ICAO CAPACITY AND EFFICIENCY

AIR NAVIGATION REPORT

ICAO Middle East Region

Third Edition

Reference Period (Jan-Dec 2018)

Disclaimer

TABLE OF CONTENTS

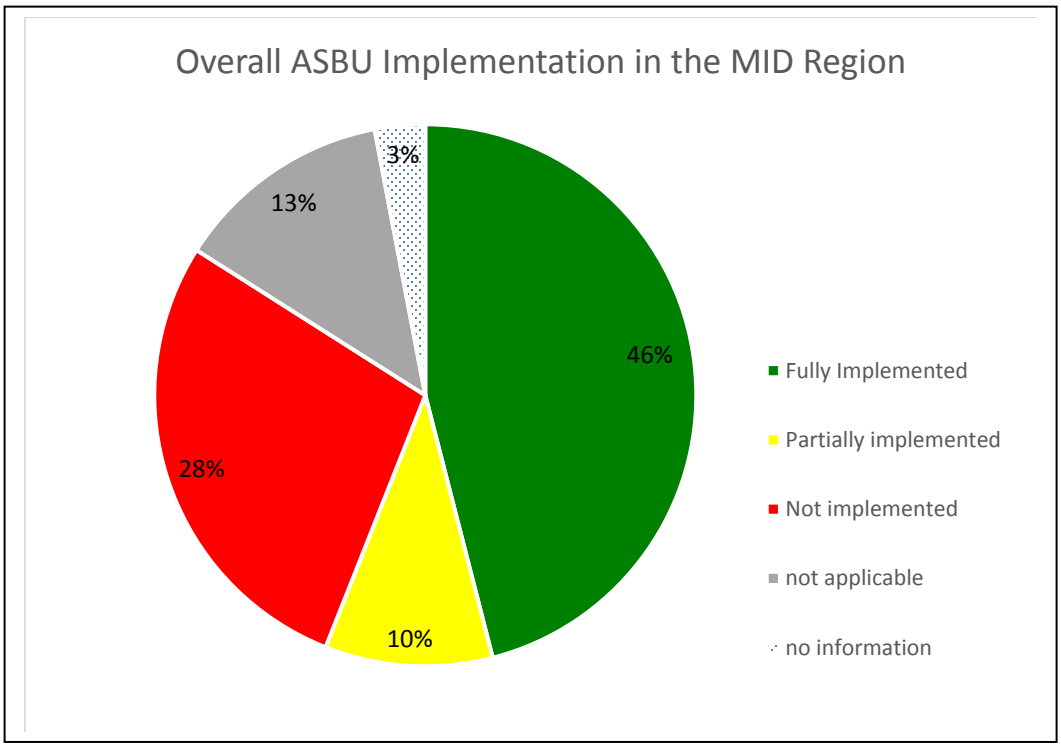
EXECUTIVE SUMMARY

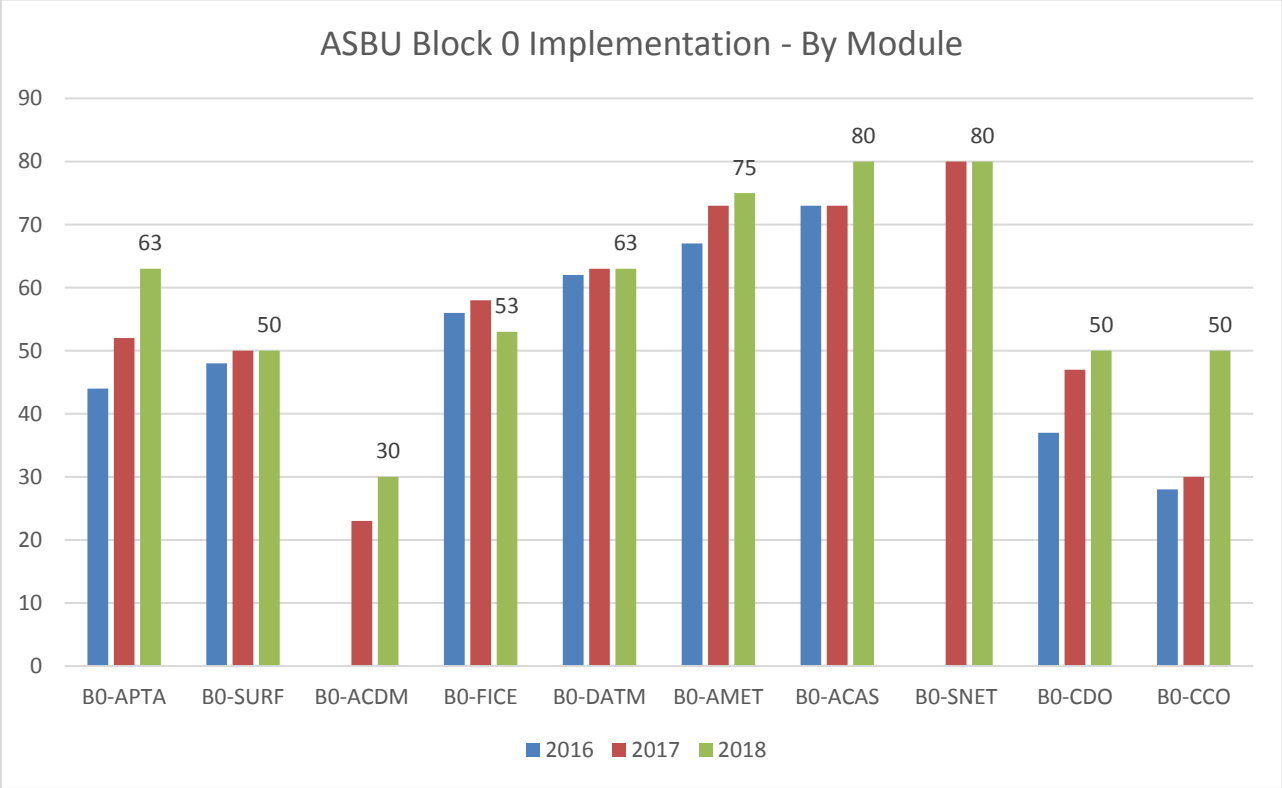
The Third Edition of the ICAO MID Air Navigation Report (2018) provides an overview of the status of implementation of the Priority 1 ASBU Block 0 Modules in the MID Region as well as the progress achieved by MID States compared to the Second Edition of the MID Air Navigation Report (2017).

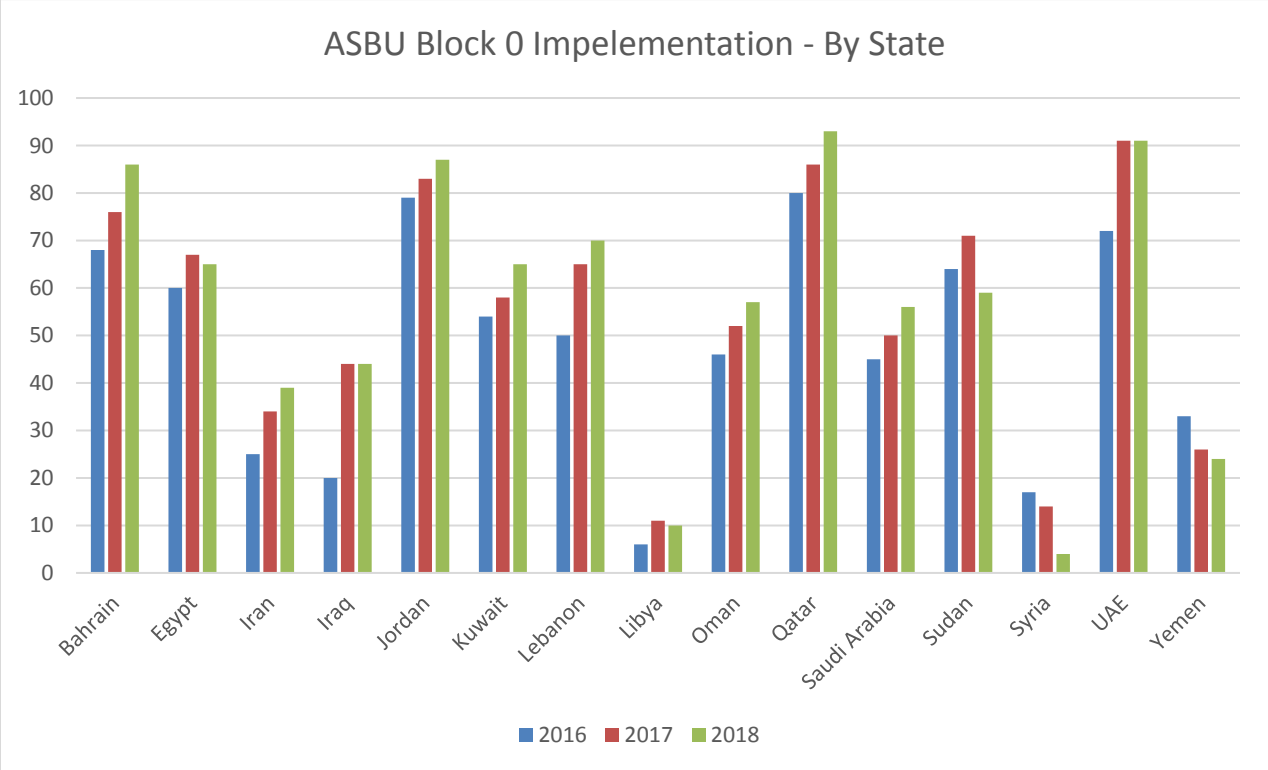
The main part of the document includes Section 2, which provides the status of implementation and the Regional Dashboard for the Priority 1 ASBU Block 0 Modules in the MID Region through different statistical maps and charts.

This Section will be complemented by providing the Outlook 2020 of the Region in Section 3 and environmental protection matters in Section 4. Section 5 provides some best practices/success story of Oman in the implementation of ASBU Block 0 Modules.

To summarize the implementation status and progress of ASBU Block 0 Modules, the following ASBU Block 0 Implementation Dashboards present status and progress achieved in the implementation of each Module and by State. Detailed status is provided in Section 2.







Note 1 – utmost care was taken in the calculation of percentages, figures and numbers, however the statistics and graphs in this report should be considered as approximate amounts.
Note 2 – progress of States from June to December 2018 may be from the States implementation as well as some changes in the Modules structure (i.e. definition of applicable AIDC/OLDI for B0-FICE)

1. INTRODUCTION

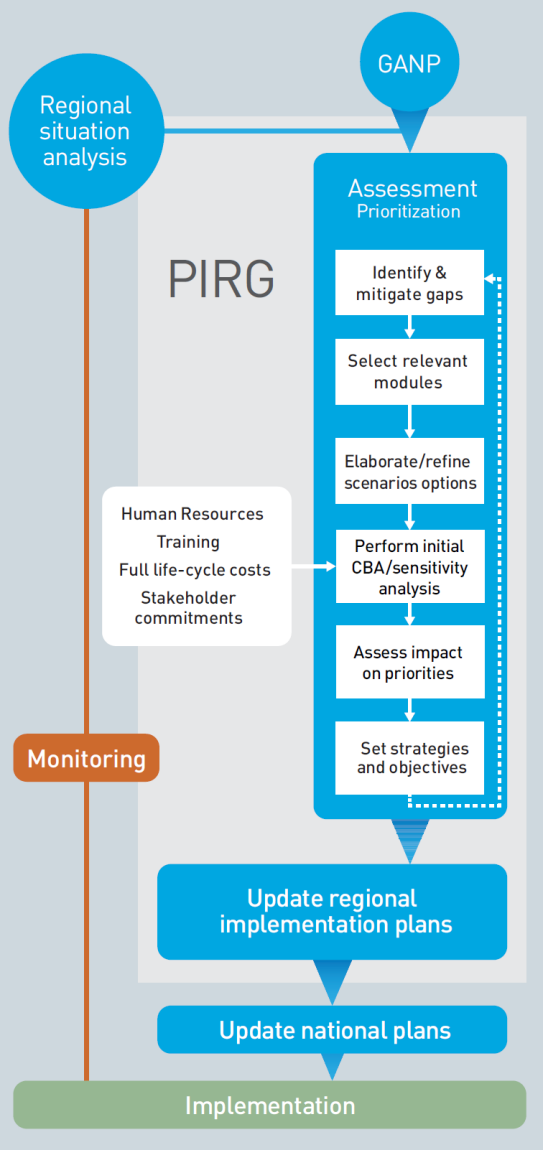
1.1 Objectives

The third edition of the ICAO MID Region Air Navigation Report presents an overview of the planning and implementation progress for the Priority 1 ASBU Block 0 Modules (and its detailed elements) within the ICAO MID Region during the reporting period January till December 2018.

The implementation status data covers the fifteen (15) ICAO MID States.

GANP states that the regional national planning process should be aligned and used to identify those Modules which best provide solutions to the operational needs identified. Depending on implementation parameters such as the complexity of the operating environment, the constraints and the resources available, regional and national implementation plans will be developed in alignment with the GANP. Such planning requires interaction between stakeholders including regulators, users of the aviation system, the air navigation service providers (ANSPs), aerodrome operators and supply industry, in order to obtain commitments to implementation.

Accordingly, deployments on a global, regional and sub-regional basis and ultimately at State level should be considered as an integral part of the global and regional planning process through the Planning and Implementation Regional Groups (i.e. MIDANPIRG). The PIRG process will further ensure that all required supporting procedures, regulatory approvals and training capabilities are set in place. These supporting requirements will be reflected in regional online Air Navigation Plan (MID eANPs) developed by MIDANPIRG, ensuring strategic transparency, coordinated progress and certainty of investment. In this way, deployment arrangements including applicability dates can also be agreed and collectively applied by all stakeholders involved in the Region. The MID Region Air Navigation Report which contains all information on the implementation process of the Priority 1 ASBU Modules of the MID Region Air Navigation Strategy (MID Doc 002) is the key document for MIDANPIRG and its Subsidiary Bodies to monitor and analyze the implementation within the MID Region.



Regional Planning

1.2 Background

Following the discussions and recommendations from the Twelfth Air Navigation Conference (AN-Conf/12), the Fourth Edition of the Global Air Navigation Plan (GANP) based on the Aviation Systems Block Upgrades (ASBU) approach was endorsed by the 38th Assembly of ICAO in October 2013. The Assembly Resolution 38-02 which agreed, amongst others, to call upon States, planning and implementation regional groups (PIRGs), and the aviation industry to provide timely information to ICAO (and to each other) regarding the implementation status of the GANP, including the lessons learned from the implementation of its provisions and to invite PIRGs to use ICAO standardized tools or adequate regional tools to monitor and (in collaboration with ICAO) analyze the implementation status of air navigation systems.

The Sixth meeting of the MIDANPIRG Steering Group (MSG/6) which was held in Cairo, Egypt from 3 to 5 December 2018 endorsed the revised version of the MID Region Air Navigation Strategy - MID Doc 002.

MIDANPIRG and its Subsidiary Bodies (in particular ANSIG) monitor the progress and the status of implementation of the ASBU Block 0 Modules in the MID Region.

Doha Declaration, which was endorsed by the third meeting of Directors General of Civil Aviation (DGCA-MID/3) (Doha, Qatar, 27-29 April 2015), has set five Targets for the Air Navigation Capacity and Efficiency, as follows:

1- *Optimization of Approach Procedures including vertical guidance (PBN):* Implement PBN approach procedures with vertical guidance, for all runways ends at international aerodromes, either as the primary approach or as a back-up for the precision approaches by 2017

2- *Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration:* 11 States to implement AIDC/OLDI between their ACCs and at least one adjacent ACC by 2017

3- *Service Improvement through Digital Aeronautical Information Management:* All States to complete implementation of Phase I of the transition from AIS to AIM by 2017

4- *Meteorological information supporting enhanced operational efficiency and safety:* 12 States to complete the implementation of QMS for MET by 2017

5- *ACAS Improvement:* All States require carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons by 2017

The MID Region Air Navigation Report is an integral part of the air navigation planning and implementation process in the MID Region; and the main tool for the monitoring and assessing the implementation of Air Navigation Systems and ASBUs in the MID Region.

1.3 Scope

This MID Air Navigation Report addresses the implementation status of the priority 1 ASBU Block 0 Modules for the reference period January 2017 to December 2018.

The Report covers the fifteen (15) ICAO MID States:

Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, Sudan, Syria, United Arab Emirates and Yemen.

ICAO MID Region

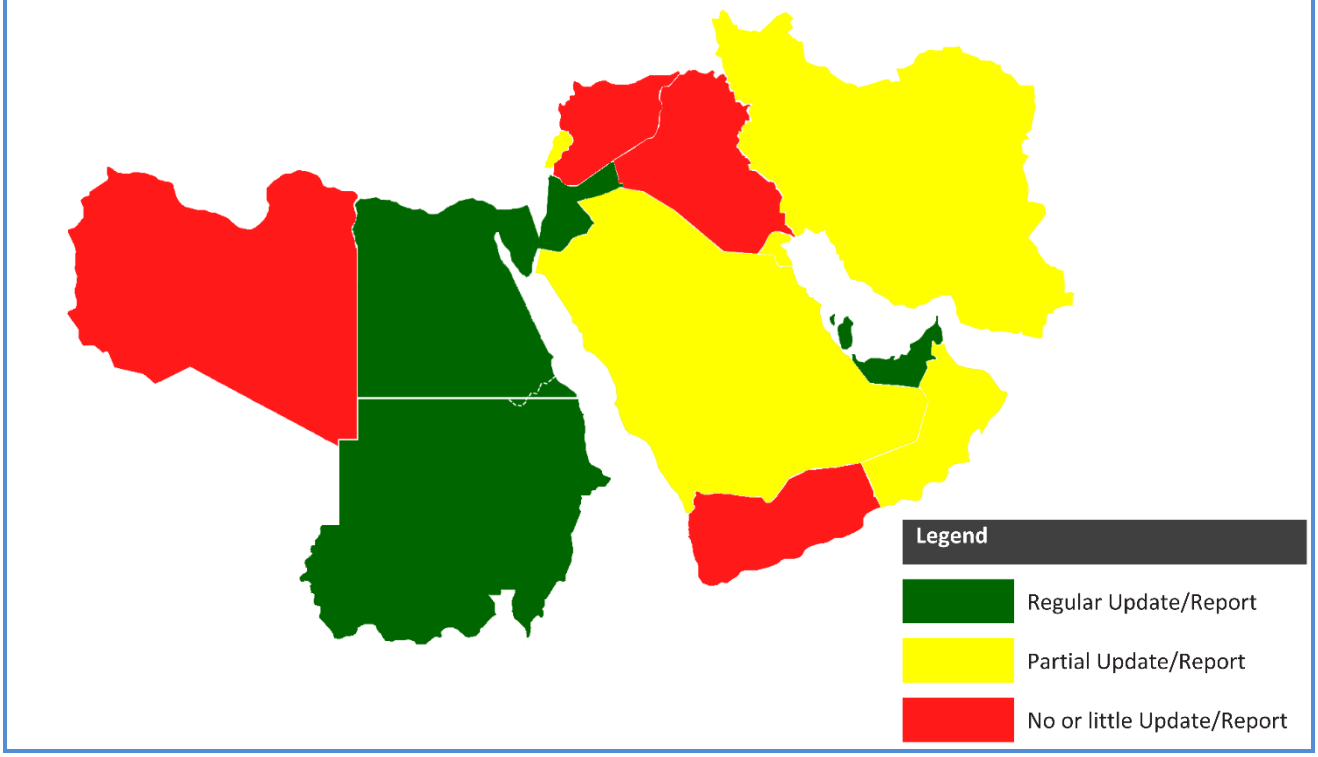
1.4 Collection of data

For the purpose of collecting necessary data for the MID Air Navigation Report-2018, a State Letter Ref.: AN AN 1/7 – 18/408 was issued on 19 December 2018, to follow-up on the MSG Conclusion 6/4, which urged States to provide the relevant data necessary for the development of the MID Region Air Navigation Report-2018. However, some States did not respond to the State Letter. The status of reporting by States is shown in the following map.

Data collected from States was complemented by some updates provided mainly through the MIDANPIRG Subsidiary Bodies and the MID eANP Volume III.

Where the required data was not provided, it is indicated in the Report by color coding (Missing Data).

Status of Reporting by States



1.5 Structure of the Report

Executive Summary provides an overall review of the ASBU Block 0 implementation in the MID Region.

Section 1 (Introduction) presents the objective and background of the report as well as the scope covered and method of data collection.

Section 2 lists the priority 1 ASBU Block 0 Modules in the MID Region and presents the status of their implementation and their progress in graphical and numeric form.

Section 3 presents the ASBU Block 0 implementation outlook for 2020 in the MID Region.

Section 4 provides an update on the State's CO2 action plans and presents an estimation of environmental benefits, in terms of CO2 emissions reduction, accrued from the implementation of some ASBU Block 0 Modules in the MID Region.

Section 5 includes success story related to the NCLB activities and implementation of ASBU Block 0 Modules, as well as its associated operational improvements and environmental benefits.

Section 6 concludes the Report by providing a brief analysis on the status of implementation and the progress of the different priority 1 ASBU Block 0 Modules.

Appendix A provides detailed status of the implementation of Priority 1 Block 0 Modules and their associated Elements for the MID States.

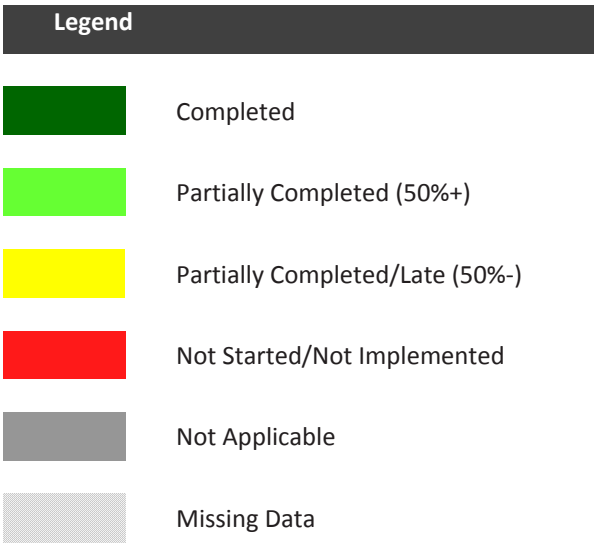
Appendix B illustrates the detailed status of implementation of ASBU Block 0 Modules in the MID States by 2020.

2. STATUS AND PROGRESS OF ASBU IMPLEMENTATION

The ICAO Block Upgrades refer to the target availability timelines for a group of operational improvements (technologies and procedures) that will eventually realize a fully-harmonized global Air Navigation System. The technologies and procedures for each Block have been organized into unique Modules which have been determined and cross-referenced based on the specific Performance Improvement Area to which they relate.

Block 0 Modules are characterized by operational improvements which have already been developed and implemented in many parts of the world. It therefore has a near-term implementation period of 2013–2018, whereby 2013 refers to the availability of all components of its particular performance modules and 2018 refers to the target implementation deadline. ICAO has been working with its Member States to help each determine exactly which capabilities they should have in place based on their unique operational requirements.

This chapter of the report gives an overview of the status of implementation for each of the Priority 1 ASBU Block 0 Modules for the MID States. The status of implementation of each Module versus its target(s) is also provided for each priority 1 ASBU Block 0 Module. The following color scheme is used for illustrating the status of implementation:



Note – Missing data is excluded in the calculation of the average regional status of implementation.

2.1 MID Region ASBU Block 0 Modules Prioritization

This report covers twelve (out of eighteen) ASBU Block 0 Modules that have been determined by MIDANPIRG/MSG as priority 1 for the MID Region (MID Doc 002 Edition February 2017, refers).

Module Code	Module Title	Priority	Start Date	Monitoring		Remarks
				Main	Supporting	
***Performance Improvement Areas (PIA) 1*: Airport Operations**						
B0-APTA	Optimization of Approach Procedures including vertical guidance	1	2014	PBN SG	ATM SG, AIM SG, CNS SG	
B0-WAKE	Increased Runway Throughput through Optimized Wake Turbulence Separation	2				
B0-RSEQ	Improve Traffic flow through Runway Sequencing (AMAN/DMAN)	2				
B0-SURF	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)	1	2014	ANSIG	CNS SG	Coordination with RGS WG
B0-ACDM	Improved Airport Operations through Airport-CDM	1	2014	ANSIG	CNS SG, AIM SG, ATM SG	Coordination with RGS WG
Performance Improvement Areas (PIA) 2 Globally Interoperable Systems and Data Through Globally Interoperable System Wide Information Management						
B0-FICE	Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration	1	2014	CNS SG	AIM SG, ATM SG	
B0-DATM	Service Improvement through Digital Aeronautical Information Management	1	2014	AIM SG		
B0-AMET	Meteorological information supporting enhanced operational efficiency and safety	1	2014	MET SG		
Performance Improvement Areas (PIA) 3 Optimum Capacity and Flexible Flights – Through Global Collaborative ATM						
B0-FRTO	Improved Operations through Enhanced En-Route Trajectories	1	2014	ATM SG		
B0-NOPS	Improved Flow Performance through Planning based on a Network-Wide view	1	2014			
B0-ASUR	Initial capability for ground surveillance	2				

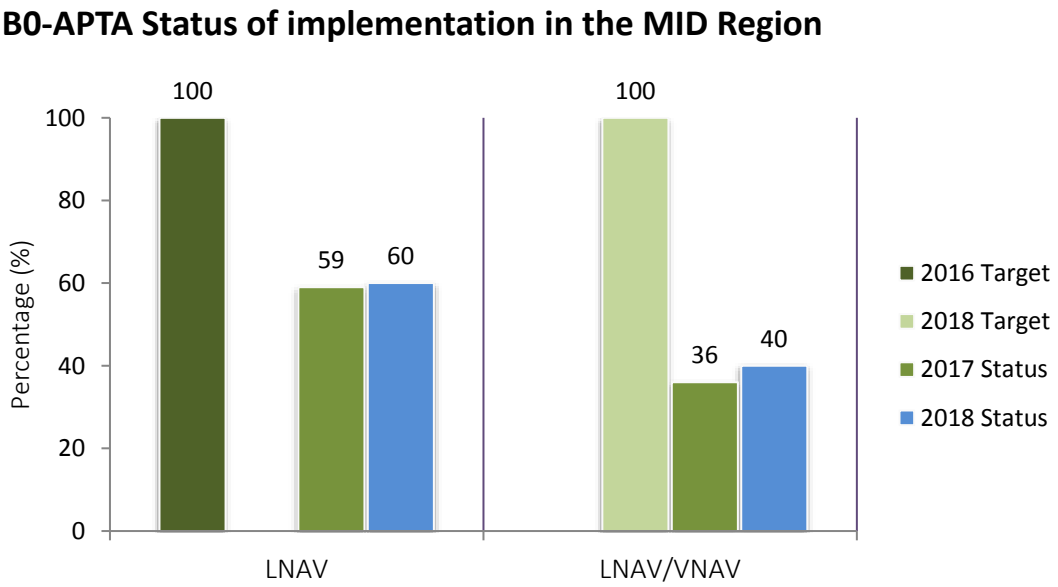
B0-ASEP	Air Traffic Situational Awareness (ATSA)	2				
B0-OPFL	Improved access to optimum flight levels through climb/descent procedures using ADS-B	2				
B0-ACAS	ACAS Improvements	1	2014	CNS SG		
B0-SNET	Increased Effectiveness of Ground-Based Safety Nets	1	2017	ATM SG		
Performance Improvement Areas (PIA) 4 Efficient Flight Path – Through Trajectory-based Operations						
B0-CDO	Improved Flexibility and Efficiency in Descent Profiles (CDO)	1	2014	PBN SG		
B0-TBO	Improved Safety and Efficiency through the initial application of Data Link En-Route	2		ATM SG	CNS SG	
B0-CCO	Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)	1	2014	PBN SG		

2.2 ASBU Implementation Status and Progress in the MID Region

2.2.1 B0-APTA

The use of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) procedures will enhance the reliability and predictability of approaches to runways, thus increasing safety, accessibility and efficiency. This is possible through the application of Basic global navigation satellite system (GNSS), Baro vertical navigation (VNAV), satellite-based augmentation system (SBAS) and GLS. The flexibility inherent in PBN approach design can be exploited to increase runway capacity.

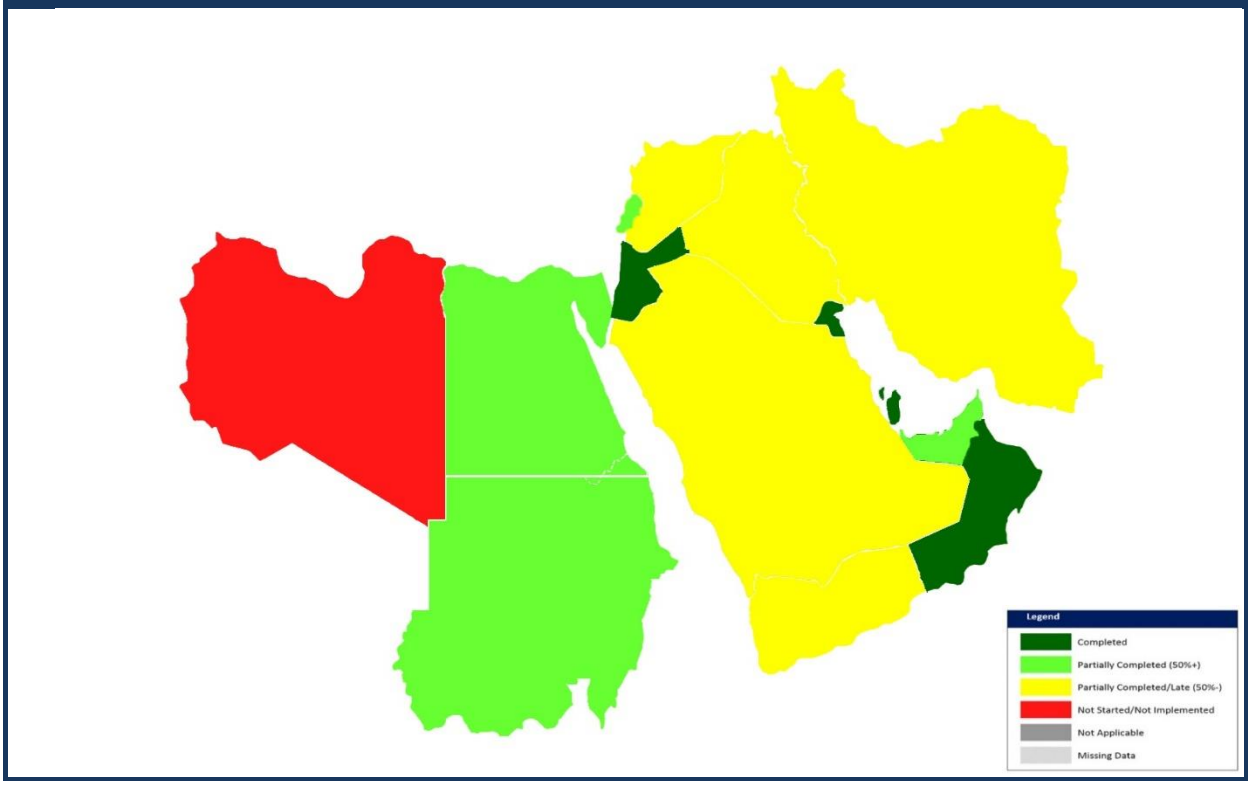
B0 – APTA: Optimization of Approach Procedures including vertical guidance				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
LNAV	All RWYs Ends at International Aerodromes	Indicator: % of runway ends at international aerodromes with RNAV(GNSS) Approach 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



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-APTA	LNAV															
	LNAV/VNAV															

The progress for B0-APTA is reasonable (with approximately 50 % implementation).

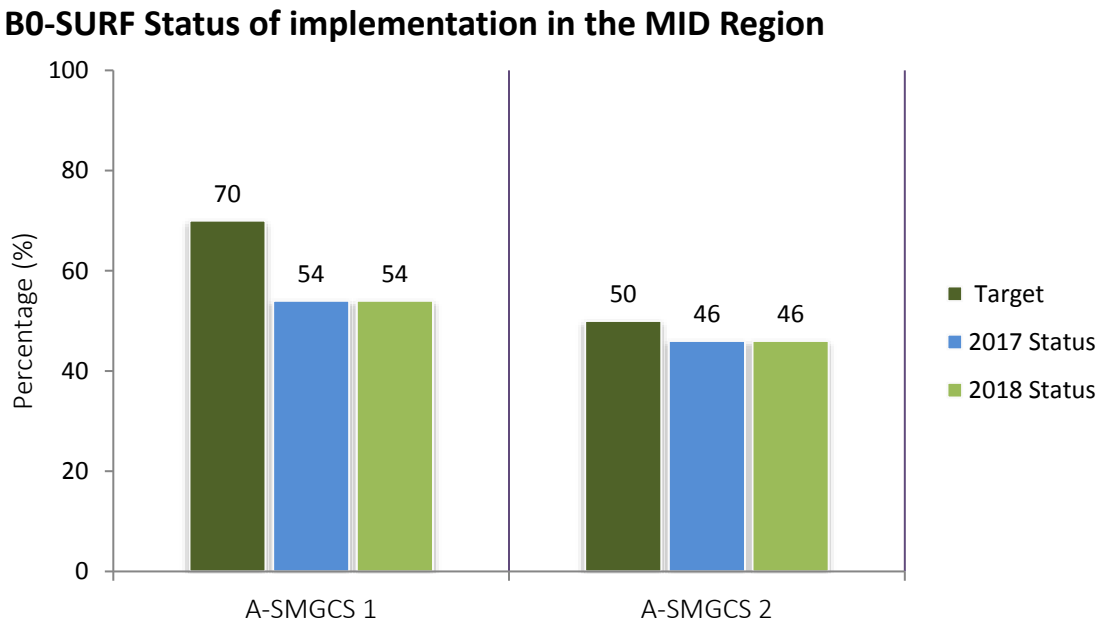
B0-APTA Status of implementation in the MID Region



2.2.2 B0-SURF

Basic A-SMGCS provides surveillance and alerting of movements of both aircraft and vehicles on the aerodrome thus improving runway/aerodrome safety. ADS-B information is used when available (ADS-B APT).

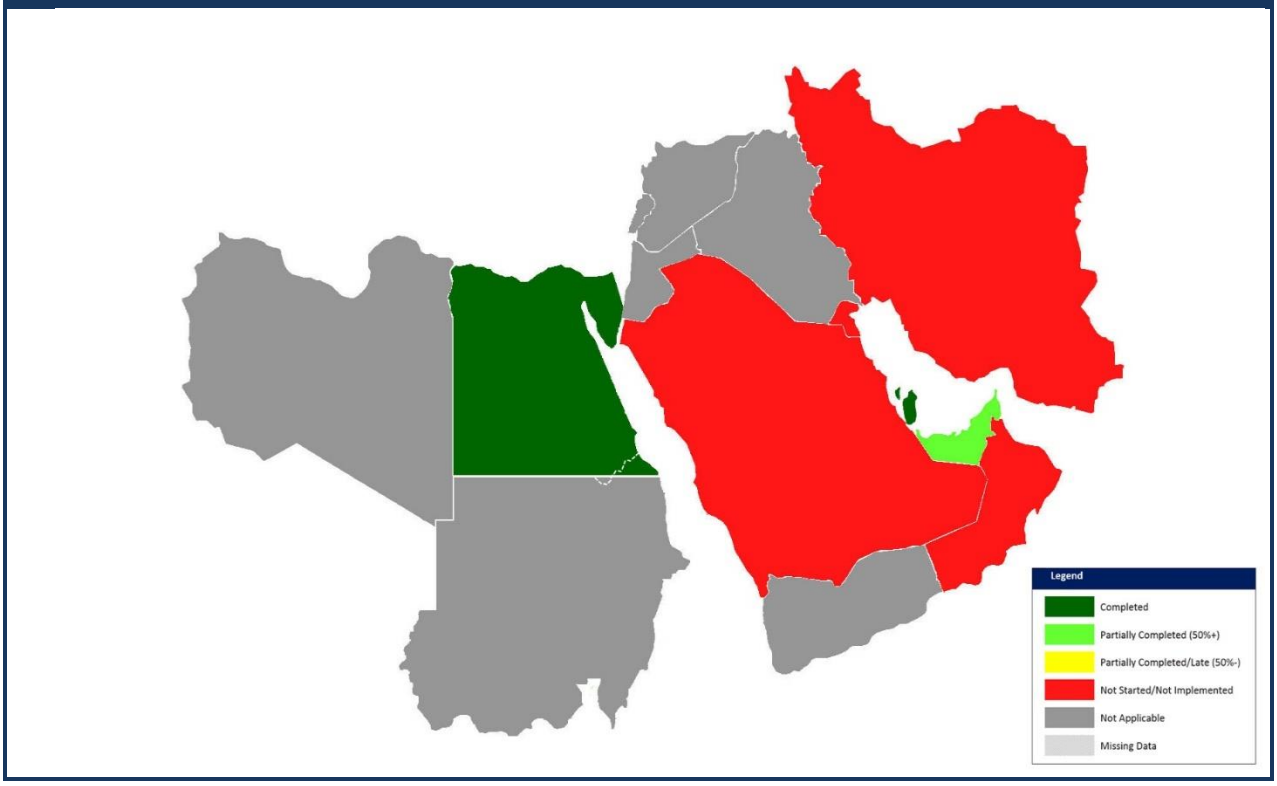
B0-SURF: Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
A-SMGCS Level 1*	OBBI, HECA, OIII, OKBK, OOMS, OTBD, OTHH, OEDF, OEJN, OERK, OMDB, OMAA, OMDW	Indicator: % of applicable international aerodromes having implemented A-SMGCS Level 1 Supporting Metric: Number of applicable international aerodromes having implemented A-SMGCS Level 1	70%	Dec. 2017
A-SMGCS Level 2*	OBBI, HECA, OIII, OKBK, OOMS, OTBD, OTHH, OEJN, OERK, OMDB, OMAA, OMDW	Indicator: % of applicable international aerodromes having implemented A-SMGCS Level 2 Supporting Metric: Number of applicable international aerodromes having implemented A-SMGCS Level 2	50%	Dec. 2017



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-SURF	A-SMGCS Level 1															
	A-SMGCS Level 2															

The progress for B0-SURF is <u>good</u> (with approximately 50% implementation). B0-SURF is not applicable for 7 States.

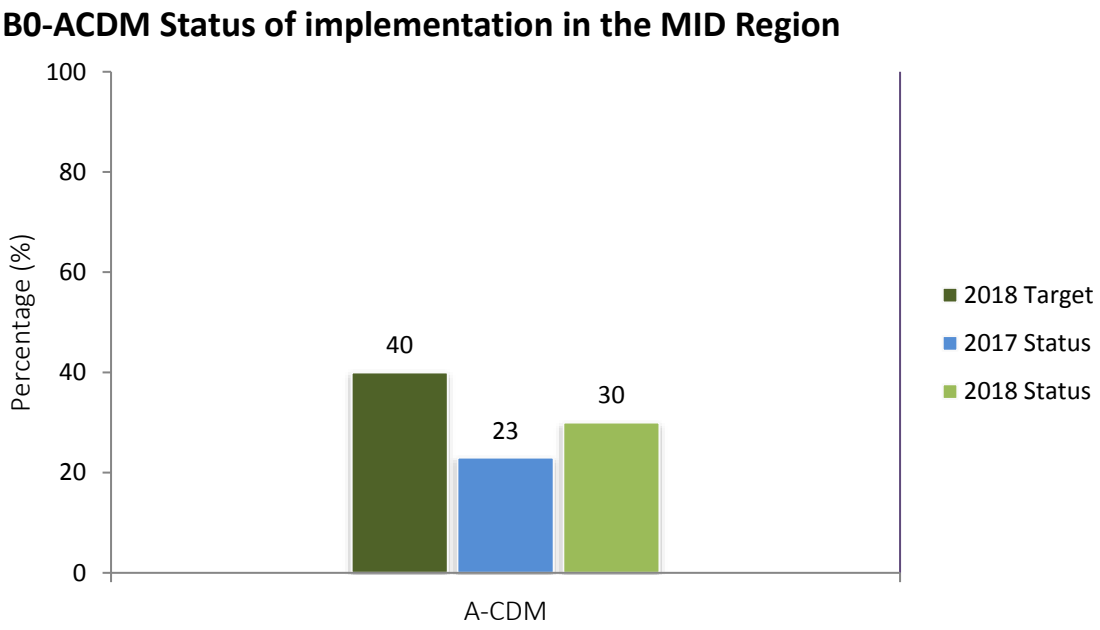
B0-SURF Status of implementation in the MID Region



2.2.3 B0-ACDM

To implement collaborative applications that will allow the sharing of surface operations data among the different stakeholders on the airport. This will improve surface traffic management reducing delays on movement and maneuvering areas and enhance safety, efficiency and situational awareness.

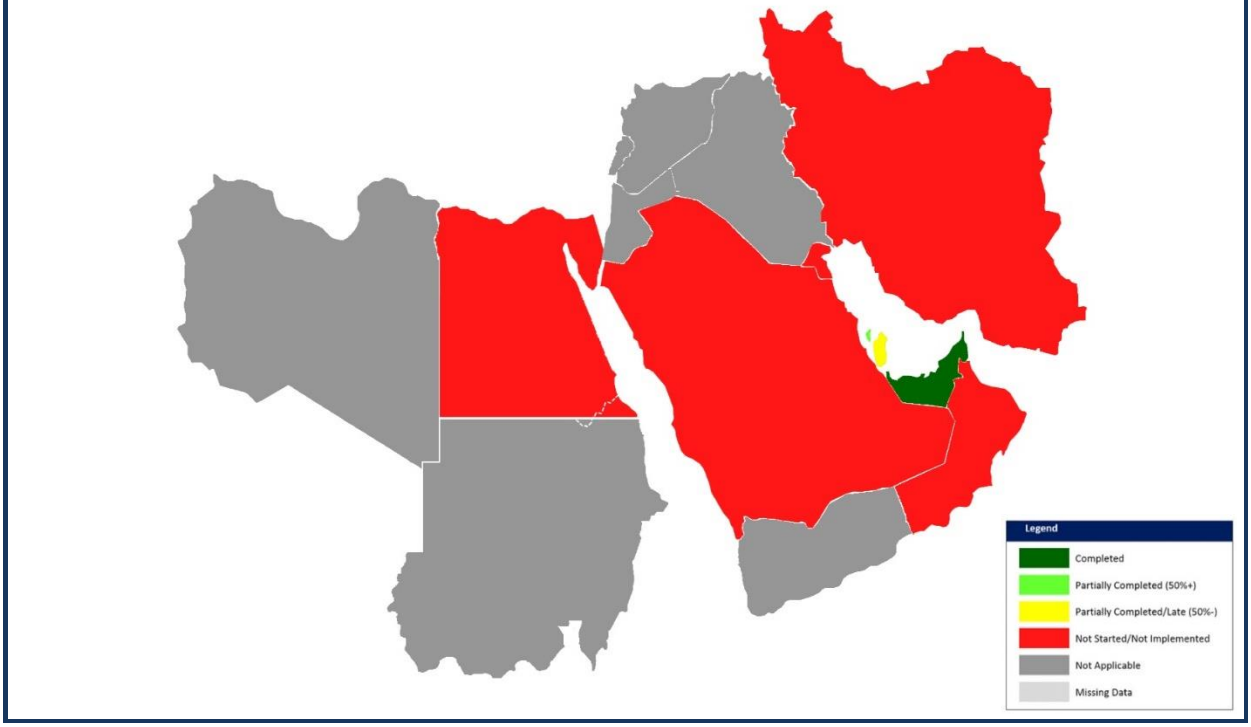
B0 – ACDM: Improved Airport Operations through Airport-CDM				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
A-CDM	OBBI, HECA, OIII, OKBK, OOMS, OTBD, OTHH, OEJN, OERK, OMDB, OMAA	Indicator: % of applicable international aerodromes having implemented improved airport operations through airport-CDM Supporting metric: Number of applicable international aerodromes having implemented improved airport operations through airport-CDM	50%	Dec. 2018



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-ACDM	A-CDM															

The progress for B0-ACDM is very slow (with approximately 30% implementation. Nevertheless, implementation is ongoing in some States.

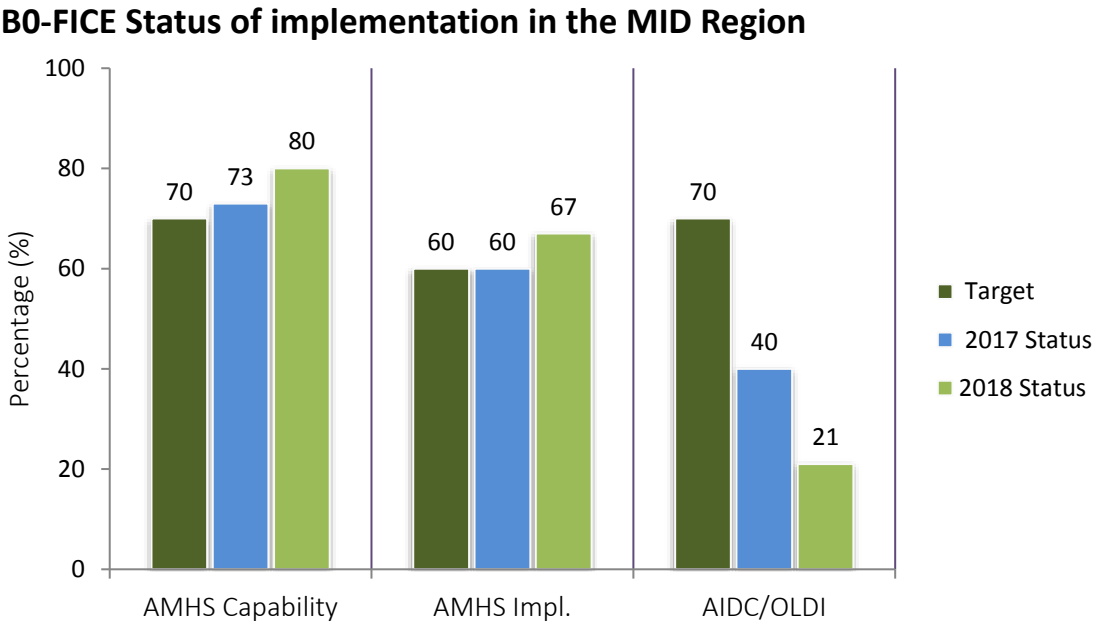
B0-ACDM Status of implementation in the MID Region



2.2.4 B0-FICE

To improve coordination between air traffic service units (ATSUs) by using ATS Interfacility Data Communication (AIDC) defined by the ICAO *Manual of Air Traffic Services Data Link Applications* (Doc 9694). The transfer of communication in a data link environment improves the efficiency of this process particularly for oceanic ATSUs.

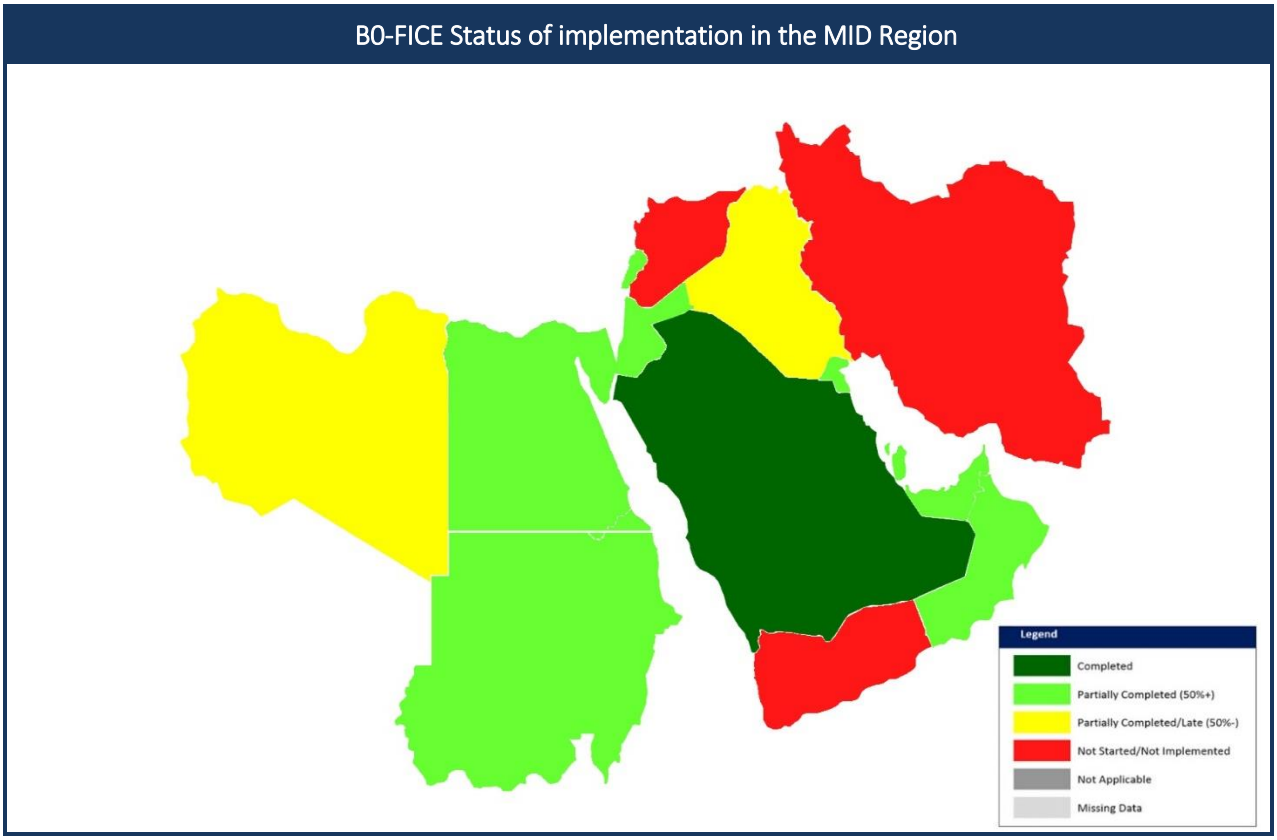
B0 – FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
AMHS capability	All States	Indicator: % of States with AMHS capability Supporting metric: Number of States with AMHS capability	70%	Dec. 2017
AMHS implementation /interconnection	All States	Indicator: % of States with AMHS implemented (interconnected with other States AMHS) Supporting metric: Number of States with AMHS implemented (interconnections with other States AMHS)	60%	Dec. 2017
Implementation of AIDC/OLDI between adjacent ACCs	As per the AIDC/OLDI Applicability Table*	Indicator: % of priority 1 AIDC/OLDI Interconnection have been implemented Supporting metric: Number of AIDC/OLDI interconnections implemented between adjacent ACCs	70%	Dec. 2020



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-FICE	AMHS capability															
	AMHS impl. /interconnection															
	Implementation of AIDC/OLDI between adjacent ACCs															

The progress for B0-FICE is reasonable (with approximately 53% implementation). However, the AIDC/OLDI implementation in 2018 decreased due to definition of new applicability area as agreed in MSG/6 meeting (3-5 December 2018, Egypt).

B0-FICE Status of implementation in the MID Region

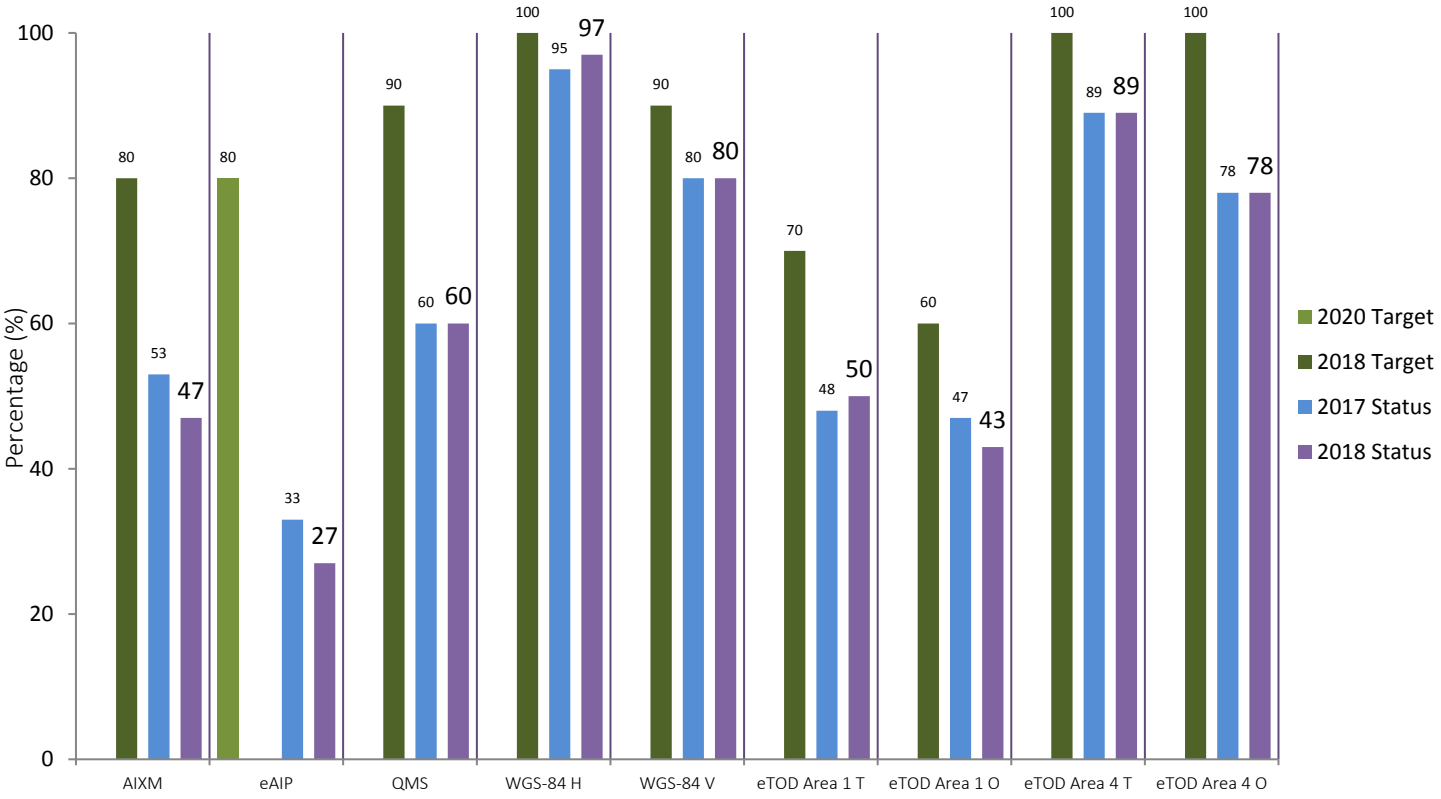


2.2.5 B0-DATM

The initial introduction of digital processing and management of information, through aeronautical information service (AIS)/aeronautical information management (AIM) implementation, use of aeronautical information exchange model (AIXM), migration to electronic aeronautical information publication (AIP) and better quality and availability of data.

B0 – DATM: Service Improvement through Digital Aeronautical Information Management				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
AIXM	All States	Indicator: % of States that have implemented an AIXM-based AIS database Supporting Metric: Number of States that have implemented an AIXM-based AIS database	80%	Dec. 2018
eAIP	All States	Indicator: % of States that have implemented an IAID driven AIP Production (eAIP) Supporting Metric: Number of States that have implemented an IAID driven AIP Production (eAIP)	80%	Dec. 2020
QMS	All States	Indicator: % of States that have implemented QMS for AIS/AIM Supporting Metric: Number of States that have implemented QMS for AIS/AIM	90%	Dec. 2018
WGS-84	All States	Indicator: % of States that have implemented WGS-84 for horizontal plan (ENR, Terminal, AD) Supporting Metric: Number of States that have implemented WGS-84 for horizontal plan (ENR, Terminal, AD) Indicator: % of States that have implemented WGS-84 Geoid Undulation Supporting Metric: Number of States that have implemented WGS-84 Geoid Undulation	Horizontal: 100% Vertical: 90%	Dec. 2018 Dec. 2018
Agreement with data originators	All States	Indicator: % of States that have signed Service Level Agreements (SLA) with at least 50% of their AIS data originators Supporting Metric: Number of States that have signed Service Level Agreements (SLA) with at least 50% of their AIS data originators	80%	Dec. 2020

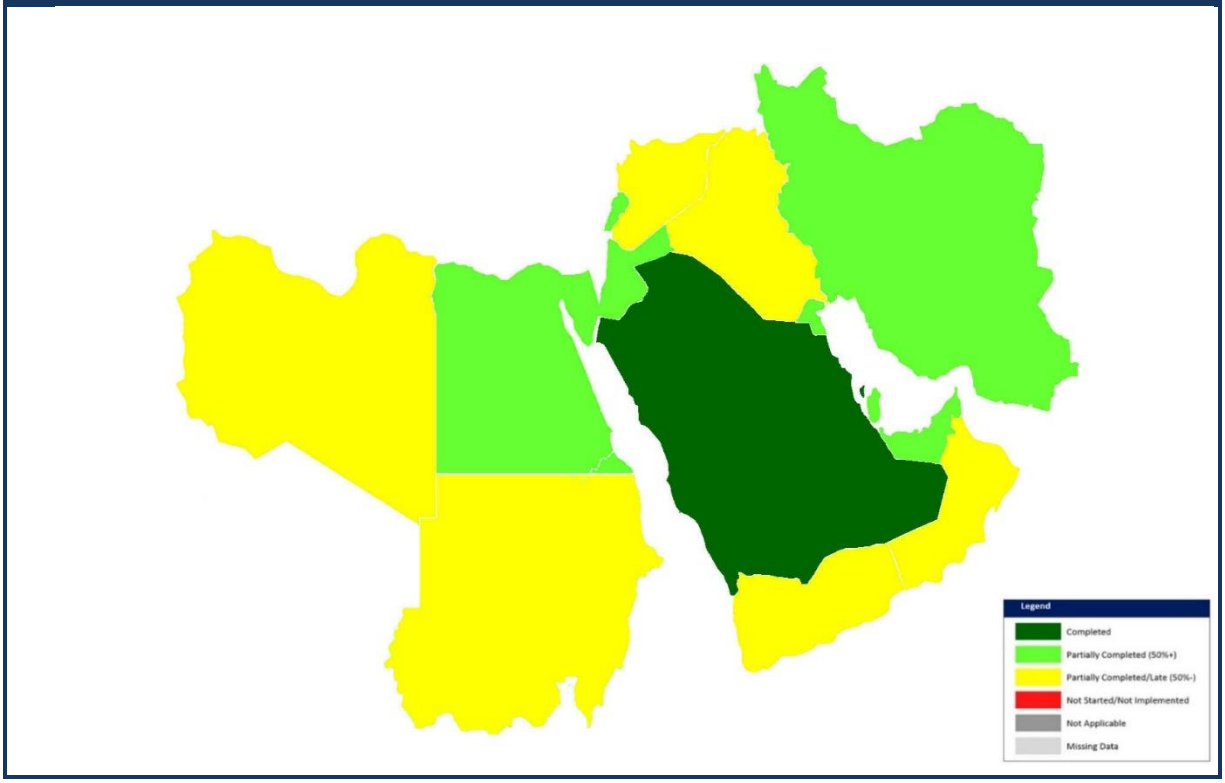
B0-DATM Status of implementation in the MID Region



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-DATM	AIXM															
	eAIP															
	QMS															
	WGS-84 – H															
	WGS-84 – V															
	Area 1 Terrain															
	Area 1 Obstacles															
	Area 4 Terrain															
	Area 4 Obstacles															

The progress for B0-DATM is good (with approximately 63% implementation). However, AIXM implementation decreased due to specifying the target to have AIXM 5.1 version. TOD Area 4 is not applicable in 6 States.

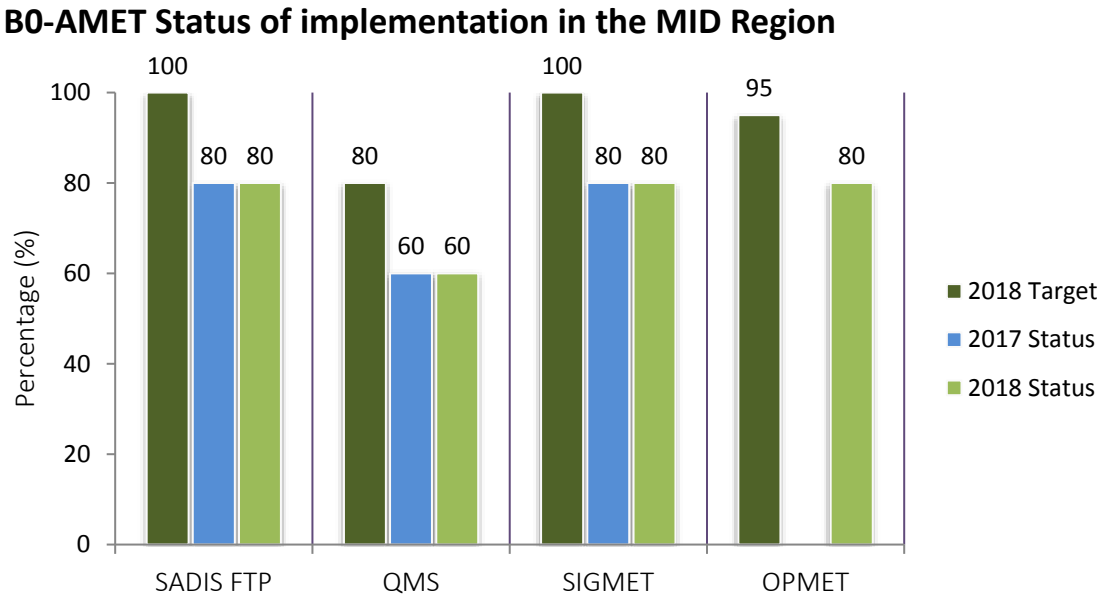
B0-DATM Status of implementation in the MID Region



2.2.6 B0-AMET

Global, regional and local meteorological information:
a) forecasts provided by world area forecast centres (WAFC), volcanic ash advisory centres (VAAC) and tropical cyclone advisory centres (TCAC);
b) aerodrome warnings to give concise information of meteorological conditions that could adversely affect all aircraft at an aerodrome including wind shear; and
c) SIGMETs to provide information on occurrence or expected occurrence of specific en-route weather phenomena which may affect the safety of aircraft operations and other operational meteorological (OPMET) information, including METAR/SPECI and TAF, to provide routine and special observations and forecasts of meteorological conditions occurring or expected to occur at the aerodrome.

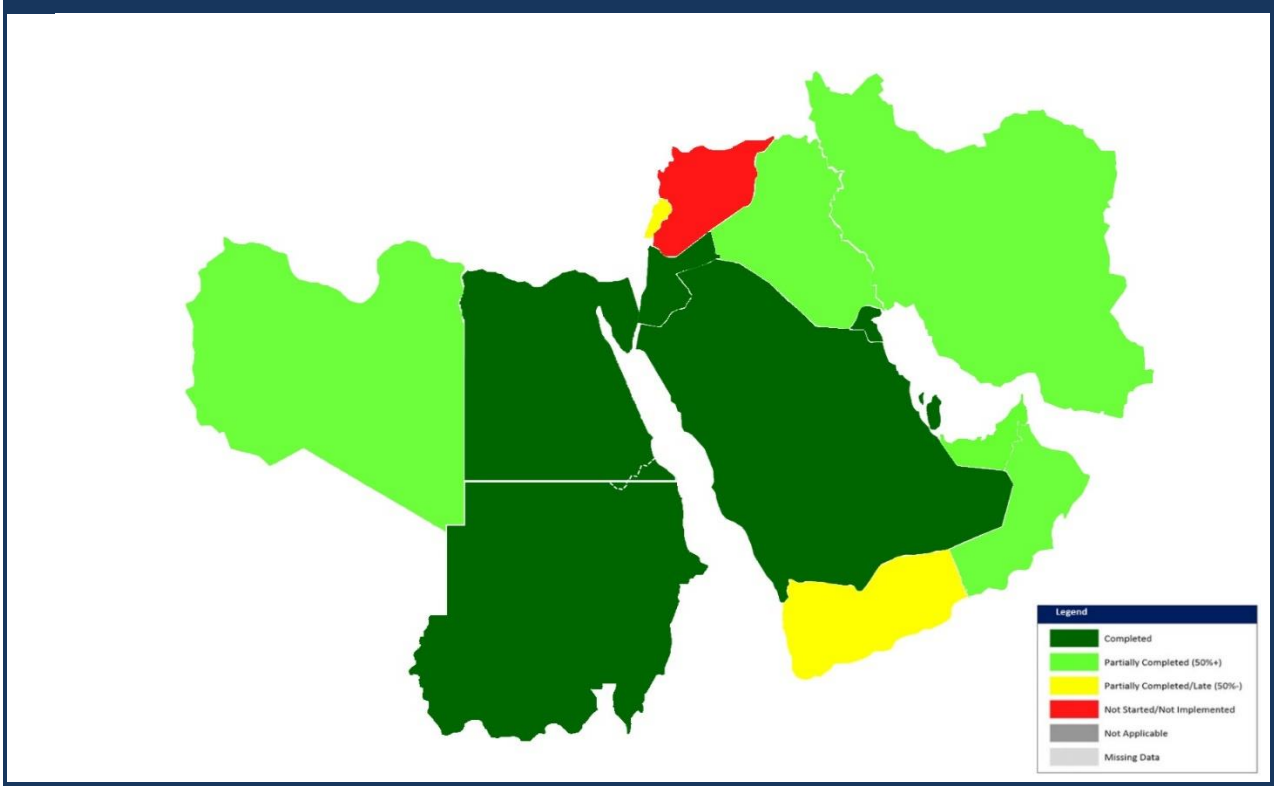
B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
SADIS FTP	All States	Indicator: % of States having implemented SADIS FTP service Supporting Metric: Number of States having implemented SADIS FTP service	100%	Dec. 2018
QMS	All States	Indicator: % of States having implemented QMS for MET Supporting metric: number of States having implemented QMS for MET	80%	Dec. 2018
SIGMET	All States with MWOs in MID Region	Indicator: % of States having implemented SIGMET Supporting metric: number of States having implemented SIGMET	100%	Dec. 2018
OPMET	All States	Indicator: % of States having implemented METAR and TAF Supporting metric: number of States having implemented METAR and TAF	95%	Dec. 2018
WIND SHEAR	TBD	Indicator: TBD Supporting metric: TBD	TBD	TBD



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-AMET	SADIS FTP															
	QMS															
	SIGMET															
	OPMET															

The progress for B0-AMET is good (with approximately 75% implementation).

B0-AMET Status of implementation in the MID Region



2.2.7 B0-FRTO

To allow the use of airspace which would otherwise be segregated (i.e. special use airspace) along with flexible routing adjusted for specific traffic patterns. This will allow greater routing possibilities, reducing potential congestion on trunk routes and busy crossing points, resulting in reduced flight length and fuel burn.

B0 – FRTO: Improved Operations through Enhanced En-Route Trajectories				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
Flexible Use of Airspace (FUA) Level 1 Strategic	All States	Indicator: % of States that have implemented FUA Level 1 Supporting metric*: number of States that have implemented FUA Level 1	50%	Dec. 2019
FUA Level 2 Pre-tactical	All States	Indicator: % of States that have implemented FUA Level 2 Supporting metric*: number of States that have implemented FUA Level 2	60%	Dec. 2020
FUA Level 3 Tactical	All States	Indicator: % of States that have implemented FUA Level 3 Supporting metric*: number of States that have implemented FUA Level 3	60%	Dec. 2022

* *Implementation should be based on the published aeronautical information*

Note – B0-FRTO implementation data will be collected during the ATM SG/5 meeting planned in September 2019.

2.2.8 B0-NOPS

Air Traffic Flow Management (ATFM) is used to manage the flow of traffic in a way that minimizes delay and maximizes the use of the entire airspace. ATFM can regulate traffic flows involving departure slots, smooth flows and manage rates of entry into airspace along traffic axes, manage arrival time at waypoints or Flight Information Region (FIR)/sector boundaries and re-route traffic to avoid saturated areas. ATFM may also be used to address system disruptions including crisis caused by human or natural phenomena.

Experience clearly shows the benefits related to managing flows consistently and collaboratively over an area of a sufficient geographical size to take into account sufficiently well the network effects. The concept for ATFM and demand and capacity balancing (DCB) should be further exploited wherever possible. System improvements are also about better procedures in these domains, and creating instruments to allow collaboration among the different actors.

B0 – NOPS: Improved Flow Performance through Planning based on a Network-Wide view				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
ATFM Measures implemented in collaborative manner	All States	Indicator: % of States that have established a mechanism for the implementation of ATFM Measures based on collaborative decision Supporting metric: number of States that have established a mechanism for the implementation of ATFM Measures based on collaborative decision	100%	Dec. 2018
ATFM Structure	All States	Indicator: % of States that have established an ATFM Structure Supporting metric: number of States that have established an ATFM Structure	100 %	Dec. 2019

Note – B0-NOPS implementation data will be collected during the ATM SG/5 meeting planned in September 2019.

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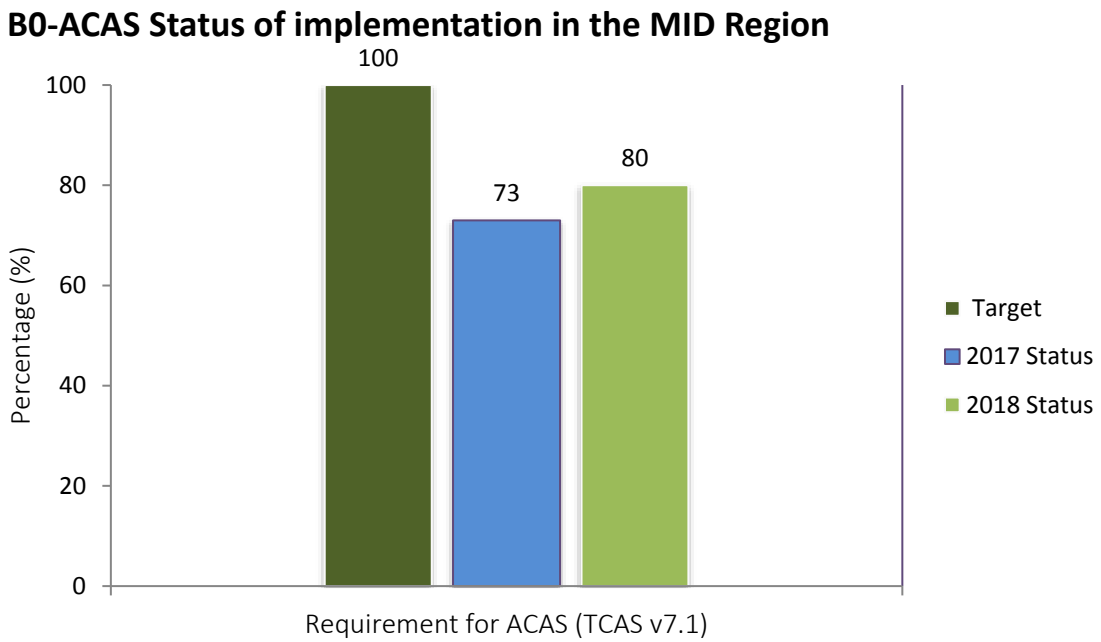
2.2.9 B0-ACAS

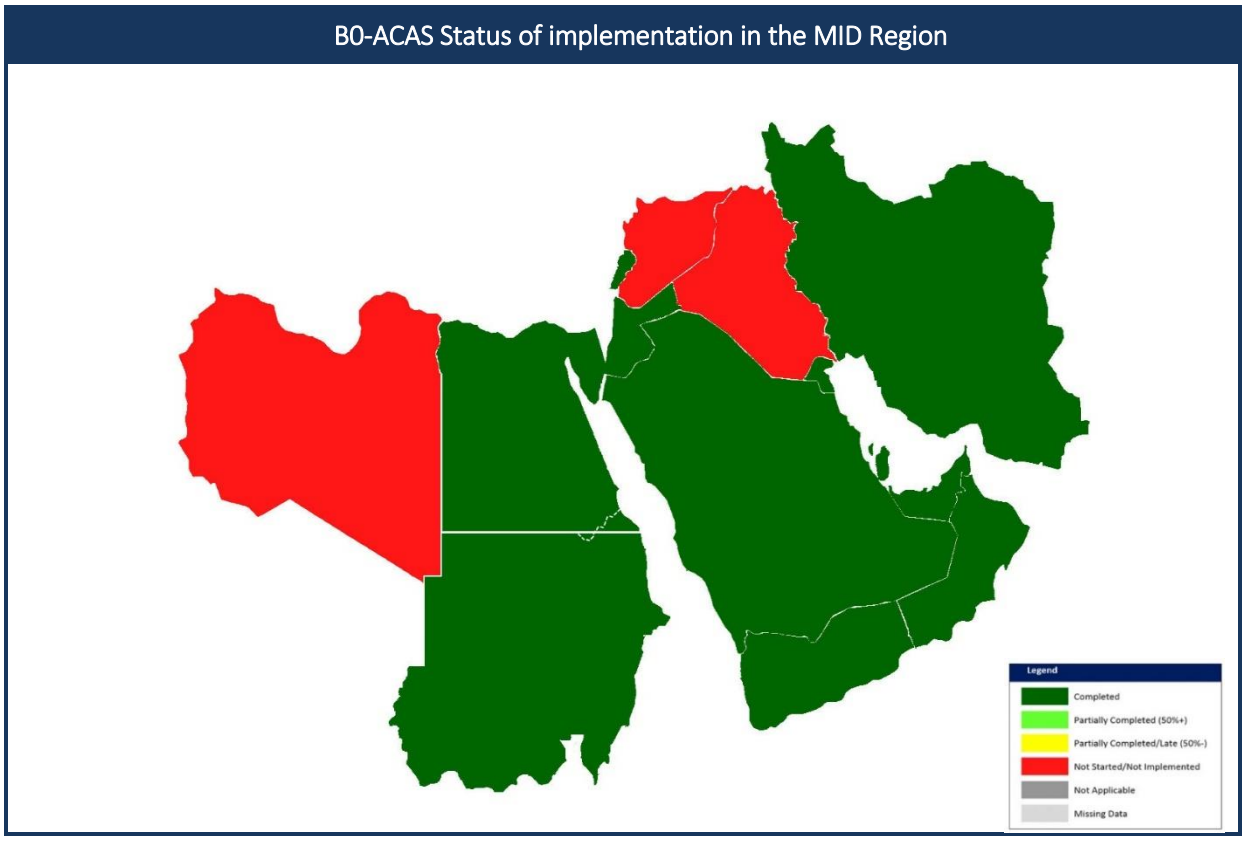
To provide short-term improvements to existing airborne collision avoidance systems (ACAS) to reduce nuisance alerts while maintaining existing levels of safety. This will reduce trajectory deviations and increase safety in cases where there is a breakdown of separation.

B0 – ACAS: ACAS Improvements				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
Avionics (TCAS V7.1)	All States	Indicator: % of States requiring carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons Supporting metric: Number of States requiring carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons	100%	Dec. 2017



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-ACAS	ACAS (TCAS V7.1)															

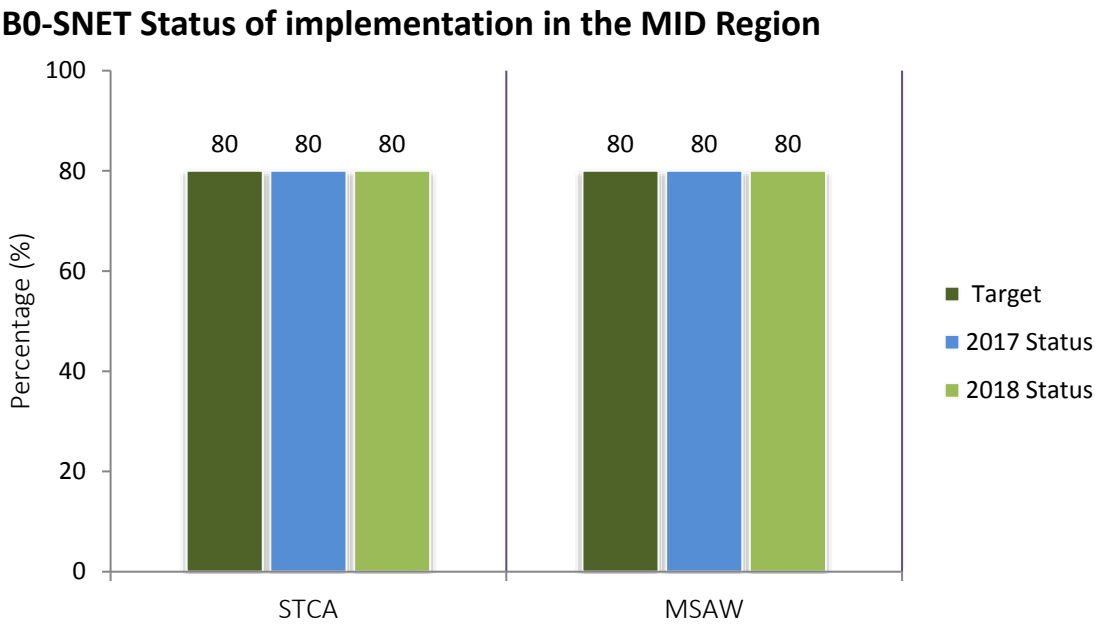
The progress for B0-ACAS is <u>good</u> (with approximately 80% implementation).



2.2.10 B0-SNET

To enable monitoring of flights while airborne to provide timely alerts to air traffic controllers of potential risks to flight safety. Alerts from short-term conflict alert (STCA), area proximity warnings (APW) and minimum safe altitude warnings (MSAW) are proposed. Ground-based safety nets make an essential contribution to safety and remain required as long as the operational concept remains human centered.

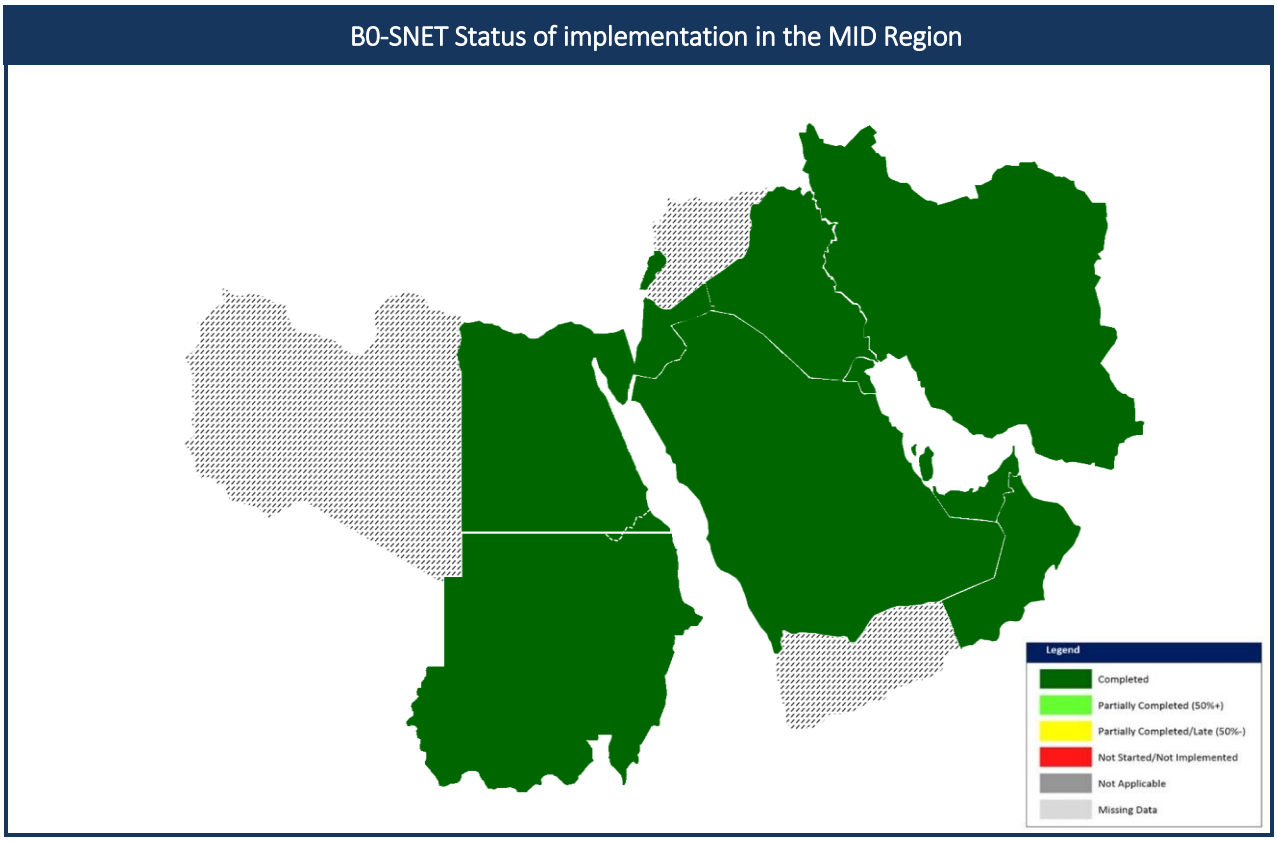
B0 – SNET: Increased Effectiveness of Ground-based Safety Nets				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
Short-Term Conflict Alert (STCA)	All States	Indicator: % of States that have implemented Short-term conflict alert (STCA) Supporting metric*: number of States that have implemented Short-term conflict alert (STCA)	80 %	Dec. 2018
Minimum Safe Altitude Warning (MSAW)	All States	Indicator: % of States that have implemented Minimum safe altitude warning (MSAW) Supporting metric*: number of States that have implemented Minimum safe altitude warning (MSAW)	80 %	Dec. 2018



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-SNET	Short-term conflict alert (STCA)															
	Minimum safe altitude warning (MSAW)															

The progress for B0-SNET is very good (with approximately 80% implementation).

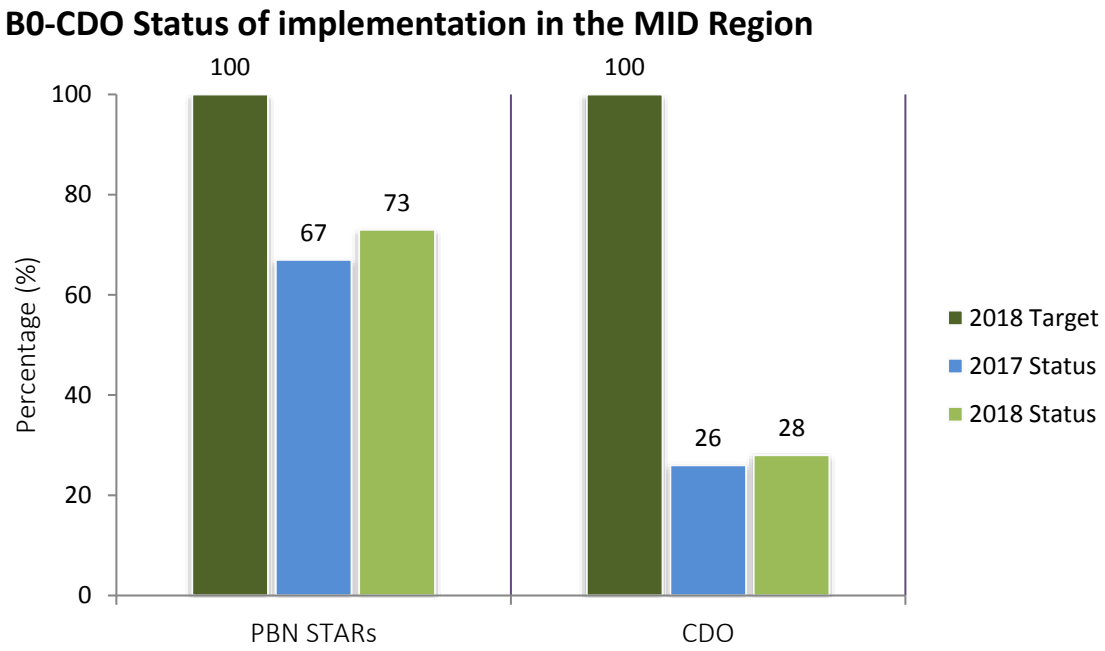
B0-SNET Status of implementation in the MID Region



2.2.11 B0-CDO

To use performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will optimize throughput, allow fuel efficient descent profiles and increase capacity in terminal areas.

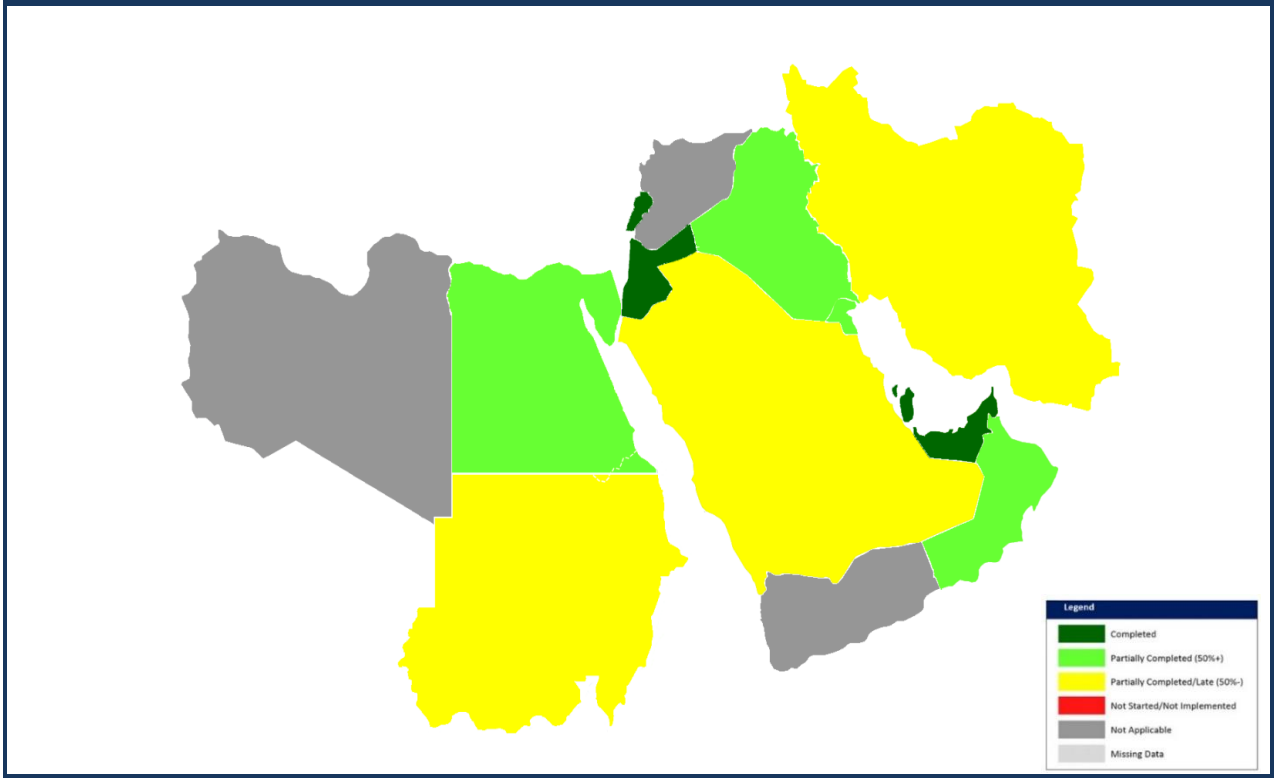
B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
PBN STARs	OBBI, HESN, HESH, HEMA, HEGN, HELX, OIIE, OISS, OIKB, OIMM, OIFM, ORER, ORNI, OJAM, OJAI, OJAQ, OKBK, OLBA, OOMS, OOSA, 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% (for the identified Aerodromes/TMAs)	Dec. 2018
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 for the identified Aerodromes/TMAs)	Dec. 2018



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-CDO	PBN STARs															
	International aerodromes/TMAs with CDO															

The progress for B0-CDO is acceptable (with approximately 50% implementation).

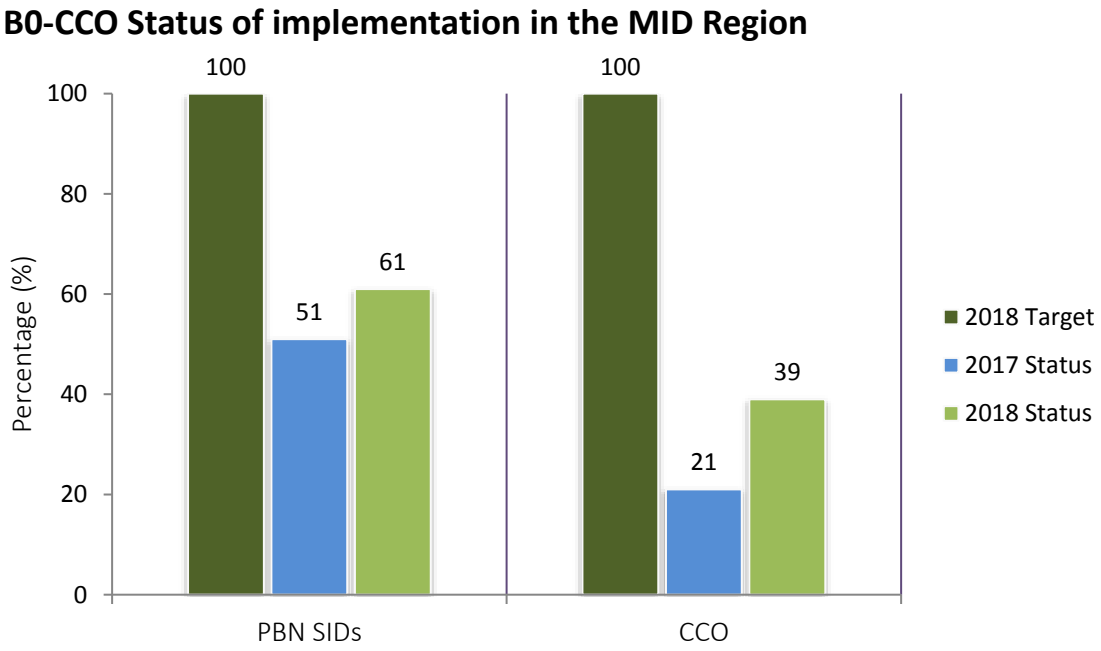
B0-CDO Status of implementation in the MID Region



2.2.12 B0-CCO

To implement continuous climb operations in conjunction with performance-based navigation (PBN) to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles and increase capacity at congested terminal areas.

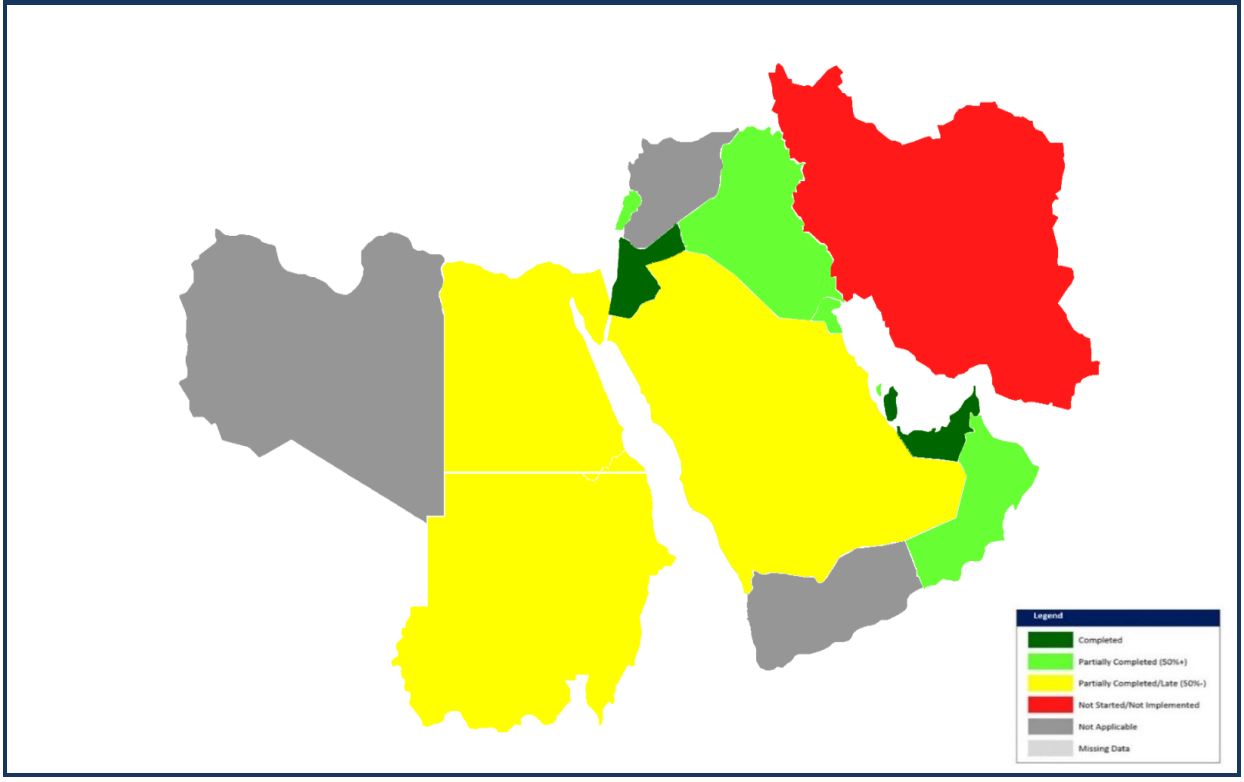
B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)				
Elements	**Applicability**	**Performance Indicators/Supporting Metrics**	**Targets**	**Timelines**
PBN SIDs	OBBI, HESN, HESH, HEMA, HEGN, HELX, OIIE, OISS, OIKB, OIMM, OIFM, ORER, ORNI, OJAM, OJAI, 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% (for the identified Aerodromes/TMAs)	Dec. 2018
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% (for the identified Aerodromes/TMAs)	Dec. 2018



Module	Elements	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Oman	Qatar	Saudi	Sudan	Syria	UAE	Yemen
B0-CCO	PBN SIDs															
	Intl ADs/TMAs with CCO															

The progress for B0-CCO is acceptable (with approximately 50% implementation).

B0-CCO Status of implementation in the MID Region



3 ASBU BLOCK 0 IMPLEMENTATION OUTLOOK FOR 2020

3.2 Status of Implementation-2020

This section consolidates the outlook of the Block 0 Modules implementation in the MID States, by 2020. The table below presents the status of implementation of the 18 ASBU Block 0 Modules foreseen to be achieved by the end of 2020, in accordance with the planning dates reported by States in the ICAO MID Region. This would provide a good basis/prerequisite for the planning of ASBU Block 1 implementation (2019-2025).

Detailed status of implementation of the 18 ASBU Block 0 Modules foreseen to be achieved by the end of 2020, for each State is provided at **Appendix B**.
The following color scheme is used for the projection of the outlook status:

Legend

- Good (75%+)
- Acceptable (50%-75%)
- Slow (25%-50%)
- Very Slow (25%-)
- Missing Data

Module	Status of implementation December 2016 (approximate rate)	Status of implementation December 2017 (approximate rate)	Status of implementation December 2018 (approximate rate)	Projected Status of implementation by 2020* (approximate rate)
B0-APTA	44%	52%	**50%**	**96%**
B0-WAKE	(Priority 2)	(Priority 2)	(Priority 2)	**71%**
B0-RSEQ	(Priority 2)	(Priority 2)	(Priority 2)	**55%**
B0-SURF	48%	50%	**50%**	**67%**
B0-ACDM	0%	23%	**30%**	**50%**
B0-FICE	56%	58%	**53%**	**83%**
B0-DATM	62%	63%	**63%**	**87%**
B0-AMET	67%	73%	**75%**	**92%**
B0-FRTO	43%	45%	**TBD**	**71%**
B0-NOPS	(Priority 2)	(Priority 2)	**TBD**	**46%**
B0-ASUR	(Priority 2)	(Priority 2)	(Priority 2)	**70%**
B0-ASEP	(Priority 2)	(Priority 2)	(Priority 2)	**69%**
B0-OPFL	(Priority 2)	(Priority 2)	(Priority 2)	**60%**
B0-ACAS	73%	73%	**80%**	**100%**
B0-SNET	(Priority 2)	80%	**80%**	**100%**
B0-CDO	34%	47%	**50%**	**67%**
B0-TBO	(Priority 2)	(Priority 2)	(Priority 2)	**44%**
B0-CCO	28%	36%	**50%**	**63%**
Overall Implementation	46%	**55%**	**58%**	**77%**

Note – projected status for 2020 is calculated based on information received from 12 States (out of 15).

4 ENVIRONMENTAL PROTECTION

4.1 Introduction

Environmental Protection, to minimize the adverse environmental effects of civil aviation activities, is one of the five strategic objectives of ICAO. With a view to minimizing the adverse effects of international civil aviation on the environment, ICAO formulates policies, develops and updates Standards and Recommended Practices (SARPs) on aircraft noise and aircraft engine emissions, and conducts outreach activities. Information related to the ICAO activities on environmental protection is available on the ICAO website at: https://www.icao.int/environmental-protection/Pages/default.aspx

This section provides an update on the States' Action Plans on CO2 Emissions Reduction; and presents an estimation of environmental benefits, in terms of fuel saving / CO2 emissions reduction, accrued from the implementation of some ASBU Block 0 Modules in the MID Region.

4.2 States' Action Plans on CO2 Emissions Reduction

The ICAO Assembly 38 (24 September to 4 October 2013) endorsed the Resolution 38-18 Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate Change which encouraged States to voluntarily prepare and submit Action Plans on CO2 emission reduction to ICAO. An ambitious work programme was further laid down for capacity building and assistance to States in the development and implementation of their Action Plans to reduce emissions, which States were initially invited to submit by the 37th Session of the ICAO Assembly in October 2010.

ICAO Assembly 39 (Montreal, Canada, 27 September – 6 October 2016) encouraged States, through Assembly Resolution 39-2 Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change, to submit voluntary Action Plans outlining respective policies and actions, and annual reporting on international aviation CO2 emissions to ICAO.

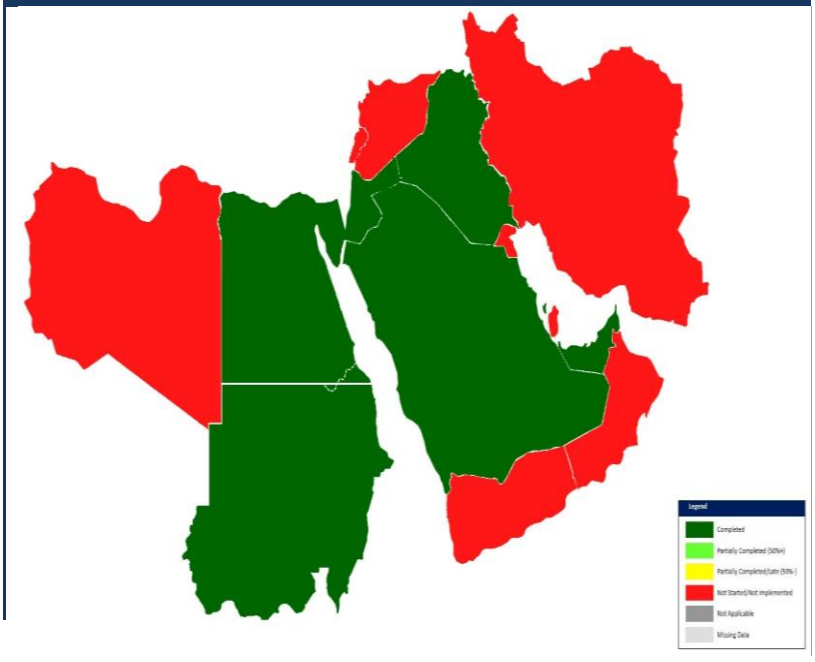
The MIDANPIRG/16 meeting (Kuwait, 13 - 16 February 2017) invited States to develop/update their Action Plans for CO2 emissions reduction and submit them to ICAO through the APER website or the ICAO MID Regional Office.

An Action Plan is a means for States to communicate to ICAO information on activities to address CO2 emissions from international aviation. The level of information contained in an action plan should be sufficient to demonstrate the effectiveness of actions and to enable ICAO to measure progress towards meeting the global goals set by Assembly Resolution A38-18. Action plans give States the ability to: establish partnerships; promote cooperation and capacity building; facilitate technology transfer; and provide assistance.

The Status of the provision of Action Plans on CO2 emission in the MID Region is as follows:

State	Action Plans
Bahrain	June 2015
Egypt	July 2016
ran	-
Iraq	June 2012
Jordan	September 2013
Kuwait	-
Lebanon	-
Libya	-
Oman	-
Qatar	-
Saudi Arabia	April 2018
Sudan	January 2015
Syria	-
UAE	June 2012 (update May 2018)
Yemen	-

Status of States' Action Plans



4.3 Estimation of the Environmental Benefits accrued from implementation of ASBU Block 0 Modules

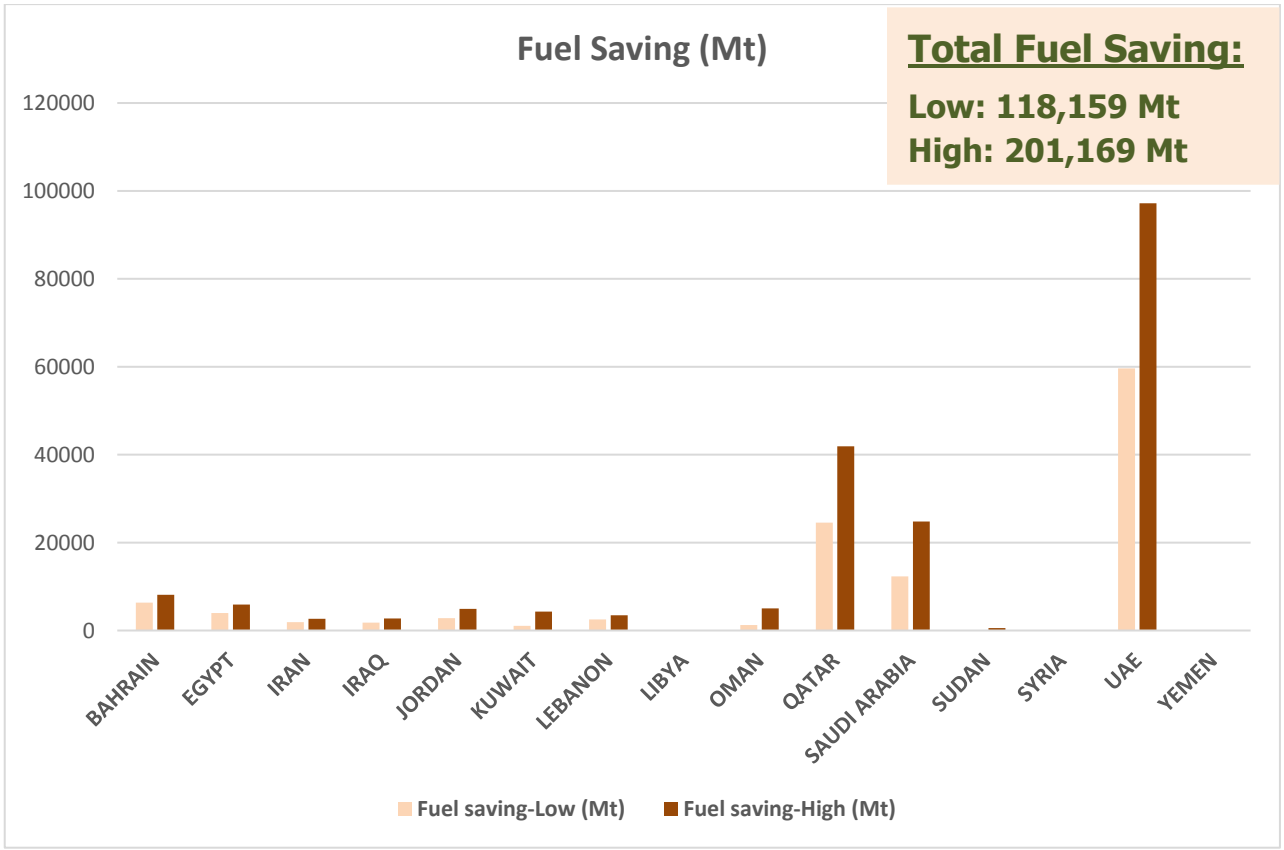
CAEP/10 conducted an assessment of the potential environmental benefits (fuel savings / CO2) for the period between the start of implementation of ASBU Block 0 modules in 2013 and the planned implementation of such modules in 2018 (end of Block 0). In order to accomplish this task, CAEP developed sets of Rules-of-Thumb for each studied module with the overall intent to provide a conservative estimate of ASBU Block 0 fuel saving benefits. Rules-of-Thumb were developed using existing, publically available data, literature, and assumptions, together with the professional judgment of the analysts. A total of twenty-three (23) rules of thumb have been developed for thirteen (13) ASBU Block 0 Modules.

The results of the ASBU Block 0 analysis conducted by CAEP highlight a potential reduction in fuel consumption by 2018 due to the implementation of ASBU Block 0 modules when compared to the 2013 baseline. The results show that the following Block 0 Modules (operational improvements) would have the biggest contribution to fuel saving in the MID Region:

- **CCO 1 (CCO)**
- **CDO 1 (CDO)**
- ACDM
- **CDO 2 (PBN STARs)**
- ASUR (ADS-B Surveillance)
- **CCO 2 (PBN SIDs)**
- **APTA 1 (Radius to Fix)**

As the status of implementation of B0-ACDM and B0-ASUR is still low in the MID Region, a Methodology for the Estimation of environmental benefits accrued from the implementation of priority 1 Block 0 Modules in the MID Region has been developed for B0-APTA, CCO and CDO, based on the Rules of Thumb and the available traffic data.

The estimation has shown a **total of 118,159 to 201,169 Mt** of fuel saving in the MID Region (**372,201 to 633,682 Tonnes of CO2**), as a result of the implementation of the selected Block 0 Modules (APTA, CDO and CCO), as shown below:



5 SUCCESS STORIES/BEST PRACTICES

OMAN: SAFETY ENHANCEMENTS IN THE OMAN AIR TRAFFIC CONTROL NETWORK

In addition to the launch of the region's most advanced Air Traffic Control Centre, the past two years has seen tremendous additional enhancements to Oman's aviation safety.

The PACA Muscat Air Traffic Control Centre, which governs Oman's airspace, needed a system that could adapt to the roles of in-flight and approach surveillance, presenting information in an environment that would facilitate controller access and decision making.

Each controller workstation features a single 56" high-resolution screen that allows controllers to quickly bring up any application on-screen, while providing rapid and easy access to radar, weather and flight plan information, amongst others - without having to leave their seat.

The user-friendliness and the system's functionalities simplify the controller's tasks, thereby increasing the time available for correct decision-making and for managing growing volumes of air traffic. A vital element in the lethal consequence environment of air traffic control.

Medium Term Conflict Detection (MTCD)

The MTCD element within the new Air Traffic Management system that is used by PACA is one of the single most valuable improvements to safety due to the amount of time it buys a controller.

Muscat ATM Medium-Term Conflict Detection (MTCD) function is designed to warn the controller of potential conflict between flights in his area of responsibility in a time horizon configurable between 8 to 20 minutes ahead according to the airspace structure and operational procedures.

Buying Time

The aim of MTCD is to facilitate a move from the current largely reactive form of air traffic control to more pro-active control, thereby balancing more evenly the workload of tactical and planning tasks, enhancing sector team efficiency and providing an even safer and better service to airspace user.

By maximizing the opportunity of pro-actively solving problems during sector planning, it reduced tactical workload on the controller, again increasing safety.

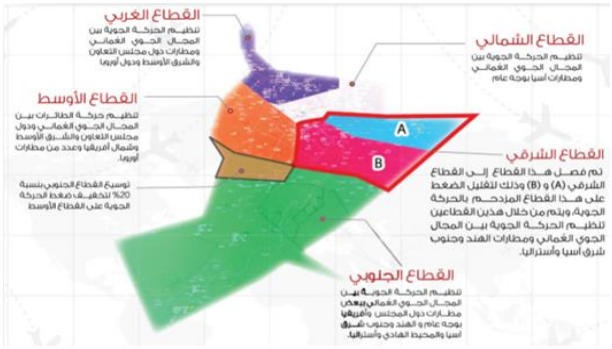
DYNAMIC SECTOR SPLIT CONCEPT – INTRODUCTION OF AREA SECTOR 6:

Oman has seen enormous growth in its aviation sector over the past ten years. This growth has been even more pronounced over the past three years with the rise of low cost airlines, including Oman's own Salam Air in addition to the growth in Oman Air fleet and operations.

The nature of air traffic flow in Oman airspace is of dynamic demands. The optimal solution to manage dynamic air traffic demands over the day of operations is to introduce enhancements to the current operational structure with less deviation in controller task load and leads to a significantly lower controller task load for the newly created airspace.

Recently, Oman's airspace was divided into five sectors: North, Central, West, East and South. Based on ATC studies and information gathered from external sources such as MIDRMA, the East sector has been highlighted as being the busiest sector and requiring restructuring.

The challenges were various, but the main was to achieve a new airspace structure in which East Sector can be split into two dynamic sectors of equal or very close traffic level that shall be always below the determined threshold.

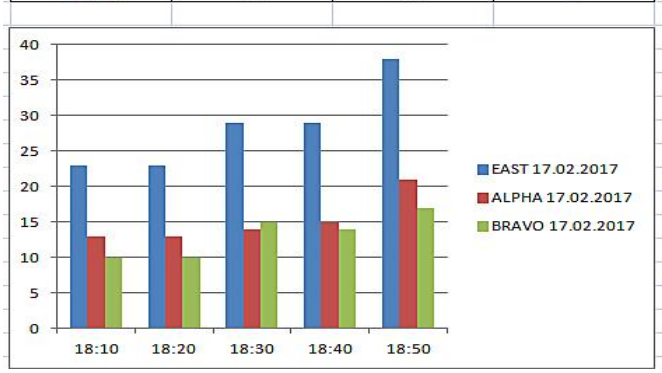


Much of this was left in the hands of PACA's airspace design team, who had to deal with the reorganization of the various waypoints within the sector and also agreeing to new airways with minimum changes on entry and exit points with our neighbors.

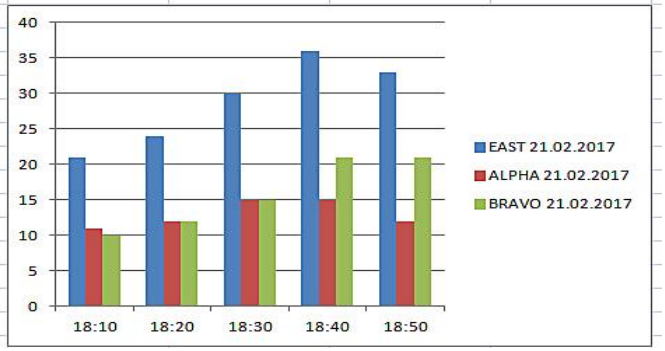
Once this was established, risk assessment and quality control checks had to be done with numerous tests run using PACA's state of the art simulation systems that can replicate scenarios from general procedures to emergency responses.

The result of this project from a safety perspective was a new dynamic sector concept that allows controllers to split East sector if traffic flow gets to a point where a single controller is becoming overloaded.

TIME UTC	EAST 17.02.2017	ALPHA 17.02.2017	BRAVO 17.02.2017
18:10	23	13	10
18:20	23	13	10
18:30	29	14	15
18:40	29	15	14
18:50	38	21	17



TIME UTC	EAST 21.02.2017	ALPHA 21.02.2017	BRAVO 21.02.2017
18:10	21	11	10
18:20	24	12	12
18:30	30	15	15
18:40	36	15	21
18:50	33	12	21



INAUGURATION OF THE MUSCAT CONTINGENCY CENTRE

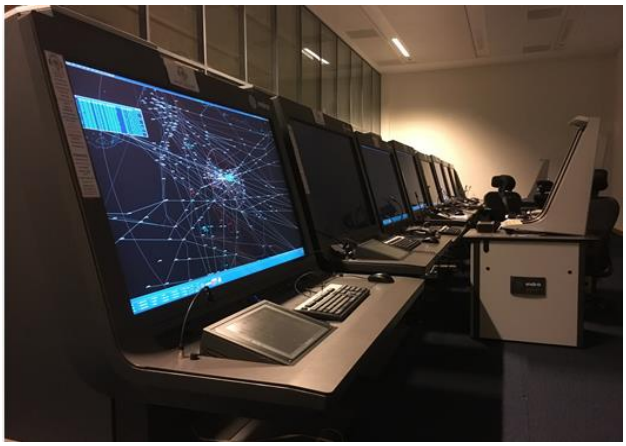
PACA did not want to be in a position to have its aviation safety compromised, in the albeit unlikely event that the main air traffic control system failed, so it has invested heavily in assets to deal with a situation like this.

The flagship response to this issue is the Muscat Contingency Centre. This is housed in a separate building from the main Air Traffic Control unit and is essentially a mirror image of the main control system.

A comprehensive Migration Plan was developed, tested and implemented to provide procedures for orderly and efficient failover from the main ATM Complex to Contingency Center in the event of total disruption of Air Traffic Services in Muscat ACC, and rollback to the main ATM Complex once normal operations is restored, guaranteeing the service continuity.

Should the services in the ATM Complex degraded or ever go offline, the Muscat Contingency Centre is available 24 hours a day to provide the same level of services and functions as the main ATM Complex. In terms of capacity, the Contingency Center has five area sectors in addition to Muscat Radar sector. In term of redundancy, the Contingency Center is operating independently from the main ATM Complex.

Furthermore, letters of agreement are in place with neighboring flight information regions and air navigation service providers to implement emergency procedures during short periods of downtime as the systems change over.



These procedures are all part of the border Muscat emergency response plan.

On July 4, 2018, and after obtaining approval from the regulator, PACA conducted successful Failover and Rollback activity.

With this success, PACA moved to new level in ANS provision during contingency situations.

- Migration Management
- Migration Strategy
- Migration to CTC
- Service Restoration
- Service Continuity
- Roll Back Procedure

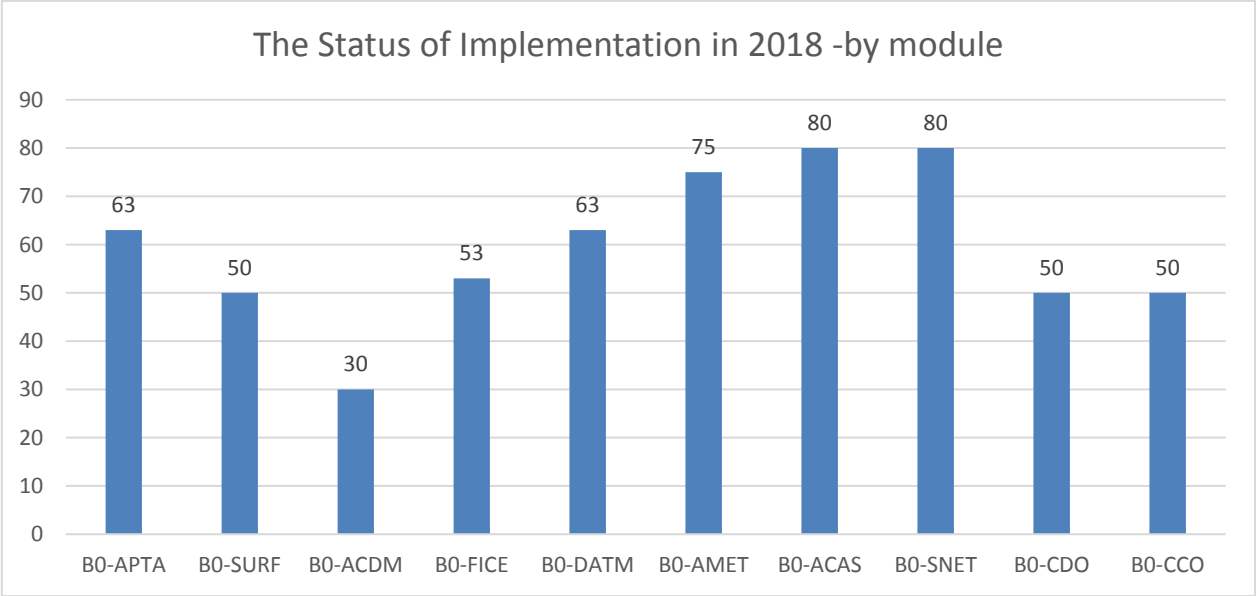
6 CONCLUSION

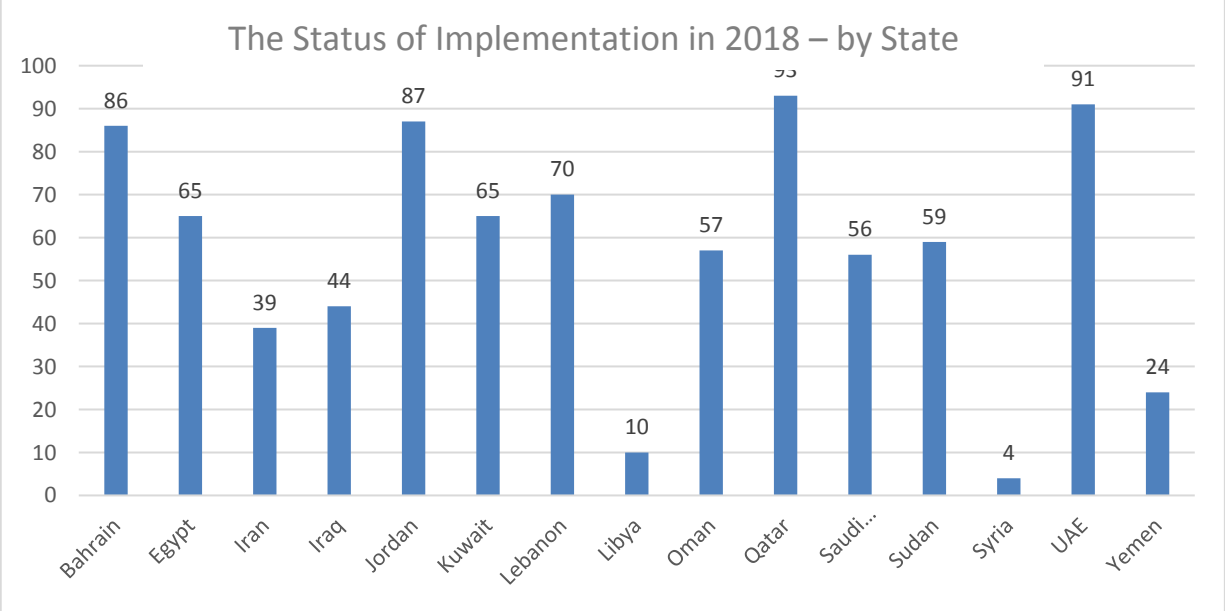
The overall implementation of priority 1 ASBU Block 0 Modules in the MID Region is around 58% compared to 55% in 2017. The implementation of some modules has been acceptable/good; such as B0-ACAS, B0-AMET and B0-DATM. Nevertheless, some States are still facing challenges to implement the majority of the Block 0 Modules.

The status of implementation of the ASBU Block 0 Modules also shows that Bahrain, Egypt, Jordan, Kuwait, Qatar, Saudi Arabia and UAE made a good progress in the implementation of the priority 1 ASBU Block 0 Modules.

An estimated amount of 118,159 to 201,169 Mt of fuel (**372,201 to 633,682 Tonnes of CO2**) has been saved in the MID Region in 2018, as a result of the implementation of the selected Block 0 Modules (APTA, CDO and CCO).

Looking into the States' plans for 2020 (outlook), it is envisaged that the status of implementation of the priority 1 ASBU Block 0 Modules would be around 77%, and the status of implementation of all ASBU Block 0 modules would be around 72%. The focus/priority of States is to complete the implementation of B0-APTA, B0-FICE, B0-DATM, B0-AMET, B0-CCO and B0-CDO.





Status of implementation of Doha Declaration Targets:

Doha Declaration was endorsed by the third meeting of Directors General of Civil Aviation (DGCA-MID/3) in Doha, Qatar from 27 to 29 April 2015. Doha Declaration set five Targets for the Air Navigation Capacity and Efficiency, as follows:

1- Optimization of Approach Procedures including vertical guidance (PBN): Implement PBN approach procedures with vertical guidance, for all runways ends at international aerodromes, either as the primary approach or as a back-up for the precision approaches by 2017

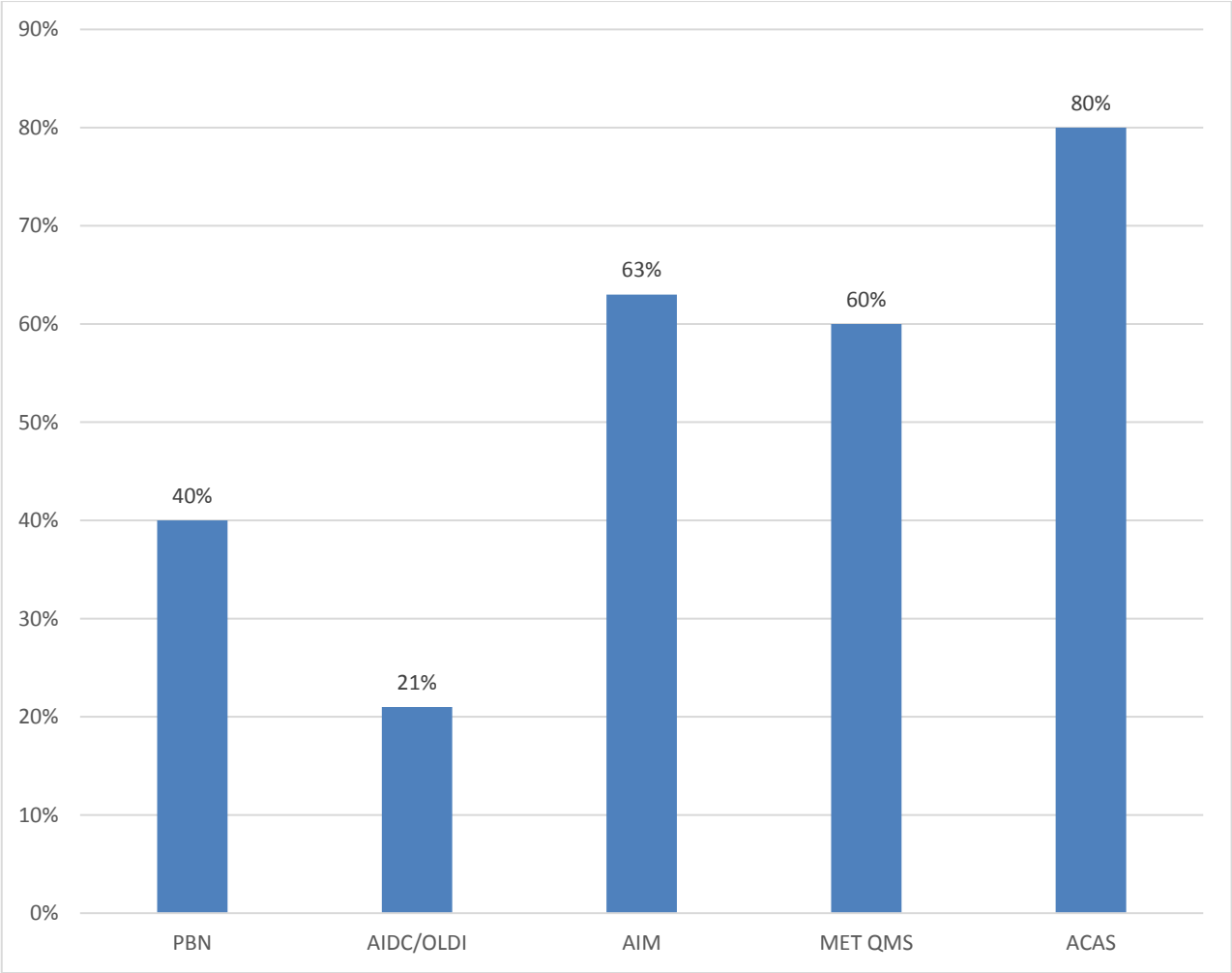
2- Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration: 11 States to implement AIDC/OLDI between their ACCs and at least one adjacent ACC by 2017

3- Service Improvement through Digital Aeronautical Information Management: All States to complete implementation of Phase I of the transition from AIS to AIM by 2017

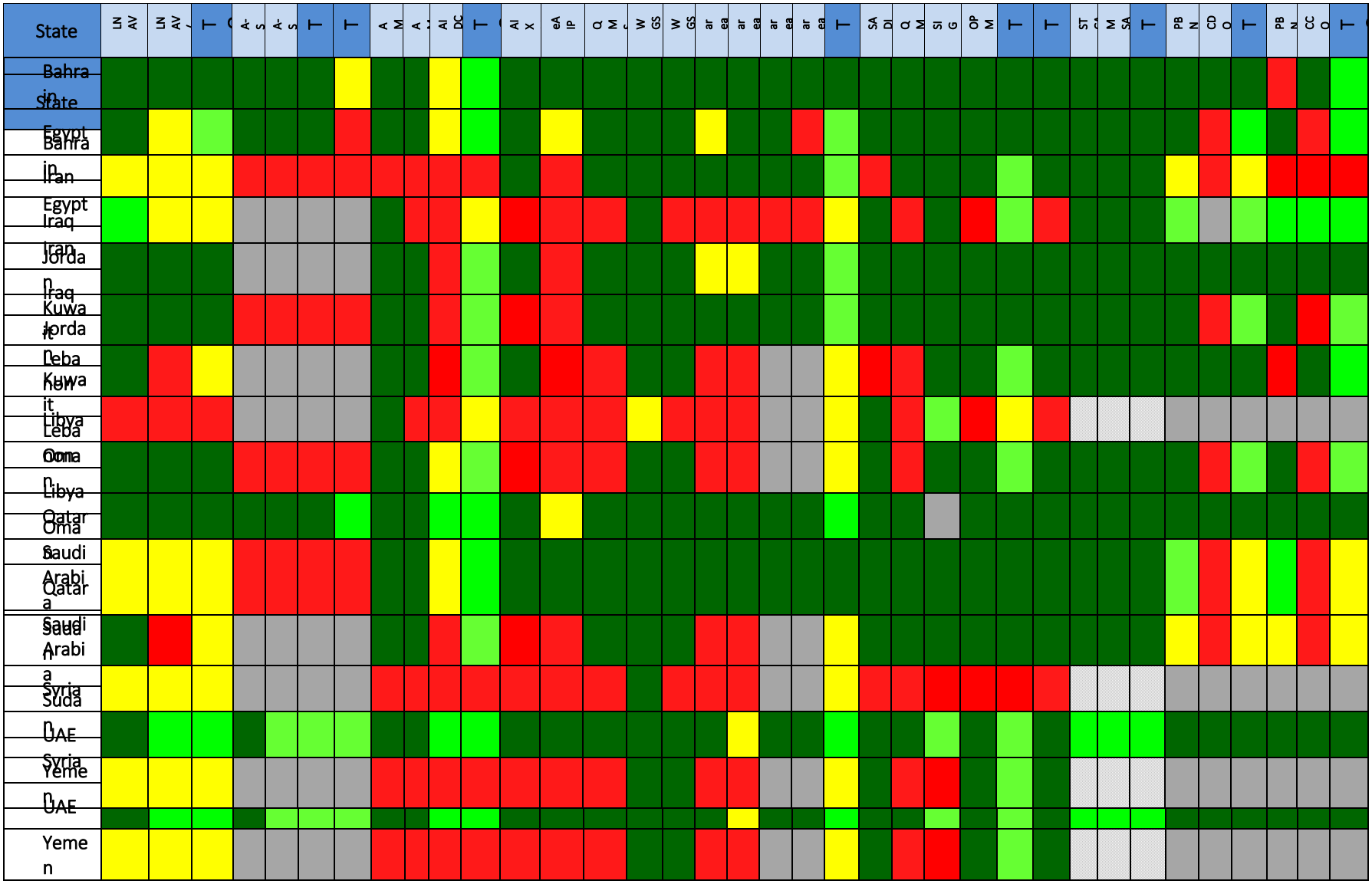
4- Meteorological information supporting enhanced operational efficiency and safety: 12 States to complete the implementation of QMS for MET by 2017

5- ACAS Improvement: All States require carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons by 2017

Status of implementation by States related to the Targets of the Doha Declaration is as follows:



APPENDIX A: STATUS OF ASBU BLOCK 0 MODULES



APPENDIX B: ASBU BLOCK 0 STATUS OF IMPLEMENTATION OUTLOOK 2020

State	B0-APTA	B0-SURF	B0-ACDM	B0-FICE	B0-DATM	B0-AMET	B0-FRTO	B0-NOPS	B0-ASUR	B0-ASEP	B0-OPFL	B0-ACAS	B0-SNET	B0-CDO	B0-TBO	B0-CCO
Bahrain	FI	FI	PI	FI	FI	FI	PI	PI	FI	PI	N/A	FI	FI	FI	PI	FI
Egypt	FI	FI	PI	FI	FI	FI	FI	FI	FI	N/A	N/A	FI	FI	PI	N/A	PI
Iran	PI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	N/A	FI
Iraq	PI	N/A	NI	FI	FI	PI	PI	NI	NI	NI	N/A	FI	FI	NI	NI	NI
Jordan	FI	NI	PI	PI	PI	FI	NI	NI	FI	N/A	N/A	FI	FI	PI	NI	PI
Kuwait	FI	PI	PI	PI	PI	FI	PI	PI	PI	PI	PI	FI	FI	PI	PI	PI
Lebanon	FI	N/A	PI	PI	FI	PI	PI	NI	NI	FI	NI	FI	FI	PI	PI	NI
Libya	MD	N/A	MD	PI	PI	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD
Oman	FI	PI	PI	FI	FI	FI	FI	FI	PI	FI	N/A	FI	FI	PI	N/A	PI
Qatar	FI	FI	PI	FI	FI	FI	FI	PI	FI	N/A	N/A	FI	FI	FI	PI	FI
Saudi Arabia	PI	PI	PI	FI	FI	FI	FI	N/A	FI	FI	FI	FI	FI	FI	FI	FI
Sudan	FI	N/A	N/A	PI	PI	FI	PI	PI	PI	FI	PI	FI	FI	PI	PI	PI
Syria	PI	N/A	PI	PI	PI	PI	MD	MD	FI	MD	MD	PI	MD	MD	MD	MD
UAE	FI	PI	PI	FI	FI	FI	FI	PI	FI	MD	N/A	FI	FI	FI	PI	FI
Yemen	PI	N/A	MD	PI	PI	MD	MD	MD	MD	MD	MD	FI	MD	MD	MD	MD

Legend

- FI: Fully Implemented
- PI: Partially Implemented
- NI: Not Implemented
- N/A: Not Applicable
- Missing Data

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