB, HSSS, HSPN, OMAA, OMAD, OMDB, OMDW, OMSJ	Indicator: % of International Aerodromes/TMA with PBN STAR implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented as required.	100% by Dec. 2018 for the identified Aerodromes/TMAs
International aerodromes/TMAs with CDO	OBBI, HESH, HEMA, HEGN, OIIE, OIKB, OIFM, OJAI, OJAQ, OKBK, OLBA, OOMS, OTHH, OEJN, OEMA, OEDF, OERK, HSSS, HSPN, OMAA, OMDB, OMDW, OMSJ	Indicator: % of International Aerodromes/TMA with CDO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented as required.	100% by Dec. 2018 for the identified Aerodromes/TMAs

STATUS OF IMPLEMENTATION

Status of RWYs Ends with LNAV/VNAV in MID Region



Status of SIDs and STARs in MID Region



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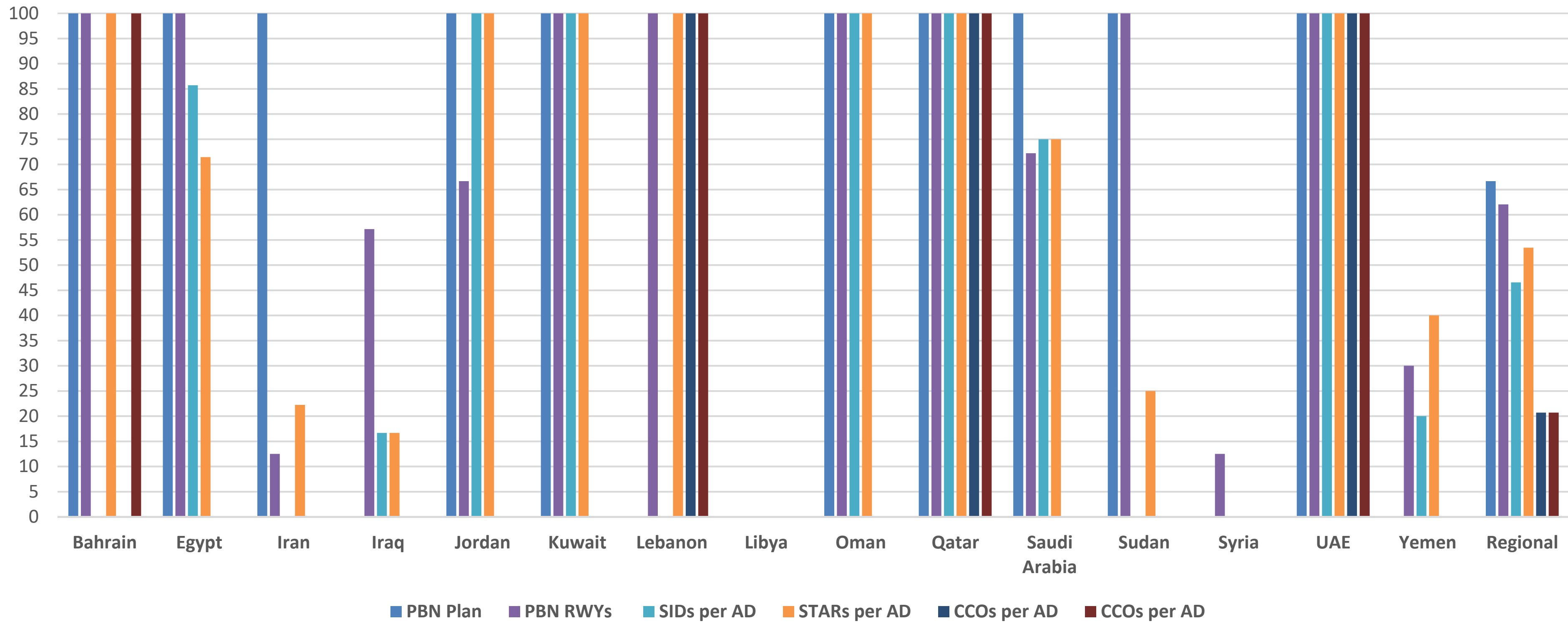
Status of PBN Implementation in MID Region



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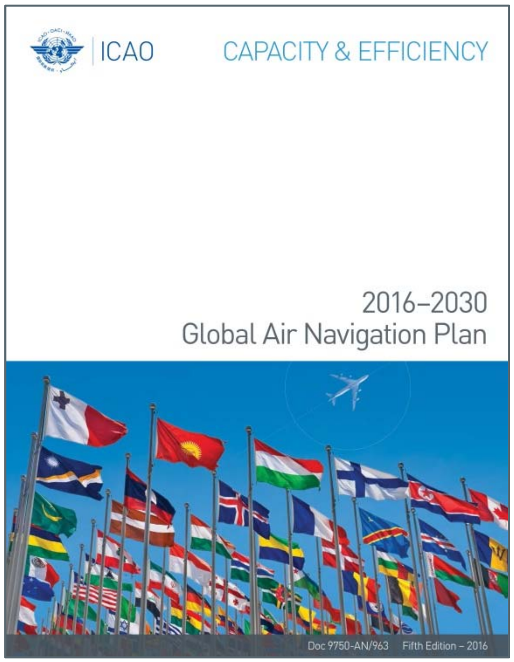
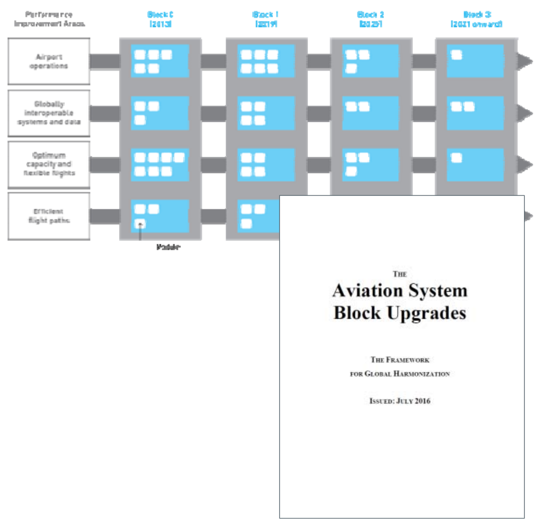
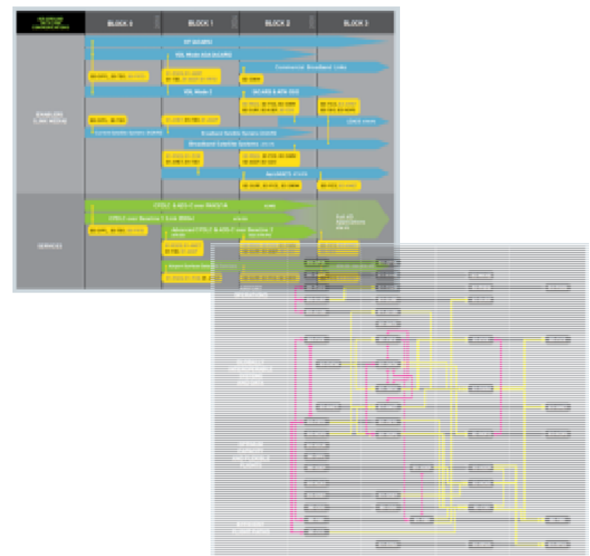
Contents of the 2016-2030 GANP



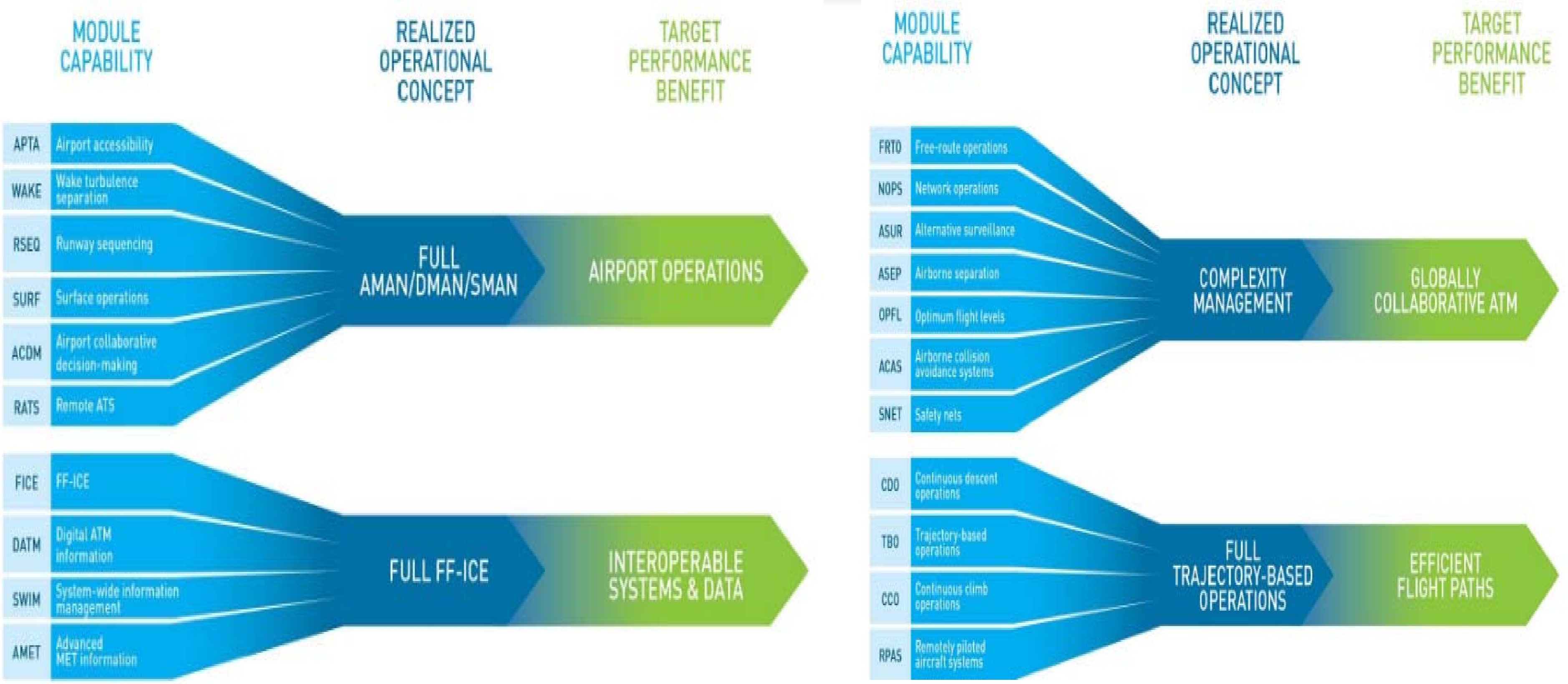


Aviation System Block Upgrades (ASBU) Methodology



Technology Roadmaps and Module Dependencies

ASBU Modules coverage over time



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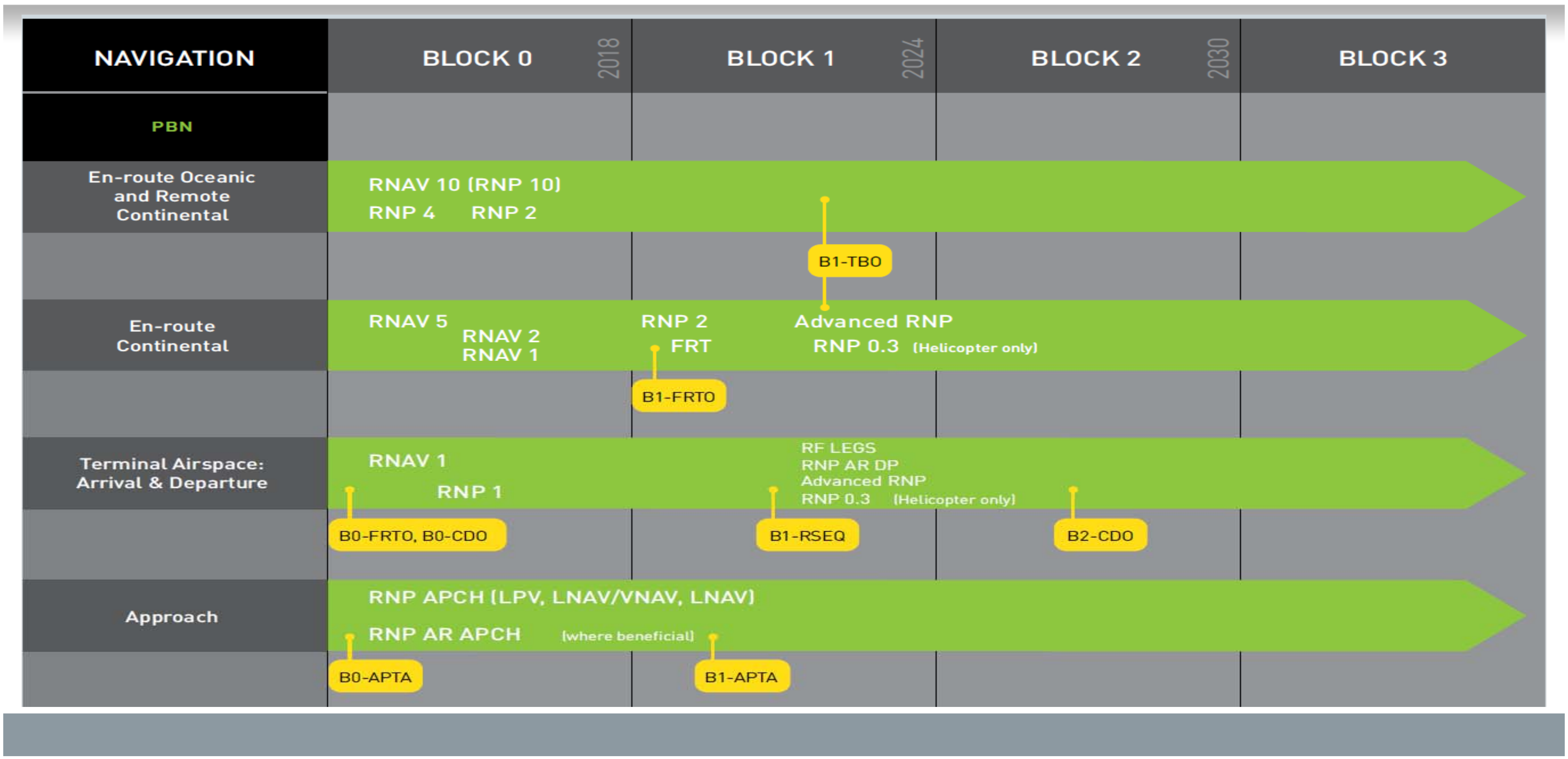
GANP PBN Roadmap



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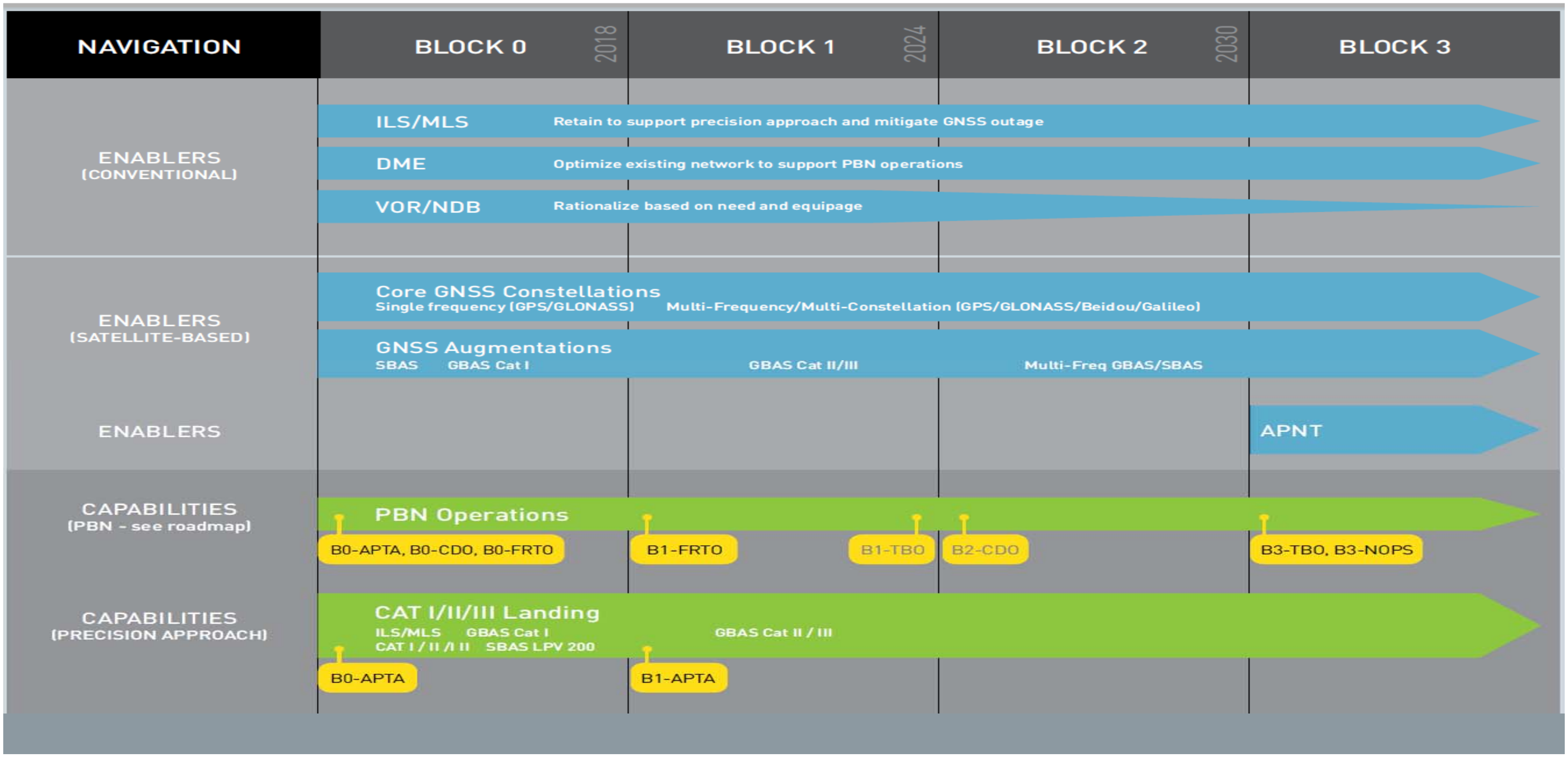
GANP Navigation Roadmap



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GANP 2016 KPIs

KPA	EFFICIENCY		CAPACITY		PREDICTABILITY	
FOCUS AREA(S)	ADDITIONAL FLIGHT TIME & DISTANCE	ADDITIONAL FUEL BURNS	CAPACITY, THROUGHPUT & UTILIZATION	CAPACITY SHORTFALL & ASSOCIATED DELAY	PUNCTUALITY	VARIABILITY
CORE KPIs	**KPI02** Taxi-Out Additional Time **KPI13** Taxi-In Additional Time		**KPI09** Airport Peak Arrival Capacity **KPI10** Airport Peak Arrival Throughput		**KPI01** Departure punctuality **KPI14** Arrival Punctuality	**KPI15** Flight time variability
ADDITIONAL KPIs	**KPI04** Filed Flight Plan en-Route Extension **KPI05** Actual en-Route Extension **KPI08** Additional time in terminal airspace	**KPI16** Additional fuel burn	**KPI06** En-Route Airspace Capacity **KPI11** Airport Arrival Capacity Utilization	**KPI07** En-Route ATFM delay **KPI12** Airport/ Terminal ATFM Delay	**KPI03** ATFM slot adherence	

ASBU Block 1 – APTA and CDO (2016)

B1-APTA Optimized airport accessibility

To progress further with the universal implementation of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) approaches. PBN and GLS (CAT II/III) procedures to enhance the reliability and predictability of approaches to runways increasing safety, accessibility and efficiency.

Applicability

This Module is applicable to all runway ends.

Benefits

Efficiency	Cost savings related to the benefits of lower approach minima: fewer diversions, overflights, cancellations and delays. Cost savings related to higher airport capacity by taking advantage of the flexibility to offset approaches and define displaced thresholds.
Environment	Environmental benefits through reduced fuel burn.
Safety	Stabilized approach paths.

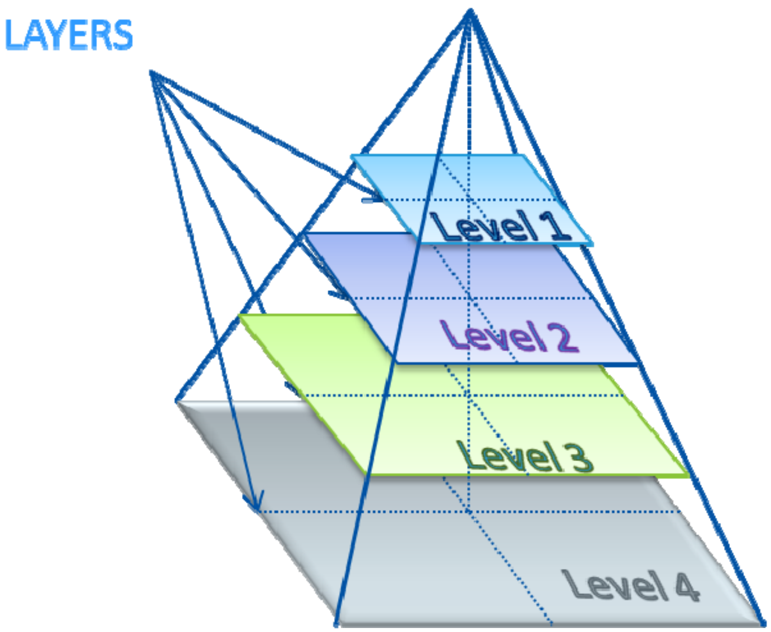
Cost

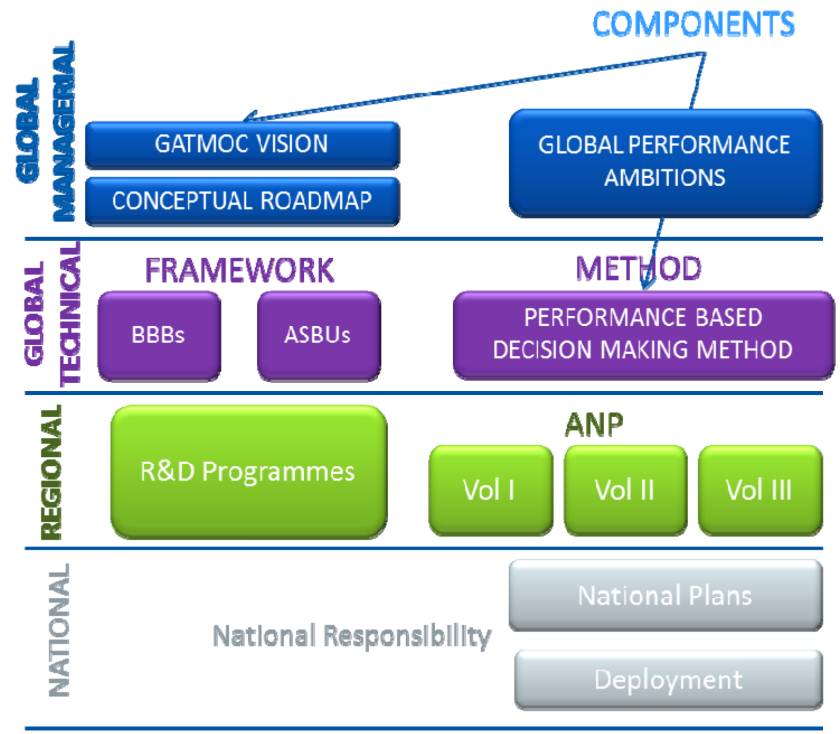
Aircraft operators and ANSPs can quantify the benefits of lower minima by modelling airport accessibility with existing and new minima. Operators can then assess benefits against avionics and other costs. The GLS CAT II/III business case needs to consider the cost of retaining ILS or MLS to allow continued operations during an interference event. The potential for increased runway capacity benefits with GLS is complicated at airports where a significant proportion of aircraft are not equipped with GLS avionics.

ASBU Block 1 – APTA and CDO (2016)

B1-CDO	Improved flexibility and efficiency in descent profiles (CDOs) using VNAV
	To enhance vertical flight path precision during descent, arrival, and to enable aircraft to fly an arrival procedure not reliant on ground-based equipment for vertical guidance. The main benefit is higher utilization of airports, improved fuel efficiency, increased safety through improved flight predictability and reduced radio transmission, and better utilization of airspace.
	Applicability
	Descent, arrival, flight in terminal area.
	Benefits
	Capacity: VNAV allows for added accuracy in a continuous descent operation (CDO). This capability allows for the potential to expand the applications of standard terminal arrival and departure procedures for improved capacity and throughput, and improve the implementation of precision approaches.
	Efficiency: Enabling an aircraft to maintain a vertical path during descent allows for development of vertical corridors for arriving and departing traffic thus increasing the efficiency of the airspace. Additionally, VNAV promotes the efficient use of airspace through the ability for aircraft to fly a more precisely constrained descent profile allowing the potential for further reduced separation and increased capacity.
	Environment: VNAV allows for reduced aircraft level-offs, resulting in lower emissions.
	Predictability: VNAV allows for enhanced predictability of flight paths which leads to better planning of flights and flows.
	Safety: Precise altitude tracking along a vertical descent path leads to improvements in overall system safety.
	Cost
	VNAV allows for reduced aircraft level-offs, resulting in fuel and time savings.

Creating a Multilayer Structure





https://www4.icao.int/ganpportal/ASBU

GANP 2019 KPIs

KPA	Efficiency			Capacity		Predictability	
Focus Area(s)	**Additional flight time & distance**	**Vertical flight efficiency**	**Additional fuel burn**	**Capacity, throughput & utilization**	**Capacity shortfall & associated delay**	**Punctuality**	**Variability**
Core KPIs	**KPI02** Taxi-out additional time **KPI13** Taxi-in additional time			**KPI09** Airport peak arrival capacity **KPI10** Airport peak arrival throughput		**KPI01** Departure punctuality **KPI14** Arrival punctuality	**KPI15** Flight time variability
Additional KPIs	**KPI04** Filed flight plan en-route extension **KPI05** Actual en-route extension **KPI08** Additional time in terminal airspace	**KPI17** Level-off during climb **KPI18** Level capping during cruise **KPI19** Level-off during descent	**KPI16** Additional fuel burn	**KPI06** En-route airspace capacity **KPI11** Airport arrival capacity utilization	**KPI07** En-route ATFM delay **KPI12** Airport/Terminal ATFM delay	**KPI03** ATFM slot adherence	

ASBU 2019 Framework basic definitions

Aviation System Block Upgrades (ASBUs): a global operational framework that allows all Member States to advance their air navigation capabilities based on their specific operational requirements.

ASBU Performance Improvement Area: main area of the air navigation system that requires improvement in order to achieve the vision outlined in the Global ATM Operational Concept.

ASBU Thread: key feature area of the air navigation system that needs improvement in order to achieve the vision outlined in the Global ATM Operational Concept.

ASBU Element: a specific change in operations designed to improve the performance of the air navigation system under specified operational conditions.

ASBU Enabler: component (standards, procedures, training, technology, etc.) required to implement an element.

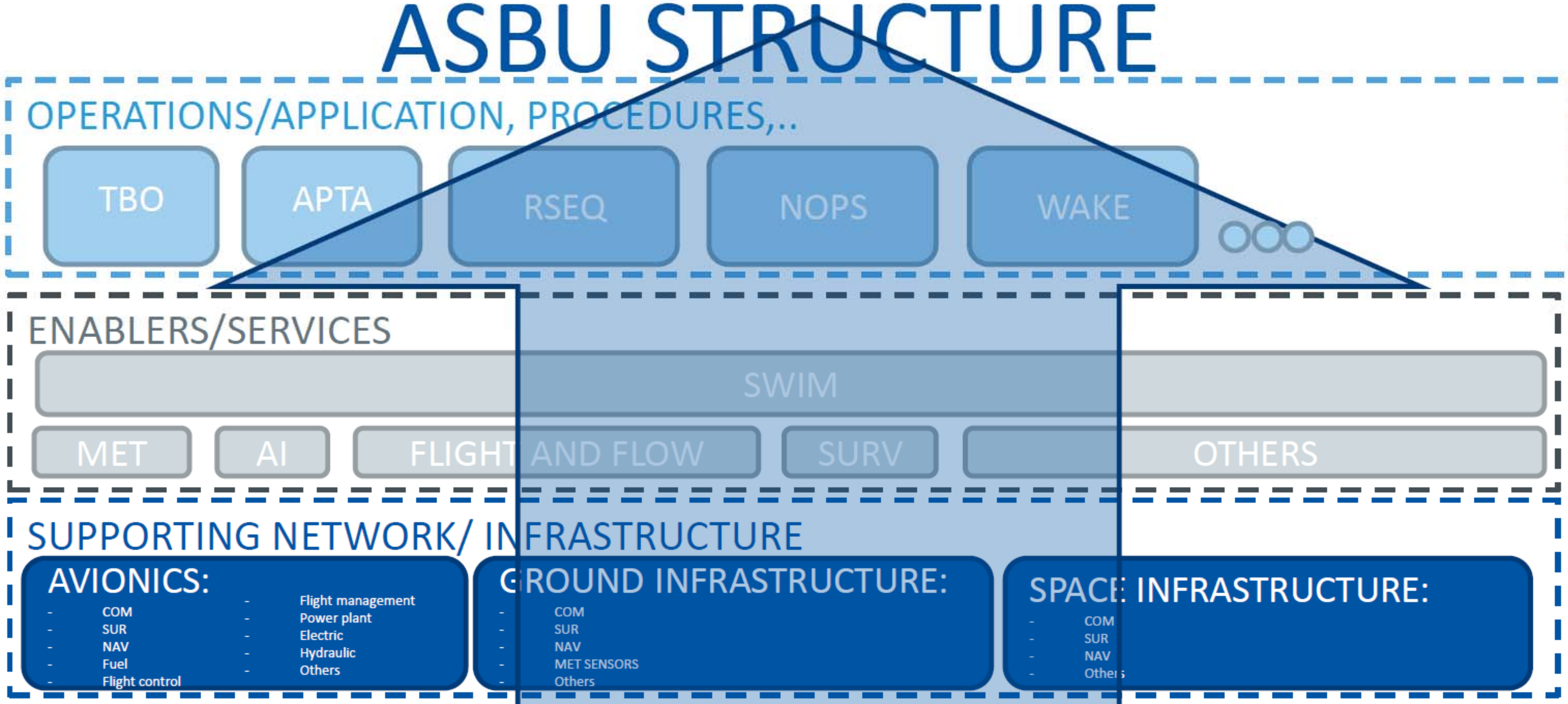
ASBU Block: a six year timeframe whose starting date defines a deadline for an element to be available for implementation.

ASBU Module: a group of elements from a thread that, according to the enablers' roadmap, will be available for implementation within the defined deadline established by the ASBU Block.

Key Performance Areas: expectations of the ATM community as defined in Doc 9854 "Global ATM Operational Concept".

Key Performance Indicator: specific and measurable metric within a key performance area.

ASBU STRUCTURE



ASBU Block 0 – APTA (2019)

APTA-B0/1	PBN Approaches (with basic capabilities)
APTA-B0/2	PBN SID and STAR procedures (with basic capabilities)
APTA-B0/3	Cat I Precision Approach Procedures
APTA-B0/4	PBN transitions to/from xLS (with basic capabilities)
APTA-B0/5	PBN Operations for helicopters (with basic capabilities)
APTA-B0/6	CCO and CDO (Basic)
APTA-B0/7	Performance based Aerodrome Operating Minima

ASBU Block 1 – APTA (2019)

APTA-B1/1	PBN Approaches (with advanced capabilities)
APTA-B1/2	PBN SID and STAR procedures (with advanced capabilities)
APTA-B1/3	GBAS CAT II/III precision approach procedures
APTA-B1/4	PBN to and from xLS transitions – with advanced capabilities
APTA-B1/5	SID and STAR transitions
APTA-B1/6	Simultaneous operations to parallel runways
APTA-B1/7	PBN Operations for helicopters (with advanced capabilities)
APTA-B1/8	VPT RNAV Operations
APTA-B1/9	Performance-based aerodrome operating minima (Ground Infrastructure)
APTA-B1/10	Performance-based aerodrome operating minima (Airborne equipment)
APTA-B1/11	CCO and CDO (Advanced)

The meeting is invited to:

a) review and update the status of PBN implementation in the MID Region;

b) take into consideration the latest developments related to the update of GANP and ASBU framework during the discussions on the u[date of the MID Air Navigation Strategy Part related to PBN;

c) urge States to take actions to meet the agreed regional targets; and

d) encourage States to participate in the ACAO/ICAO Symposium (Cairo, Egypt, 9-12 March 2020)

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THANK YOU