UAE ATM STRATEGIC PLAN

1 Foreword

Air traffic management is defined by ICAO as the dynamic, integrated management of air traffic and airspace — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties.

To fully support a globally harmonized air navigation system, ICAO has developed the *Global Air Navigation* Plan (GANP, Doc 9750) to provide clear guidance on the guiding operational targets and supporting technologies, avionics, procedures, standards and regulatory approvals needed to realize them. The GANP establishes a framework for incremental implementations based on the specific operational profiles and traffic densities of each State. This is accomplished through the aviation system block upgrades (ASBUs) methodology which forms the basis of the GANP.

The UAE Air Traffic Management Strategic Plan builds on the framework established under the GANP and aims to provide leadership and direction to the ATM community on the future capabilities and technologies required to deliver an ATM system that is responsive to airspace users, is capable of ensuring a safe, economic and efficient system that accommodates demand, is globally interoperable environmentally sustainable and satisfies national interests including defence and security.

The UAE Air Traffic Management Strategic Plan establishes the vision for ATM in the UAE in the period to 2030. In recognition of the potential for significant changes in operating capabilities and technologies over such a period, the plan must necessarily be high level, with the strategies identified being robust enough to 'stand the test of time', and maintain a strategic, rather than tactical direction that can be followed throughout the planning period.

A strategic plan is most effective when there is widespread agreement with, and commitment to, its objectives. The industry needs to work cohesively to deliver the desired outcomes.

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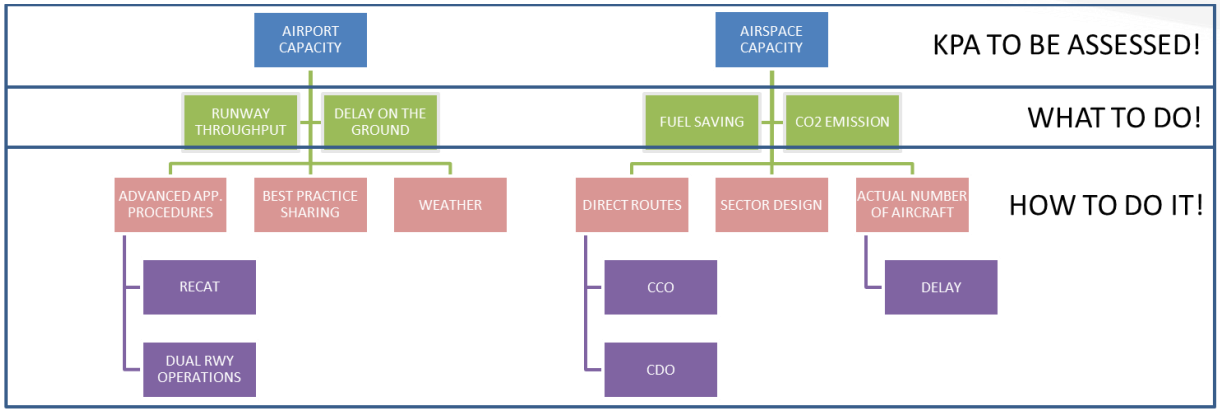
2 Executive Summary

The UAE Air Traffic Management Strategic Plan is intended to support the evolution to a future Air Traffic Management (ATM) system in the United Arab Emirates that is performance-based, addresses ATM community expectations, is cost-efficient and globally harmonized.

Whereas the ICAO Global ATM Operational Concept is a statement of ***"what"*** is envisaged in terms of an interoperable global ATM system, the objective of the UAE ATM Strategic Plan is to detail ***"how"*** these initiatives will be enabled in accordance with UAE ATM community expectations and the ICAO MID Region Air Navigation Strategy, which is aligned with the GANP and ASBU methodology.

The GCAA is responsible for the planning and operation of safe, expeditious and efficient air navigation services in the UAE. In 2012, the GCAA launched the UAE Airspace and ATM Study to identify Airspace, ATM and CNS challenges and to propose solutions through a detailed report identifying gaps and recommendations for improvement. The Final Report of the UAE Airspace Study was released in September 2013, with 15 key recommendations and 38 additional recommendations relating to proposed improvements in Airspace, ATM and CNS.

In 2016 the Airspace Restructuring Project (ARP) was launched with the aim to integrate phase one and two of the above mentioned UAE Airspace study. Implementation of the final design for the period to 2025 was accomplished on 7 December 2017.



COMMON EVALUATION CRITERIA

The chart above describe how, through common evaluation criteria, the ARP project team have met the ICAO Global ATM Operational Concept statements.

The UAE ATM Strategic Plan together with the Recommendations of the UAE Airspace Study, form the basis for the evolution of ATM within the framework of the ICAO Aviation System Block Upgrade (ASBU) and in accordance with the ICAO MID Region Air Navigation Strategy.

A list of 53 recommendations is now included in this document as Schedule 4 with priorities assigned and links to ASBUs and MID Region Air Navigation Strategy.

It is through adherence to the planning framework as outlined above, that the UAE Airspace and ATM system can be optimized so as to provide the capacity necessary to meet the demands of forecast traffic growth to 2030 and beyond.

3 Introduction

The continuing growth of air traffic in the region has placed increased demand on airspace capacity, which necessitates an optimum utilization of the available airspace and Airports. The ICAO Aviation System Block Upgrade (ASBUs) framework provides an evolutionary sequence of improved capabilities that are well-defined, scalable and cost effective.

Accordingly, the purpose of the UAE ATM Strategic Plan is to articulate Air Navigation strategies that are aligned with the ICAO MID Region Air Navigation priorities and based on the ASBU methodology.

The UAE Air Traffic Management Strategic Plan facilitates the evolution to a future ATM system in the UAE that is performance-based, addresses ATM community expectations, is cost-efficient, environmentally sustainable and is globally harmonized. This ensures that the UAE continues to maintain an ATM system that can safely accommodate demand, is globally interoperable, environmentally sustainable and satisfies national interests, including defense and security.

4 UAE Airspace Policy

The UAE is committed to ensuring continuous development and enhancement to the airspace infrastructure, to ensure a safe and sustainable civil aviation sector.

The Government considers the safety of air services as the first priority in airspace administration and the General Civil Aviation Authority (GCAA) should respond quickly to emerging changes in risk levels for air transport operations. Airspace administration should also seek to deliver good safety outcomes to all aviation participants.

The purpose of the UAE Airspace Policy is to create an effective, efficient, safe, secure, accessible and flexible environment within which demands for access to National airspace do not put a constraint on reasonable growth in the aviation sector of the economy. This may be brought about by embracing technological advances which supports management of the future aircraft demands in the most efficient manner possible, including air traffic flow management processes which favors aircraft better equipped to comply with airspace requirements.

The Government expects that the GCAA will continue to reform the UAE's airspace and move towards closer alignment with the ICAO system and adoption of proven international best practice with the intent of contributing to the economic wellbeing of the UAE.

The Government has also identified four specific airspace policy objectives in relation to the administration and use of UAE-administered airspace, which are as follows:

- Effective cooperation and collaboration between the ATM Community Members to achieve agreed expectations in the Key Performance Areas (KPAs);
- Support for ICAO's Global Air Traffic Management (ATM) Operational Concept and Global Air Navigation Plan (GANP);
- The adoption of the ICAO Aviation System Block Upgrade (ASBU) programme; and
- Enhanced ATM services for UAE aerodromes served by Air Services, as determined by GCAA.

The priorities also include achieving the key attributes of the 2030 UAE Airspace and ATM System which include:

- Fair and equitable access to all airspace, airports and ATM services based on Best Capable – Best Served.
- UAE airspace considered as a "National Asset" with the implementation of Flexible Use Airspace for Civil and Military operations based on real-time needs.
- Seamless Air Navigation Service Provision throughout the UAE.
- PBN Route Structure throughout UAE.
- Flight Procedures tailored for optimum climb and descent to runways in use – where feasible.
- Airport infrastructures that maximize throughput and minimize congestion.
- Balancing traffic demands and capacities in a collaborative manner.
- Interoperability of ATM systems within the UAE and with neighbouring FIRs.

5 Periodic Review of the UAE ATM Strategic Plan

The planning horizon for the UAE ATM Strategic Plan extends to 2030, with a 3 year planning cycle.

Accordingly, the UAE ATM Strategic Plan and Schedules will be reviewed and updated every 3 years, to ensure that informed decision-making is based on accurate demand and capacity forecasting.

6 The ATM Community

The global ATM Operational Concept defines the ATM Community as: "The aggregate of organizations, agencies or entities that may participate, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATM system." [1] Within the UAE, the ATM Community is comprised of, and not limited to, the following organizations:

- Abu Dhabi Airports
- Abu Dhabi Department of Transport
- Air Arabia Airlines
- Any other Airlines (AOL)
- Dubai Civil Aviation Authority
- Dubai Airports
- Dubai Air Navigation Services (DANS)
- Dubai Airwing
- Emirates Airline
- Etihad Airways
- Flydubai
- Fujairah Department of Civil Aviation
- General Aviation fraternity – consulted as necessary
- Global Aerospace Logistics (GAL)
- International Air Transport Association (IATA)
- National Centre for Meteorology and Seismology
- Presidential Flight

[1] ICAO Doc 9584 Global Air Traffic Management Operational Concept Appendix B

- Ras Al Khaimah Airport LLC
- Ras Al Khaimah Department of Civil Aviation
- Serco
- Sharjah Department of Civil Aviation
- Sharjah Airport Authority
- UAE General Civil Aviation Authority
- UAE Military

6.1 ATM Community Expectations and Key Performance Areas (KPAs)

The ICAO ATM Global Operational Concept lists a number of general, high level ATM Community expectations, which are used in performance management as the framework for key performance areas (KPAs). They provide the main focus on the overall ATM strategic planning process.

The ATM Community Expectations include the following: [2]

	KPA – 01	Access and equity
	KPA – 02	Capacity
	KPA – 03	Cost effectiveness
	KPA – 04	Efficiency
	KPA – 05	Environment
	KPA – 06	Flexibility
	KPA – 07	Global interoperability
	KPA – 08	Participation by the ATM community
	KPA – 09	Predictability
*	KPA – 10	Safety
	KPA – 11	Security

*Note: *"While **safety** is the highest priority, the expectations are shown in alphabetical order as they*

[2] ICAO Doc 9854 ATM Global Operational Concept Appendix D 1 – 2

would appear in English".[3]

A key expectation of the Global ATM Operational Concept is that "The ATM community should continuously be involved in the planning, implementation, and operation of the system to ensure that the evolution of the global air navigation system meets the expectations of the community.[4]

6.2 Collaborative Approach

A collaborative approach is an essential element of the operational concept. It enables all members of the ATM community, especially airspace users, to participate in the ATM decision making that affects them. The level of participation will reflect the level to which a decision will affect them.

A collaborative approach means achieving an acceptable solution that takes into account the needs of those involved. All participants will therefore require a spirit of cooperation. A balance is required because collaborative decision making is primarily invoked to resolve competing demands for an ATM resource and to organize a safe sharing of that resource among airspace users.[5]

6.3 The National Airspace Advisory Committee (NASAC)

The NASAC provides an industry-wide representation forum for developing the industry position on airspace matters as the basis for strategic advice to the GCAA, regarding the development and implementation of the GCAA approved integrated airspace plan.

A primary function of the NASAC is to recommend initiatives to provide a high quality service to airspace users and air navigation service providers through the safe, accurate and timely planning of the national airspace, utilising a performance based approach, measuring safety, capacity, cost effectiveness,

[3] ICAO Doc 9854 ATM Global Operational Concept Appendix D 1 – 2 introduction
[4] ICAO Doc 9584 Global Air Traffic Management Operational Concept Appendix D
[55] ICAO Doc 9854 Global ATM Operational Concept Appendix I Para 10.3

efficiency and environmental impact.[6]

The UAE ATM Strategic Plan has been developed in collaboration with the ATM Community through the UAE National Airspace Advisory Committee (NASAC).

7 ICAO GANP and Aviation Systems Block Upgrade (ASBU)

The ICAO Global Air Navigation Plan (GANP) provides the Aviation System Block Upgrade (ASBU) framework, its modules and associated technology roadmaps for Communications, Surveillance, Navigation, Information Management and Avionics.

The core of the ASBU framework is linked to four specific and interrelated aviation Performance Improvement Areas (PIA), namely:

a) Airport operations;
b) Globally interoperable systems and data;
c) Optimum capacity and flexible flights; and
d) Efficient flight paths.

The PIAs and Upgrade Modules associated with each have been organized into a series of four Blocks (Blocks 0, 1, 2 and 3) based on target implementation timelines for the various capabilities they contain.

Block 0

a) Technologies and capabilities which have already been developed and implemented in many parts of the world today; and
b) Features a near-term availability milestone, or Initial Operating Capability (IOC), of 2013 for high density based on regional and State operational need.

Blocks 1 – 3

[6] NASAC Terms of Reference 17th February 2013

a) Blocks 1 through 3 are characterized by both existing and projected performance area solutions; and

b) Availability milestones begin in 2020, 2025 and 2030 respectively.

8 ICAO MID Region Air Navigation Strategy and National Air Navigation Performance Framework

The Aviation System Block Upgrades (ASBU) methodology was formalized at the Twelfth Air navigation Conference and is part of the ICAO Global Air Navigation Plan GANP (Doc 9750).

ANC-Conf/12 also urged States and ICAO Air Navigation Planning and Implementation Regional Groups (PIRGs) to harmonize regional and national air navigation plans with the ASBU methodology. Accordingly, the ICAO MID Region Air Navigation Strategy was endorsed by MIDANPIRG/14 (Jeddah, Saudi Arabia 15 – 19 December 2013) to support the harmonization of regional and national air navigation plans within the ASBU framework. The MID Region Air Navigation Strategy includes prioritization of the ASBU Block 0 Modules as follows:

Priority 1

Modules that have the highest contribution to the improvement of air navigation safety and/or efficiency in the MID Region. These modules should be implemented where applicable and will be used for the purpose of regional air navigation monitoring and reporting for the period 2013 – 2020.

Priority 2

Modules recommended for implementation based on identified operational needs and benefits.

A list of the prioritized ASBU Block 0 Modules is shown under **Schedule 1**.

The MID Region Air Navigation Strategy also identifies the KPI's, Targets and Action Plans that should be

reflected in the UAE National Air Navigation Performance Framework. A list of the UAE KPI's Targets and Action Plans is shown at **Schedule 2**.

9 UAE Airspace Optimization Program 2030

ATM evolution requires a clearly defined progressive strategy including tasks and activities which best represent the regional and national planning processes in accordance with the ICAO global planning framework.

The UAE is committed to ensuring continuous development and enhancement to the airspace infrastructure, to ensure a safe and sustainable civil aviation sector.

For this reason, the UAE ATM Community shall develop Action Plans that are:

- Aligned with the list of prioritized ASBU Modules, in accordance with the ICAO MID Region Air Navigation Strategy;
- In compliance with the objectives of the UAE Airspace Policy;
- In compliance with the UAE PBN Implementation plan;
- Aligned with the progress of the UAE Airspace Optimization Program; and
- Aligned with the advice and recommendations of the NASAC.

In order to comply with what above stated, 3 main areas of intervention have been identified. These areas, namely Development, Management and Airspace Efficiency and for which all ANSPs have responsibilities, are the fundaments to progress an effectiveness airspace strategy within the UAE Airspace Optimization Program 2030.

A common approach by all ANSPs to the airspace strategy will also promote an advanced cooperation between all stakeholders and Military representatives with the aim to enhance a more efficient airspace usage and traffic management.

The implementation of UAE Action Plans shall be in accordance with the GCAA regulatory processes, with due regard to the guidance provided in the appropriate Regulations, Guidance Materials, and Advisory Publications.

10 Demand and Capacity Forecasting

"Developing a forecast is also a process to achieve a shared understanding of the future with ATM community members. This consensus is essential since it is the basis for identifying needs and agreeing on plans.

Not only should the forecast itself be developed in a collaborative manner, to enhance credibility of the forecast, but the forecasting approach and method also need to be collaborated between community members.

As part of the cooperation, it is important that ATM community members agree to use the same forecasting scenario as the basis for setting performance targets and estimating future performance."[7]

Short Term (2020), Medium Term (2025) and Long Term (2030) Forecast

Table 1 shows the consolidated forecast for all airports.

4.8% growth from 2018 - 2020 and 2.4% from 2020-2030.

Sources:

1. Abu Dhabi International Airport, Al Ain International Airport, Al Bateen Executive Airport, Sir Baniyas and Delma Island Airport forecasts were provided by Abu Dhabi Airports Company.
2. Dubai Airport and Dubai World Central Airport forecasts were provided by Dubai Airports. The forecast numbers have not been separated between the two airports and doesn't include military and helicopter movements.

[7] ICAO Doc 9883 Manual on Global Performance of the Air Navigation System Part 2 Para 2.2.5.6

3. Sharjah International Airport, Ras Al Khaimah and Fujairah International Airport forecasts were prepared by the Forecast Workgroup based on data provided by the relevant airport authorities.
4. Overflights data was provided by GCAA Sheikh Zayed Center.

Table 1 – UAE Airports Forecast

	Last Year (Actual)		Forecast		Forecast		Forecast	
Airport	2018		2020		2025		2030	
	Total	Avg/Day	Total	Avg/Day	Total	Avg/Day	Total	Avg/Day
Abu Dhabi	139,748	383	139,943	383	187,151	513	226,621	621
Al Bateen Executive	27,026	74	28,869	79	42,389	116	51,572	141
Al Ain International	75,825	208	107,015	293	121,264	332	151,117	414
Sir Baniyas and Delma	1,892	5	2,000	5	2,000	5	2,000	5
Dubai	408,250	1,118	415,308	1,138	466,658	1,279	N/A	N/A
Dubai World Central	29,955	82	33,285	91	60,053	165	N/A	N/A
Dubai Total	438,205	1,201	448,593	1,229	526,711	1,443	N/A	N/A
Sharjah	85,405	234	88,855	243	141,784	388	180,956	496
Fujairah	11,148	31	11,598	32	12,805	35	14,138	39
Ras Al Khaimah	14,785	41	18,823	52	30,314	83	48,822	134
Total	794,034	2,176	796,210	2,316	1,064,418	2,916	N/A	N/A
Overflights	148,410	407	175,752	481	202,517	554	228,014	624

11 Supporting Strategies

The following supporting strategies were determined by the NASAC after taking into account the views of Airspace users and industry stakeholders.

11.1 Civil/Military Cooperation Strategy

Airspace is recognised as a National asset, which should, except in times of National emergency, be available to all users in an organized and equitable manner. Almost half (47%) of the UAE FIR is currently reserved for military use needs to be made available in periods of little or no military activity to enable civil access thus reducing delays, fuel use and congestion currently affecting civil aviation.

Civil Aviation Law, Article 20, gives the GCAA, as the Competent Authority, the responsibility for establishing Rules relating to the use of airspace, while Article 7.2 of the GCAA Law requires the Authority to determine areas over which flying is prohibited, restricted or dangerous in coordination with the concerned authorities in the State.

The UAE CIVIL/MILITARY coordination plan is designed to facilitate the requirements of the UAE Airspace Policy with respect to Civil/Military Cooperation. The plan requires the adoption of the ICAO Aviation System Block Upgrade (ASBU) modules related to civil/military cooperation and the adherence to the time-lines incorporated in the various related modules.

It details the UAE position on enhancing civil/military collaboration and cooperation which should result in benefits to airspace management and air traffic management (ATM) system operations. Civil/military coordination has been shown in other parts of the world to:

a) Attain higher levels of safety;

b) Increase airspace capacity through an effective use of the airspace;

c) Enhance national security; and

d) Increase operational efficiencies through:

1) the interoperability of civil and military aircraft;

2) a reduction in distances flown;

3) the establishment of optimal flight profiles; and

4) a reduction in fuel consumption and carbon emissions.

Enhanced coordination have a positive impact on day-to-day airspace management while advanced strategic planning and use of restricted areas, allows for improved planning, predictability and execution of future technical and operational concepts. Collaborative assessments of costs and benefits will allow the UAE to meet the future demands and enhanced management of civil and military aviation with much greater certainty. Further, as a result of regional collaboration, Gulf States will likely be encouraged to consider common requirements for technology, capabilities, performance and procedures to meet future ATM demands.

11.2 CNS Strategy

The capabilities of the infrastructure enabling the delivery of services from the ATM system in particular those relating to communication, navigation, and surveillance and its development, is an essential pre-requisite for the introduction of any new ATM initiative. It is essential that ground infrastructure is compatible with, and exploits the capabilities of, modern aircraft and systems.

The CNS strategy is intended to coordinate the future development, procurement and implementation of technical and technological infrastructure systems across government, industry and the wider ATM community. It sets out the agreed strategic direction of the stakeholders and is subject to on-going review. The nature of technological development makes

it impractical to attempt to prescriptively define the technological base or implementation schedule for infrastructure facilities much beyond 15 years.

The CNS strategy covers the civil communication, navigation and surveillance systems and capabilities used in the UAE. The CNS Strategy references the recommendations from the Airspace study as follows:

- Develop and implement a unified UAE-wide Enterprise Architecture describing the capabilities and systems that will be used for air navigation services provision, including by the military.

11.2.1 Communication

Specific operational goals relating to communication have also been identified providing aeronautical information to all airspace users, meeting required communication performance criteria.

The functional needs for communication services will continue over the next fifteen years without significant change. Hence, changes to voice communication infrastructure will be predominantly associated with equipment replenishment, modernisation and service improvements. The utilisation of data-link techniques will grow rapidly enabling improvements to existing air/ground communications, supporting new surveillance services and progressing towards the more fully integrated communication capabilities proposed under the ATN.

Voice communications will continue to be predominately based on VHF in airspace utilising 25 kHz channel spacing to accommodate traffic density however a move to 8.33 kHz or 12.5 kHz spacing will be adopted if required. Air/ground traffic will progressively move from voice services to data-link communications such as CPDLC and PDC. AMHS and ATN data link communication services will be introduced to eventually replace the existing FANS-1/A and AFTN systems. Integration of data services towards SWIM will require suitable data communication services. It is anticipated that the stepwise migration to SWIM enabled applications will have an impact on the underlying ground-ground data communication services. The move towards Internet technologies will require special attention to Cyber security to

assure integrity and availability of communication lines.

11.2.2 Navigation

Specific operational goals relating to navigation have also been identified which support the UAE PBN Implementation Plan.

In the next fifteen years the UAE navigation infrastructure will be based upon GNSS, GLS and the ILS navigation systems. This approach is consistent with ICAO MID Region Air Navigation Strategy.

11.2.3 Surveillance

Specific operational goals relating to surveillance have also been identified relating to the need for supporting ATS throughout UAE airspace, providing ground-based independent surveillance and providing or supporting ground-based automatic dependent surveillance and both ground based and airborne ADS in controlled airspace throughout UAE airspace.

There will be an increase in the use of automatic surveillance techniques and a corresponding decline in pilot position reports. Both primary and secondary surveillance radar will continue to be used in busy terminal environments and Mode S capability will be a feature of the future ground-based surveillance infrastructure.

ADS-B will be used widely to provide both ground and airborne surveillance and its introduction will enable the introduction of significant changes to ATM. Multilateration will become a viable and accurate means of surveillance.

Multi-Sensor to support ground surveillance at the major airports consisting of SMR, ADS and Multilateration systems are expected to contribute to the advanced operations to increase safety and efficiency by A-SMGCS and DMAN systems.

11.3 Aerodromes (ATM) Strategy

The aerodrome strategy should meet the aerodrome operations concept under which an aerodrome operator optimizes the ground infrastructure including, airfield lighting, taxiways, runways, runway exits and precise surface guidance to improve safety and maximize capacity in all weather conditions for which the airport is required to operate through customer demand.

The strategy will also allow the aerodromes to incorporate collaborative decision making at strategic, pre tactical and tactical stages to manage the demand capacity balance, improve predictability of operations, and provide traffic synchronization through elimination of choke points, 4-D trajectory control and optimization of traffic sequencing.

The Aerodrome strategy will apply to all UAE aerodromes (civilian and military) to support the overall UAE ATM Strategic Plan. This strategy will allow the improved data flow on arriving flights to enhance traffic handling on the ground. Enhancement of the interface between airside airport operations and ATM which takes account of airport operations in route planning & vice versa and increased ability to react to last minute changes on the ground.

The aerodrome operational architecture will ensure ATM community expectations are satisfied and meet expected increases in capacity, predictability and efficiency demands through efficient design and construction of aprons, taxiways and runways and provision of appropriate landing aids and systems that support all weather operations. The airport infrastructure and systems should support provision of situational awareness between all aircraft and ground vehicles. All aerodromes shall enforce aerodrome safeguarding strategy to ensure safety and viability of operations.

11.4 AIM Strategy – From AIS to AIM

The purpose of the Aeronautical Information Management Strategy is: *"To achieve a uniform and efficient aeronautical information management structure, based on system wide information management, to support all phases of flight, by providing quality assured digital aeronautical data and aeronautical information in a timely manner."*

AIS must make the transition from the supply of predetermined products to the management of data from which Aeronautical Information in its entirety can be extracted and subsequently customized in a variety of ways to serve future ATM needs.

This challenge will be met by the transition to AIM. AIM will be responsible for both the content (including formats, timeliness, collection, checking, distribution, etc.) and the proper management of the data (storage, consistency between databases, interfacing with other systems, etc.). AIM will manage data on the basis of the System Wide Information Management (SWIM) concept which is a globally all-encompassing, structured but open approach to data management. Progressive implementation of the SWIM principles in AIM is in fact AIM's evolution to IM, or Information Management that is fully SWIM based and which is the ultimate goal.

User applications are an important new element of the concept. AIM will ensure that user applications can access data immediately and from any location, including aircraft in flight or on the ground, where appropriate connectivity is available. The role of user applications is to transform data into aeronautical information, customized to the specific requirements of a given user at a given time. User applications for self-briefing, flight planning, operational control, CDM and in-flight use (e.g. Electronic Flight Bag - EFB, 4D displays for taxiing) can be envisaged among others. These applications will also be system independent, scaleable and will cover the needs of a broad spectrum of aeronautical information users.

In AIM, the frontier between textual and graphical formats will dissolve. Only data of the required quality will be managed and made available, and it will be the role of the applications to select and then intelligently use and if required display information in whichever format (textual or graphical) is the most appropriate and as requested by the user.

AIM will be able to meet users' needs on several levels. It will be a significant driver of the transition also on the user side. It will offer superior data service and total flexibility for users via the user applications concept. It will also retain the ability to offer traditional AIS products to users who have yet to make the transition (AIS is one component of AIM). This will be achieved by the UAE AIS Database.

AIM is a concept for managing the content of aeronautical data and the data itself, providing quality assured data to user applications for the benefit of all aviation stakeholders. Its open standards and common data exchange models will ensure platform independence and Interoperability.

Appropriate rules and procedures will be developed to ensure that all data sources meet the AIM requirements for data quality.

11.4.1 Flight and Flow-Information for Collaborative Environment (FF-ICE)

Flight and Flow-Information for Collaborative Environment (FF-ICE) takes into consideration the requirements of the ATM community, including the military, to achieve a "common picture" in global ATM. The focus on cooperation should be, in particular, in the areas of data security, data exchange, data integrity, and data sharing.

The FF-ICE supports all the ATM Operational Concept components requiring flight information (demand and capacity balancing (DCB), conflict management (CM), service delivery management (SDM), airspace organization and management (AOM), aerodrome operations (AO), traffic synchronization (TS), airspace user operations (AUO)) and refines the *Global ATM Operational Concept* in the area of flight information management. It constitutes the necessary basis for the most advanced ATM systems and the development of four-dimensional (4D) trajectory management.

The FF-ICE concept addresses the following topics:

a) Provision and sharing of information between authorized members of the ATM community, which includes:

1) Aircraft and flight identification, including aircraft capabilities;
2) Airspace user intent and preferences for each flight;
3) Information necessary to support search and rescue (SAR); and
4) Information supporting access requirements;

b) The life cycle and intended use of the above information;

c) The mechanisms supporting the exchange/sharing of FF-ICE information between members of the ATM community; and

d) Assumptions on the surrounding information environment.

Within the UAE ATM Strategic plan:

- The FF-ICE will provide the ability to share the same flight information across a broad range of collaborating participants before and during a flight.

- The FF-ICE will replace all existing data message formats between ATM community members about flight intent and flight progression.

- The information about the flight will be available from the time of first notification of the flight intent until after the flight has completed, at which time the information will be archived.

11.4.2 Electronic Flight Bags and other Portable Electronic Solutions

The ability to use different media for data transmission directly to the flight deck will reduce pilot workload, improve situational awareness, improve efficiency and related reduction in cost and emissions while meeting the operator's requirement to provide to the crews information

that can affect the flight(s) as and when it becomes available

The EFB or other devices will also facilitate the ability for crew to have one easily accessible source for the data and information necessary to conduct the flight and reduce the use of paper in the cockpit. All Regulatory CAR-OPS and Operational requirements must be taken into account.

Information that can be uplinked either on a request or a push/pull concept would include, but not limited to, latest NOTAM, SIGMETS, volcanic activity, Airspace restrictions etc. that enable the crews to make informed decisions on the latest available data.

Aircraft are being fitted with capabilities such as Airport Moving Maps to mitigate runway incursions/excursions and increase situational awareness. The ability to overlay ATC instructed taxi routes, preferred runway exits and taxiway closures will also increase the efficiency of the operation, the airport and the level of safety.

Those airports and agencies that supply Gatelink or Wi-Fi communication facilities can maximize the efficiencies and safety of the operation.

11.4.3 AIM - Expected Benefits

AIM will bring benefits to all parts of the ATM system by enabling the provision of aeronautical data of the required quality, accessible by all users (human as well as systems) at all times. As such, it will especially contribute to:

Safety – Timely and accurate aeronautical data of the appropriate scope is essential for the safe use of modern ATM and navigation techniques.

ATM performance – AIM is an essential enabler for concepts like CDM and enhanced airspace management.

Flight Efficiency – The interaction of all elements of gate-to-gate activities will be harmonized to create the "Time Ordered ATM System", to efficiently exploit the full capacity of airports and airspace.

Enabling User Applications – A basic tenet of the AIM concept is the provision of aeronautical data of the required quality in standard format, without prejudice as to how the data will be used. Specific rules and procedures for ATM and aircraft operation will ensure proper usage.

Uniformity and interoperability of systems –AIM acts in the direction of improved uniformity and interoperability both on a regional level, and on a global scale.

Cost effectiveness - AIM offers a cost effective, uniform data management environment meeting the needs of all users in an open and interoperable networked system.

11.5 MET Strategy

The National Centre for Meteorology (NCM), established as the Meteorological Service Provider for the UAE under Law number 6 of 2007, is responsible for the provision of meteorological services to transportation.

Civil Aviation Law, article 3, paragraph c, requires that the provisions of this Law shall apply in respect of Civil Airports in all technical activities such as Meteorological services to aviation. Article 4 states that the Competent Authority shall supervise all matters relating to civil aviation and its development in the State. It shall also supervise the compliance with the generally acceptable international regulations at the airports of the State, and monitor the implementation thereof, in coordination with the local Authorities.

The GCAA Law, Article 6, paragraph 1, states that the GCAA shall undertake, in coordination with

local authorities and concerned bodies, the execution of the Civil Aviation Law, including implementation of international agreements and treaties in the fields of civil aviation and Meteorology.

The Meteorological strategy is to comply with ICAO Annex 3 requirements to contribute to the safety, efficiency and regularity of international air navigation. This shall be achieved by supplying all stakeholders with the meteorological information required for the performance of their various functions. Meteorological services currently supplied by the airport's individual ANSPs shall progressively be taken over by the NCM.

The GCAA will retain an oversight of all NCM Aviation MET functions and units providing aviation meteorological services.

11.6 Search and Rescue Strategy (SAR)

Search and Rescue services within the UAE Search and Rescue Region (SRR) are presently provided by two authorities: GHQ in the Abu Dhabi Emirate and Dubai Police in the Northern Emirates. The Convention on International Civil Aviation requires that a State shall establish a single Rescue Coordination Centre (RCC), and Rescue Sub-centres (RSC) as deemed appropriate, in each SRR. The RCC can provide either civil aviation SAR services alone or, if established as a Joint RCC (JRCC), both aviation and maritime SAR services.

As the GCAA mandate to regulate and oversight SAR extends only to civil aviation operations, and bearing in mind the immense task of establishing effective SAR services in all of the maritime, terrestrial and military sectors, as well as civil aviation, GCAA considers that its responsibilities can most effectively be met by ensuring that civil aviation SAR is properly established within the family of civil aviation services treated by the Chicago Convention and established as a distinct civil aviation service. This may be done by either establishing a separate Aviation RCC (ARCC) or a separate aviation SAR stream within a Joint RCC (JRCC).

The Emirates SRR is approximately coincident with the UAE Flight Information Region. The organizational structure of civil aviation SAR services will have no immediate impact on airspace design. The RCC will, however, independently or in cooperation with an RSC (or RSCs), have a SAR service responsibility throughout the entire SRR.

The SAR involvement of ATM extends from the provision of In-Flight Emergency Response (IFER) services, (that must effectively interface with SAR services), to SAR Alerting, (including evaluation of emergency events), and, as and when required, initial coordination of SAR operations pending the assumption of responsibility by the RCC. ATM is then required to continue assisting the RCC with relevant data and supportive actions, (for example, tactical airspace management), until the emergency response is terminated.

11.7 Contingency Planning

ICAO Annex 11 requires States to ensure ATS units establish contingency plans. GCAA Regulations require that the same are established.

ATS units shall establish contingency management procedures with respect to adjacent units within the UAE and the ACC shall develop procedures with the ATS units in adjacent FIRs.

12 Schedules to the UAE Air Traffic Management Strategic Plan

- Schedule 1: ICAO MID Region ASBU Block 0 Modules Prioritization Table
- Schedule 2: UAE KPI's Targets and Action Plans
- Schedule 3: UAE Airspace Forecasting (2017 – 2030)
- Schedule 4: UAE Airspace development recommendations & priorities

13 References

Annex 11	Thirteenth Edition
Global Air Traffic Management Operational Concept	Doc 9854
Global Air Navigation Plan	Doc 9750
Global Aviation Safety Plan 2014 – 2016	Doc 10004
PANS-ATM	Doc 4444
PANS-OPS	Doc 8168
Manual on Global Performance of the Air Navigation System	Doc 9883
Performance Based Navigation Manual	Doc 9613
RNP AR Procedure Design Manual	Doc 9905
PBN Ops Approval Manual	Doc 9997
Manual on Use of PBN in Airspace Design	Doc 9992
CDO Manual	Doc 9931
CCO Manual	Doc 9993
GNSS Manual	Doc 9849
Safety Management Manual	Doc 9859
Manual on Air Traffic Management (ATM) System Requirements	Doc 9882
Basic Air Navigation Plan – Middle East Region	Doc 9708
Facilities and Services Implementation Document	MID FASID
MID Region Air Navigation Strategy	MIDANPIRG/14
UAE PBN Implementation Plan	GCAA
UAE Airspace Policy	GCAA
UAE Airspace Study – Final Report (10 September 2013)	GCAA
UAE CIVIL/MILITARY Coordination Plan	GCAA

Schedule 1: MID Region ASBU Block 0 modules prioritization

Performance Improvement Areas (PIA)	Performance Improvement Area Name	Module	Priority	Module Name
PIA 1	Airport Operations	B0-65 APTA	1	Optimization of Approach Procedures including vertical guidance
		B0-70 WAKE	2	Increased Runway Throughput through Optimized Wake Turbulence Separation
		B0-15 RSEQ	2	Improved Traffic Flow through Sequencing (AMAN/DMAN)
		B0-75 SURF	1	Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)
		B0-80 ACDM	1	Improved Airport Operations through Airport-CDM
PIA 2	Globally Interoperable Systems and Data - Through Globally Interoperable System Wide Information	B0-25 FICE	1	Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration
		B0-30 DATM	1	Service Improvement through Digital Aeronautical Information Management
		B0-105 AMET	1	Meteorological information supporting enhanced operational efficiency and safety
PIA 3	Optimum Capacity and Flexible Flights – Through Global Collaborative ATM	B0-10 FRTO	1	Improved Operations through Enhanced En-Route Trajectories
		B0-35 NOPS	1	Improved Flow Performance through Planning based on a Network-Wide view
		B0-84 ASUR	2	Initial Capability for Ground Surveillance
		B0-85 ASEP	2	Air Traffic Situational Awareness (ATSA)
		B0-86 OPFL	2	Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B
		B0- 101 ACAS	1	ACAS Improvements
		B0-102 SNET	2	Increased Effectiveness of Ground-based Safety Nets
PIA 4	Efficient Flight Path – Through Trajectory-based	B0-05 CDO	1	Improved Flexibility and Efficiency in Descent Profiles (CDO)
		B0-TBO	2	Improved Safety and Efficiency through the initial application of Data Link En-Route

	Operations	B0-20 CCO	1	Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

Priority 1: Modules that have the highest contribution to the improvement of air navigation safety and/or efficiency in the MID Region. These modules should be implemented where applicable and will be used for the purpose of regional air navigation monitoring and reporting.

Priority 2: Modules recommended for implementation based on identified operational needs and benefits.

Schedule 2: UAE KPI's Targets and Action Plans

B0 – APTA: Optimization of Approach Procedures including vertical guidance

Description and purpose

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), and GLS. The flexibility inherent in PBN approach design can be exploited to increase runway capacity.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
Y	Y	Y	Y	Y

Applicability consideration:

This module is applicable to all instrument, and precision instrument runway ends, and to a limited extent, non-instrument runway ends.

B0 – APTA: Optimization of Approach Procedures including vertical guidance					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
LNAV/VNAV	All Instrument RWYs	Indicator: % of instrument runways ends provided with Baro-VNAV approach procedures Supporting metric: Number of instrument runways ends provided with Baro-VNAV approach procedures	All instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2018	As per UAE PBN Implementation Plan	• 100% implemented as of 7 December 2017

Precision Approach using GLS	TBD	Indicator: % of runway ends with GLS Supporting metric Number of runway ends with GLS		As per UAE PBN Implementation Plan	Long term 2020+

B0 – WAKE: Increased Runway Throughput through optimized Wake Turbulence Separation

Description and purpose

Improves throughput on departure and arrival runways through optimized wake turbulence separation minima, revised aircraft wake turbulence categories and procedures.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-06 – Flexibility
Y	Y	Y

Applicability consideration:

Least complex – Implementation of revised wake turbulence categories is mainly procedural. No changes to automation systems are needed.

B0 – WAKE: Increased Runway Throughput through optimized Wake Turbulence Separation					
Elements	***Applicability***	**Performance Indicators/Supporting Metrics**	**Targets**	**Action Plan**	***Remarks***

RECAT Phase 1 Ad-hoc Aircraft pair reduced separation RECAT Phase 2	TBD Validation phase	Arrival Runway throughput enhancement		As per UAE RECAT Action Plan	• Report on RECAT status for UAE – TBA • Draft Regulations – TBA • Trials/Simulations – Q2 2015 - ongoing • Safety Case – TBA • Reports – Q4 2015 - ongoing

B0 – ACDM: Improved Airport Operations through Airport-CDM

Description and purpose

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 manoeuvring areas and enhance safety, efficiency and situational awareness.

Main performance impact:

KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment
Y	Y	Y

Applicability consideration:
Local for equipped/capable fleets and already established airport surface infrastructure.

B0 – ACDM: Improved Airport Operations through Airport-CDM					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
A-CDM	*TBD*	Indicator: % of Aerodromes having implemented improved airport operations through airport-CDM Supporting metric: Number of Aerodromes having implemented improved airport operations through airport-CDM	OMDB – 2019 OMAA-2019 OMDW - 2025	• Formalize partnerships within the ATM Community • Agree on decision-making approach and principles • Develop a Concept of Operations • Conduct an analysis	

B0 – RSEQ: Improved Traffic Flow through Sequencing (AMAN/DMAN)

Description and purpose

Manage arrivals and departures (including time-based metering) to and from a multi-runway aerodrome or locations with multiple dependent runways at closely proximate aerodromes, to efficiently utilize the inherent runway capacity.

Main performance impact:

KPA-02 – Capacity	KPA-04 – Efficiency	KPA-06 – Flexibility	KPA-09 – Predictability
Y	Y	Y	Y

Applicability consideration:
Runways and terminal manoeuvring area in major hubs and metropolitan areas will be most in need of these improvements. The improvement is least complex – runway sequencing procedures are widely used in aerodromes globally. However, some locations might have to confront environmental and operational challenges that will increase the complexity of development and implementation of technology and procedures to realize this Module.

B0 – RSEQ: Improved Traffic Flow through Sequencing (AMAN/DMAN)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***

	TBD	Indicator: % of Aerodromes that are managed by AMAN/DMAN systems Supporting metric: Number of Aerodromes that are managed by AMAN/DMAN systems	TBA	TBA	AMAN for OMDB AMAN for OMAA DMAN planned

B0 – FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration

Description and purpose

To improve coordination between air traffic service units (ATSUs) by using ATS Inter-facility 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.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	N	Y

Applicability consideration:

Applicable to at least two area control centres (ACCs) dealing with enroute and/or terminal control area (TMA) airspace. A greater number of consecutive participating ACCs will increase the benefits.

B0 – FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***

<table>
<tr>
<td>AMHS implementation</td>
<td>All ATS Units</td>
<td>Indicator: % of ATS Units with AMHS implemented

Supporting metric: Number of ATS Units with AMHS implemented</td>
<td>TBA</td>
<td>AMHS Implementation
<table><tr><td>OMAE (ACC)</td><td>Yes</td></tr><tr><td>OMAA</td><td>No</td></tr><tr><td>OMAL</td><td>No</td></tr><tr><td>OMAD</td><td>No</td></tr><tr><td>OMDB</td><td>Yes</td></tr><tr><td>OMDW</td><td>Yes</td></tr><tr><td>OMFJ</td><td>No</td></tr><tr><td>OMRK</td><td>No</td></tr><tr><td>OMSJ</td><td>No</td></tr></table></td>
<td>Percentage 33%</td>
</tr>
<tr>
<td>AMHS interconnection</td>
<td>All ATS Units</td>
<td>Indicator: % of ATS Units with AMHS interconnected with other ATS AMHS

Supporting metric: Number of ATS Units with AMHS interconnections implemented with other ATS AMHS</td>
<td>TBA</td>
<td>AMHS Interconnection
<table><tr><td>OMAE (ACC)</td><td>Yes</td></tr><tr><td>OMAA</td><td>Yes</td></tr><tr><td>OMAL</td><td>No</td></tr><tr><td>OMAD</td><td>No</td></tr><tr><td>OMDB</td><td>Yes</td></tr><tr><td>OMDW</td><td>Yes</td></tr><tr><td>OMFJ</td><td>No</td></tr><tr><td>OMRK</td><td>No</td></tr><tr><td>OMSJ</td><td>No</td></tr></table></td>
<td>Percentage: 33%

International AMHS Connections to
• Jeddah
• Doha
• Muscat
• Amman

Further connections will be established, depending on the readiness of partners</td>
</tr>
</table>

Implementation of AIDC/OLDI between adjacent ACCs	*SZC ACC*	Indicator: Percentage of ACCs with AIDC/OLDI systems implemented between adjacent ACCs Supporting metric: Number of AIDC/OLDI interconnections implemented between adjacent ACCs	TBA	OMAE-OMAA YES OMAE-OMAL YES OMAE-OMAD YES OMAE-OMDB YES OMAE-OMDW YES OMAE-OMFJ NO OMAE-OMRK YES OMAE-OMSJ YES OMAE-OTHH YES OMAE-OOMM NO OMAE-OBBB YES OMAE-OEJD NO OMAE-OIIX NO	Percentage: 77%

B0 – DATM: Service Improvement through Digital Aeronautical Information Management

Description and purpose

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

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	N	Y	Y	Y

Applicability consideration:

Applicable at State level, with increased benefits as more States participate

B0 – DATM: Service Improvement through Digital Aeronautical Information Management					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
1-AIXM	*GCAA*	Indicator: 100% implementation of an AIXM- based Integrated Aeronautical Information Database (IAID)		Completed	Completed

2-eAIP	*GCAA*	Indicator: 100% implementation of an IAID driven AIP Production (eAIP)		Completed	Completed
3-QMS	*GCAA*	Indicator: % of States that have implemented QMS for AIS/AIM		Completed	Completed
4-WGS-84	*GCAA*	Indicator: Implementation of WGS-84 for En-route		Completed	Completed
	All ATS Units	Indicator: % of ATS Units that have implemented WGS-84 for Terminal Supporting Metric: Number of ATS Units that have implemented WGS-84 for Terminal Indicator: % of ATS Units that have implemented WGS-84 for Aerodromes Supporting Metric: Number of ATS Units that have implemented WGS-84 for Aerodromes Indicator: % of ATS Units that have implemented Geoid Undulation Supporting Metric: Number of ATS Units that have implemented Geoid Undulation		Completed	Completed

5-eTOD	*All ATS Units*	Indicator: % of ATS Units that have implemented required Terrain datasets Supporting Metric: Number of ATS Units that have implemented required Terrain datasets Indicator: % of ATS Units that have implemented required Obstacle datasets Supporting Metric: Number of ATS Units that have implemented required Obstacle datasets		Terrain Dataset – Ongoing OMDB - Completed OMDW - Completed OMAA - Ongoing OMAL - Ongoing OMAD - Ongoing OMDL - Ongoing OMBS - Ongoing OMRK - Ongoing OMFJ - Ongoing OMSJ - Ongoing Obstacle Dataset – Ongoing OMDB - Completed OMDW - Completed OMAA - Completed OMAD - Completed OMAL - Completed OMDL - Completed OMBS - Completed OMRK- Ongoing OMSJ - Ongoing OMFJ - Completed	Implemented Areas 1 and Area 4. Area 2 and Area 3 implemented: 20% Obstacle Implemented 100% for Area 1, Area 4 Area 2 and Area 3: implemented: 80%

B0 – FRTO: Improved Operations through Enhanced En-Route Trajectories

Description and purpose

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.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
Y	Y	Y	Y	N/A

Applicability consideration:

Applicable to en-route and terminal airspace. Benefits can start locally. The larger the size of the concerned airspace the greater the benefits, in particular for flex track aspects. Benefits accrue to individual flights and flows. Application will naturally span over a long period as traffic develops. Its features can be introduced starting with the simplest ones.

B0 – FRTO: Improved Operations through Enhanced En-Route Trajectories					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
Flexible use of airspace (FUA)	*All ATS Units*	Indicator: % of ATS Units implementing FUA Supporting metric: number of ATS Units implementing FUA		As per UAE Civil/Military Coordination Plan	Ongoing

Flexible routing	*All ATS Units*	Indicator: % of established Routes overflying segregated airspace Supporting metric: Number of established Routes overflying segregated airspace		As per UAE Airspace Restructuring Program	Ongoing

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)

Description and purpose

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.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	Y

Applicability consideration:
Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex – regional/States/locations with some foundational PBN operational experience that could capitalize on near term enhancements, which include integrating procedures and optimizing performance;

b) more complex – regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex – regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics)***	***Targets***	***Action Plan***	***Remarks***
PBN STARs	TBD	Indicator: % Aerodromes/TMA with PBN STAR implemented Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented	70% by 2014 100% by 2016	As per UAE PBN Implementation Plan	100% completed
Aerodromes/TMAs with CDO	TBD	Indicator: % of Aerodromes/TMA with CDO implemented Supporting Metric: Number of Aerodromes/TMAs with CDO implemented	TBD	As per UAE Airspace Restructuring Program	ongoing

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

Description and purpose

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.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N/A	N/A	Y	Y	Y

Applicability consideration:

Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex: regional/States/locations with some foundational PBN operational experience that could capitalize on near-term enhancements, which include integrating procedures and optimizing performance;

b) more complex: regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex: regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
PBN SIDs	TBD	Indicator: % of Aerodromes/TMA with PBN SID implemented Supporting Metric: Number of Aerodromes/ TMAs with PBN SID implemented	70% by 2014 100% by 2016	As per UAE PBN Implementation Plan	100% completed
International aerodromes/TMAs with CCO	TBD	Indicator: % of Aerodromes/TMA with CCO implemented Supporting Metric: Number of Aerodromes/TMAs with CCO implemented	TBD	As per UAE Airspace Restructuring Program	

Schedule 3 2020 2025 and 2030 UAE Airspace Forecast

UAE National Airspace Advisory Committee (NASAC)
Forecast Working Group

Mandate

The NASAC working group number 3 had been formed to prepare a future forecast of number and type of aircraft operations in the UAE airspace including civilian airliners, cargo, military, GA, private and helicopter movements. These will include all IFR and VFR operations originating or terminating in UAE airspace and over flights transiting through the UAE FIR.

Membership

The group comprises of members from Abu Dhabi Airports Company (ADAC), Dubai Airports (DA) and General Civil Aviation Authority (GCAA) ANA Section.

Purpose:

The purpose of this forecasting project is to support the development of a UAE ATM strategic master plan which will identify the ATM capacity requirements in the UAE. The resulting forecast will also be used to support the development of a UAE airspace master plan, which may form the basis of restructuring of the UAE airspace and the required interfaces with adjacent FIRs.

Scope and Product:

The forecast group will prepare a short (2020), medium (2025) and long term (2030) forecast based on 2017 operations.

- The forecast group will collect all available information for 2013 and will prepare a baseline that will be used to prepare the forecasts.

- The group will collect all available unconstrained forecast for the ten civilian airports (Abu Dhabi International, Al Ain International, Al Bateen Executive, Delma and Sir Baniyas Island, Dubai International, Dubai World Central, Sharjah International, Fujairah International and Ras Al Khaimah International Airports). In case no forecast is available for an airport, average growth factors based on historical data will be used to prepare forecasts. The unconstrained individual forecast for each airport will be added together to prepare a forecast for the whole UAE. No adjustment will be made to individual airport forecasts other than to ensure that the same parameters are used for each airport.

- The forecast group will also estimate the current and future use of the airspace by documenting the current entry/exit fix usage and predict the future loadings on these fixes if no changes are

made. This will help in prioritizing the need to improve the airspace structure and bilateral negotiations by geographical areas.

- The military data will be analyzed and presented if made available to the group.
- It is recommended that as a next step, this forecast be verified by an independent third party consultant to confirm the validity of forecast numbers by conducting additional econometric analysis on a UAE wide basis.

Table 2 – UAE Airports Forecast

	Last Year (Actual)		Forecast		Forecast		Forecast	
Airport	2018		2020		2025		2030	
	Total	Avg/Day	Total	Avg/Day	Total	Avg/Day	Total	Avg/Day
Abu Dhabi Airport	139,748	383	139,943	383	187,151	513	226,621	621
Al Bateen Executive Airport	27,026	74	28,869	79	42,389	116	51,572	141
Al Ain International Airport	75,825	208	107,015	293	121,264	332	151,117	414
Sir Baniyas and Delma Airport	1,892	5	2,000	5	2,000	5	2,000	5
Dubai Airport	408,250	1,118	415,308	1,138	466,658	1,279	N/A	N/A
Dubai World Central	29,955	82	33,285	91	60,053	165	N/A	N/A
Dubai Total	438,205	1,201	448,593	1,229	526,711	1,443	N/A	N/A
Sharjah Airport	85,405	234	88,855	243	141,784	388	180,956	496
Fujairah Airport	11,148	31	11,598	32	12,805	35	14,138	39
Ras Al Khaimah Airport	14,785	41	18,823	52	30,314	83	48,822	134
Total	794,034	2,175	1,053,996	2,888	1,514,259	4,149	1,898,804	5,202
Overflights	148,410	407	175,752	481	202,517	554	228,014	624

Sources:

1. Abu Dhabi International Airport, Al Ain International Airport, Al Bateen Executive Airport, Sir Baniyas and Delma Island Airport forecasts were provided by Abu Dhabi Airports Company.
2. Dubai Airport and Dubai World Central Airport forecasts were provided by Dubai Airports. The forecast numbers have not been separated between the two airports and doesn't include military and helicopter movements.
3. Sharjah International Airport, Ras Al Khaimah and Fujairah International Airport forecasts were prepared by the Forecast Workgroup based on data provided by the relevant airport authorities.
4. Overflights data was provided by GCAA Sheikh Zayed Center.

AUH, DXB and SHJ Departures by Region

Table 3 shows the distribution of daily operations at Abu Dhabi International Airport, Dubai International Airport/Dubai World Central and Sharjah International Airport among geographical regions. The MENA (middle east and north africa) region will continue to be the primary market for operations followed by Asia (Mid) and Europe (N/W) regions.

Table 3

Region	AUH, DXB/DWC[1] and SHJ Departures by Region			
	2013	2015 forecast	2020 forecast	2030 forecast
MENA	311	344	491	766
Asia (Near)	67	95	121	193
Asia (Mid)	141	168	244	392
Asia (Far)	75	124	148	247
Europe (N/W)	96	120	160	264
Europe (S/E)	67	92	147	237
Africa (N)	20	39	47	77
Australasia	15	21	31	52
Africa (S)	19	24	31	53
America (N)	19	34	50	85
America (S)	2	4	9	15
Total	**832**	**1066**	**1479**	**2,380**

Notes:

1. The daily departures for DXB/DWC are for peak day.

AUH, DXB and SHJ Departures by Quadrant

Table 4 shows the distribution of operations at Abu Dhabi International Airport, Dubai International Airport/Dubai World Central and Sharjah International Airport among geographical quadrants. The operations in the East quadrant are expected to be greater than the Notrthwest quadrant by 2015 followed by West quadrant. This trend is then expected to continue till 2030.

Table 4

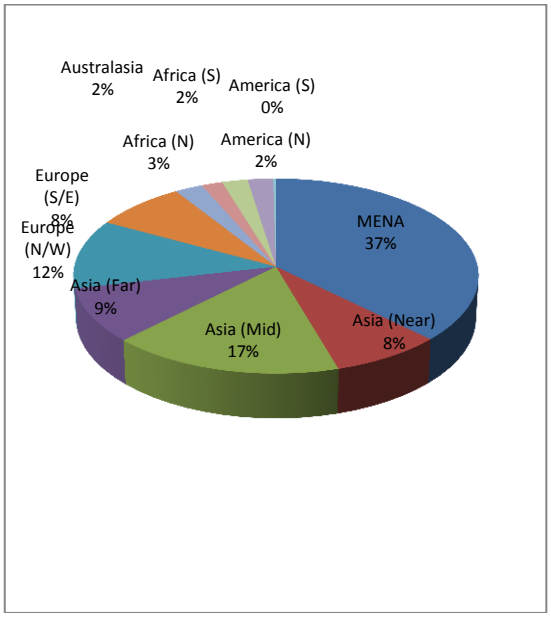
Quadrants	AUH, DXB/DWC[1] and SHJ Departures By Quadrant			
	2013	2015 forecast	2020 forecast	2030 forecast
N	71	75	118	180
S	15	19	25	43
E	219	288	388	627
W	180	213	296	469
NE	51	78	96	154
NW	230	292	416	675
SE	35	43	70	118
SW	32	57	70	116
Total	**832**	**1,066**	**1,479**	**2,380**

Notes:

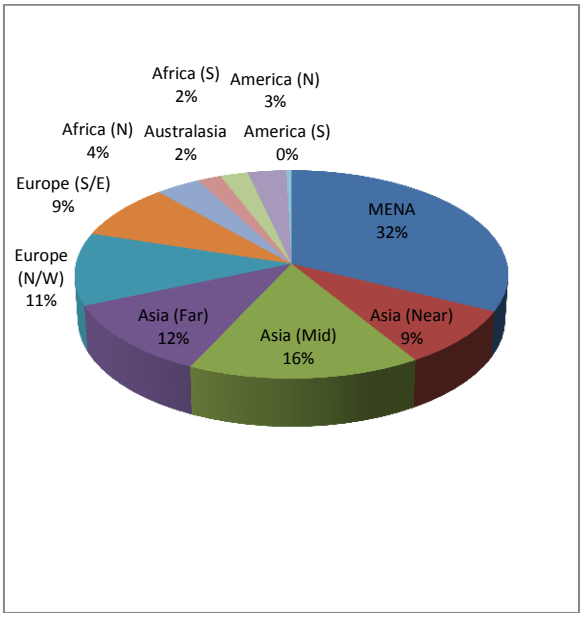
1. The daily departures for DXB/DWC are for peak day.

Exhibit 3 - AUH, DXB and SHJ Departures by Region

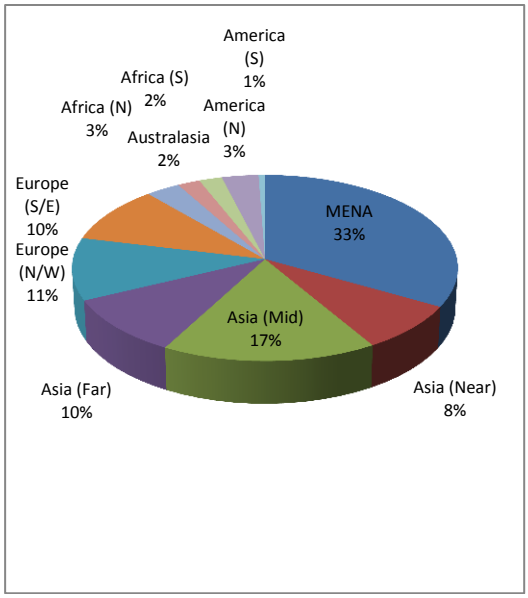
2013



2015



2020



2030

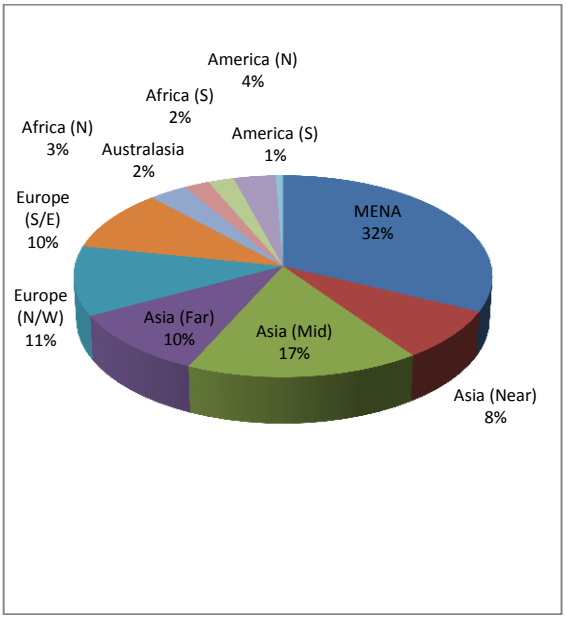
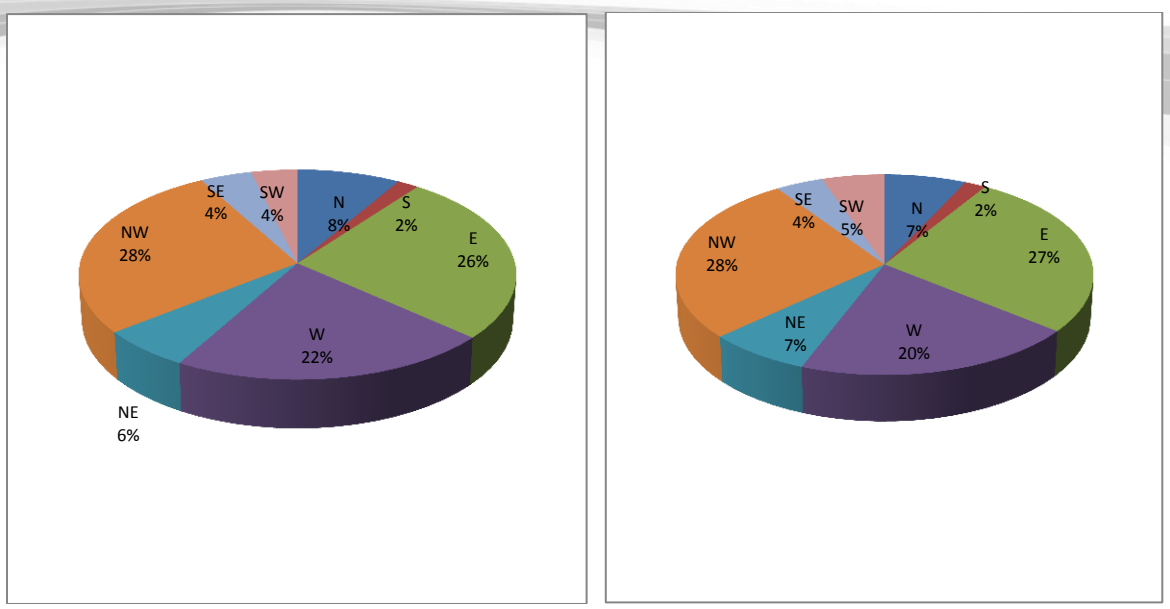
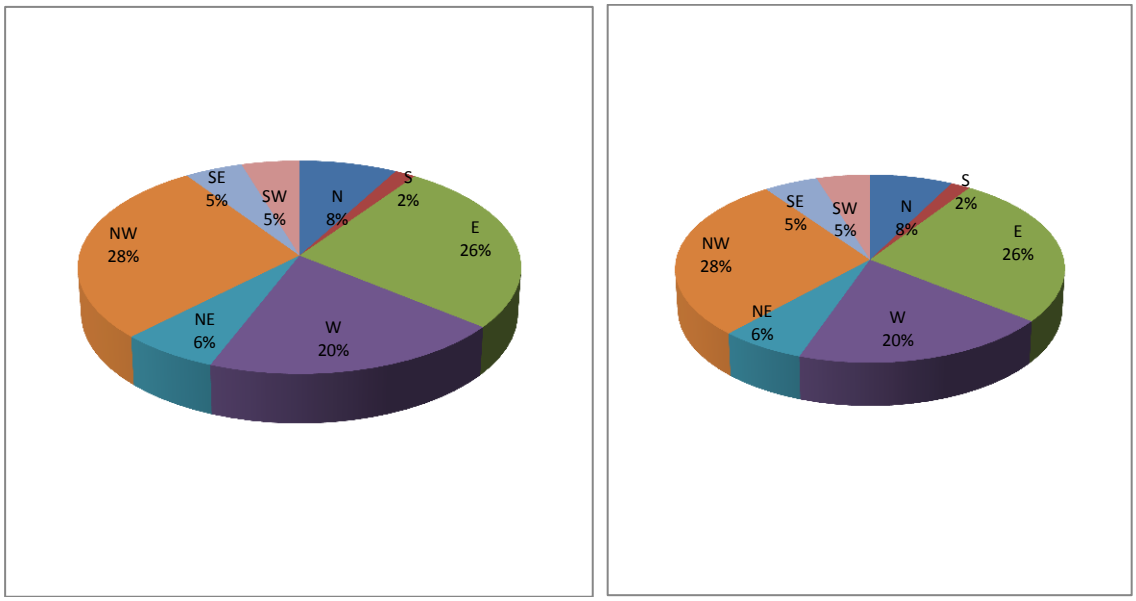


Exhibit 4 - AUH, DXB and SHJ Departures by Quadrant

2013 **2015**



2020 **2030**



Schedule 4 UAE Airspace recommendations and priorities

A common ANSPs' airspace strategy should reflect the airspace operational concept under which any single ANSP can identify the more pertinent areas of intervention to optimize the development, the management and an effective use of airspace under its jurisdiction.

The agreed airspace strategy will mainly focus on the optimization of different phases of flight such as, en-route/approach and their related linkage with the airports.

All efforts provided by different airport operators to enhance airport performances will be useless if an airspace strategy wouldn't be able to support the aviation system growth in a cooperative and collaborative

way. Areas of improvement, in terms of expected benefits should be identified and priority of intervention agreed and assigned accordingly.
Performances must be monitored and corrective actions planned and taken properly in case deficiencies are identified.
KPA 02 (capacity) will be monitored using common and agreed models for both airport and airspace ATC capacities. As result of this common approach for both enviroments, a more pertinent assessement, on what to do, how to do it and whithin which timeframe will be possible to identify area of growth and appropiate adjustments.
The consequent analysis will be linked with rest of the KPA identified by ICAO and mentioned in the chapter 7.2 to provide justification and support strategies.
Here after, the comprehensive recommendation list form the UAE Airspace study, including the key recommendations highlighted in blue:

Rec number	Overall UAE airspace study recommendations
1	Integrate strategic planning efforts into an integrated seamless UAE Airspace and ATM strategic plan
2	Conduct a detailed analysis of ANSP operational position needs for the UAE through 2030 and develop a plan to meet those needs with optimum effectiveness and efficiency
3	Conduct a vulnerability and risk assessment of all UAE ANSP facilities, and ensure continuity of operations is provided for should a catastrophic event occur.
4	Base airspace access, procedural development, and flight prioritisation planning on a shift in policy towards Best Capable-Best Served during congested periods, realising that accommodating exceptions to that policy will reduce over time.
5	Transition Obstruction Evaluation and approval processes to become nationally managed.
6	Plan for and transition to UAE Air Navigation Service Provision that is seamless from a stakeholder perspective, including requirements, system capabilities and coordination.
7	Review the various airports planning processes and develop fully coordinated recommendations to ensure capacity and efficiency will meet stakeholder expectations, or where not, limitations are clearly reflected in UAE strategic planning and alternatives selected.
8	Review airport procedures and master plans to ensure they support minimising operations on runways for other than actual takeoffs and landings.
9	Accelerate planning and construction for RETs to be optimally located to minimise runway occupancy tine for typical aircraft.
10	Transition to a seamless Aeronautical Information System (AIS) accommodating remote access by the various ANSPs and airports.
11	Develop a UAE-wide Enterprise Architecture for the provision of air navigation services and information, including military.
12	Plan for and implement ANSP systems, including meteorological, within the UAE that are fully interoperable and have common functionalities and data.
13	Plan for and implement traffic situational display capability to ANSPs and stakeholders, including Airport Operators, which facilities common situational awareness of airborne aircraft within or destined for the UAE.
14	Plan for and implement flight plan and trajectory information capabilities to ANSPs and stakeholders that support both strategic and tactical CDM with application down to the individual flight level.
15	Leverage best practices for Technical Error classification procedures, and deploy similar error classifications with phased implementation beginning with final approaches at major airports.
16	Leverage emerging best practices for wake turbulence standards, and deploy revised procedures beginning with major airports with substantial Heavy and Super aircraft operations, such as Dubai.
17	Establish a single point of accountability within GCAA for UAE Airspace and ANSP decisions with establishment of associated ANSP responsibilities and coordination processes, including military ANSPs.
18	Establish processes for integrated strategic and tactical planning of UAE airspace decisions.

19	Establish processes to ensure common standards and requirements for air navigation service provision in UAE.
20	Plan for and implement a programme to ensure expeditious pilot response to ATC clearances at major airports during high-activity periods.
21	Establish ATFM as a UAE ATM core function with dedicated operational personnel at ANSP major facilities
22	Establish collaborative constraint analysis processes to understand how projected annual growth will translate to hourly time frames and airspace sector traffic levels.
23	Establish CDM processes to determine capacity needs for hourly peaks vs. accommodated through scheduling during non-peak times.
24	Establish CDM processes for exchanging tactical information between the ANSP and stakeholders, including Airport Operators, about projected capacity- demand imbalances.
25	Establish CDM processes for making tactical decisions to adjust pre-departure flight trajectories to aid in minimising demand-capacity imbalances.
26	Establish process for the automated substitution of slot times between stakeholders.
27	Foster creation of regional ATFM through UAE leadership, using its ATFM as an example.
28	Plan for and implement the transition of separation methods from tactical ATC-developed instructions to use of ground and airborne automation decision support.
29	Provide enhanced system monitoring and alerting of separation and spacing that supports multiple separation modes and standards between aircraft with trend analysis
30	Revise operational procedures and agreements to provide a positive hand-off of aircraft between controllers within the Emirates FIR and with other FIRs.
31	Revise operational procedures and agreements to preclude the transfer of arrival, departure or over flight aircraft to operational sectors that have reached traffic saturation levels.
32	Revise operational procedures and practices to ensure consistency and seamless application within the UAE.
33	Routine use of mixed use runway procedures when there are peak periods with higher numbers of arrivals or departures than the other.
34	Increase airport throughput through application of visual separation between arrivals on same runway, arrivals to parallel runways, and arrivals from departures.
35	Increase airport throughput by application of diverging departure heading separation procedures for both same runway and parallel runways.
36	Plan for and implement transition from routine arrival holding when demand exceeds airport capacity to time based trajectory management
37	Enhance AMAN capabilities, including tactical adjustments to rates, wake category inclusion, and multiple arrival runways.
38	Enhance departure constraint management capabilities, including tactical adjustments to flight levels and broad stakeholder substitution automation capabilities
39	Provide aircraft specific arrival fix times to stakeholders through automation capabilities and to adjacent FIRs when they have the capabilities to receive that information.
40	Establish procedures that foster airborne aircraft adjusting en-route speed to increase compliance with arrival fix times.
41	Develop and implement flight procedures that foster continuous climb and descent to minimise fuel use and foster environmental objectives.
42	Transition airport surface management to time based including use of "virtual" departure queues to minimise environmental impacts, reduce airport movement area congestion, and improve predictability.
43	Develop high-level agreements and formulate a plan to transition to integrated civil- military airspace management.
44	Enhance Functional Use of Airspace (FUA) procedures to provide real-time allocation of airspace based on tactical needs.
45	Provide timely information sharing of aviation security threats and responses between military and appropriate civil organisations.

46	Develop and implement agreements with the military for accommodating their aircraft in the future airspace environment regardless of Communication, Navigation, and Surveillance (CNS) capabilities; however routes and altitudes may have to vary from optimum in order to efficiently manage overall operations and support UAE economic growth.
47	Foster UAE regional leadership through implementation of leading edge capabilities and establishment of focused ATFM capabilities
48	Increase frequency and breadth of communications with adjacent FIRs focused on improving the capabilities and efficiency of operations within the region.
49	Provide Ground-Based Augmentation System (GBAS) for precision approach capability, including very low visibility, replacing Instrument Landing System (ILS) as the primary landing aid
50	Establish and publish ground based navigation aid (NAVAID) requirements, if any, for back-up capabilities in the event of Global Navigation Satellite System (GNSS) disruptions.
51	Plan for and implement decommissioning ground-based NAVAIDs not required for GNSS backup reflective of expected aircraft capabilities and established policy.
52	Enhance PBN planning and coordination with the following defined major targets:
52a	Airways reflect Area Navigation 5 (RNAV 5) basis for en-route and RNAV 1 for major terminal area operations.
52b	Airways reflect Area Navigation 1 (RNAV 1) and initial Advanced RNP basis for en-route and all terminal area operations.
52c	Advanced RNP basis for en-route and terminal operations and future navigation capability
53	Develop the comprehensive airspace design by 2015 that accommodates transition to the PBN targets as defined in recommendation 52, using the following design objectives.
53a	Overflight airways deconflicted from arrival and departure aircraft flows
53b	Minimal holding pattern airspace- unplanned event only
53c	Tailoring profiles based on runway in use for all airports
53d	RNP approaches available for all airports with instrument approach capabilities
53e	Approach procedures use RNAV transition to final vs. vectors at all airports..
53f	Arrival and departure procedures are de-conflicted between most nearby airports.
53g	Optimised (continuous) climb and descent profiles for all airports
53h	Arrival and departure profiles based on runway in use for all airports.
53i	Flexible point to point routing for high altitude operations, except where structured routing is more efficient overall.

Not all the recommendations mentioned above are directly related to all Service Providers and Stakeholders needs.

The 15 key recommendations listed below, are shared and supported by all UAE ANSPs and stakeholders. Depending on the nature of the recommendation, they will be included in the Local/National Plan or identified as a priority according with ICAO guidelines:

Rec. number	Key recommendations	Area of interest	Involved participants	timeframe
1	Integrate strategic planning efforts into an integrated seamless UAE Airspace and ATM strategic plan	Planning	WG11 & WG12	2018-2020
2	Conduct a detailed analysis of ANSP operational position	Planning	WG11 & WG12	2018-2020

	needs for the UAE through 2030 and develop a plan to meet those needs with optimum effectiveness and efficiency			
4	Base airspace access, procedural development, and flight prioritisation planning on a shift in policy towards Best Capable-Best Served during congested periods, realising that accommodating exceptions to that policy will reduce over time.	Planning	WG11 & WG12	2018-2025-2031
11	Develop a UAE-wide Enterprise Architecture for the provision of air navigation services and information, including military.	System	WG15 and CNS technical committee	2018-2025-2031
15	Leverage best practices for Technical Error classification procedures, and deploy similar error classifications with phased implementation beginning with final approaches at major airports.	Regulator	ANA	2018-2020
16	Leverage emerging best practices for wake turbulence standards, and deploy revised procedures beginning with major airports with substantial Heavy and Super aircraft operations, such as Dubai.	Regulator	ANA and WG11	2018-2025-2031
17	Establish a single point of accountability within GCAA for UAE Airspace and ANSP decisions with establishment of associated ANSP responsibilities and coordination processes, including military ANSPs.	Regulator	ANA	2020
21	Establish ATFM as a UAE ATM core function with dedicated operational personnel at ANSP major facilities	ATFM/ CDM	WG12	2020
24	Establish CDM processes for exchanging tactical information between the ANSP and stakeholders, including Airport Operators, about projected capacity-demand imbalances.	ATFM/ CDM	WG11	2018-2020
27	Foster creation of regional ATFM through UAE leadership, using its ATFM as an example.	ATFM/ CDM	WG12	2025-2030
31	Revise operational procedures and agreements to preclude the transfer of arrival, departure or overflight aircraft to operational sectors that have reached traffic saturation levels.	ATC	WG12	2018-2020
43	Develop high-level agreements and formulate a plan to transition to integrated civil- military airspace management.	CIVIL/ MILITARY	WG12	2018-2020
44	Enhance Functional Use of Airspace (FUA) procedures to provide real-time allocation of airspace based on tactical needs.	CIVIL/ MILITARY	WG11 & WG12	2020
47	Foster UAE regional leadership through implementation of leading edge capabilities and establishment of focused ATFM capabilities	Regional	WG12	2025-2030
53	Develop the comprehensive airspace design by 2015 that accommodates transition to the PBN targets as defined in recommendation 52, using the following design objectives.	Airspace	WG11 & WG12	2018-2025-2030

Below the list of recommendations. Higher priorities are highlighted in green.

ATC RELATED			
Rec. number	priority	WG	Actions/ comments
28	2	WG11/WG12	Local plan and internal strategy related.
29	2	WG11/WG12	Local plan and internal strategy related. Input expected from ARP project
30	1	WG11/WG12	Local plan and internal strategy related. Input expected from ARP project
31	1	WG13	NOC and ATFM related
32	1	WG11/WG12	Best practice sharing (website to be considered)
33	1	WG11	Best practice sharing (website to be considered)
34	2	WG11	Regulator position and pilots community input
35	1	WG11	Local plan and internal strategy related. Input expected from ARP project
36	1	WG12	Local plan and internal strategy related. Input expected from ARP project
37	2	WG12	Local plan and internal strategy related.
38	2	WG12	Local plan and internal strategy related.
39	1	WG12/WG13	Local plan and internal strategy related. Input expected also from NOC and ATFM
40	1	WG12/WG13	Local plan and internal strategy related. Input expected also from NOC and ATFM
41	1	WG11/WG12	Local plan and internal strategy related. Input expected from ARP project
42	2	WG11	Local plan and internal strategy related.

AIRPORT RELATED			
Rec. number	priority	WG	Actions/ comments
8	2	WG11	Local plan and internal strategy related.
9	2	WG11	Local plan and internal strategy related.
23	2	WG13/WG14	Local plan and internal strategy related.
24	2	WG13/WG14	Local plan and internal strategy related.
42	2	WG11	Local plan and internal strategy related.

NAVIGATION			
Rec. number	priority	WG	Actions/ comments
49	2	WG11	Local plan and internal strategy related.
50	2	WG11	Local plan and internal strategy related. Input expected also from CNS committee
51	2	WG13/WG14	Local plan and internal strategy related. Input expected also from CNS committee

AIRSPACE			
Rec.	priority	WG	Actions/ comments

number			
52			
52A	1	WG11	Local plan and internal strategy related. Input expected from ARP project
52B	1	WG11	Local plan and internal strategy related. Input expected from ARP project
52C	2	WG11	Local plan and internal strategy related.
53			
53A	2	WG12	Local plan and internal strategy related.
53B	2	WG12	Local plan and internal strategy related.
53C	2	WG11	Local plan and internal strategy related.
53D	1	WG11	Local plan and internal strategy related. Input expected from ARP project
53E	1	WG11	Local plan and internal strategy related. Input expected from ARP project
53F	1	WG11	Local plan and internal strategy related. Input expected from ARP project
53G	1	WG11	Local plan and internal strategy related. Input expected from ARP project
53H	2	WG11	Local plan and internal strategy related.
53I	2	WG12	Local plan and internal strategy related.

PLANNING			
Rec. number	priority	WG	Actions/ comments
3	2	WG11/WG12	Local plan and internal strategy related.
5	2	????	Local plan and internal strategy related.
6	2	WG11/WG12	Local plan and internal strategy related.
7	2	WG11	Local plan and internal strategy related.
8	2	WG11	Local plan and internal strategy related.
10	2	WG12	Local plan and internal strategy related. Input expected also from AIS Technical committee

SYSTEM			
Rec. number	priority	WG	Actions/ comments
11	2	WG11/WG12	Local plan and internal strategy related. Input expected also from CNS TECHNICAL committee
12	2	WG11/WG12	Local plan and internal strategy related. Input expected also from CNS TECHNICAL committee
13	2	WG11/WG12	Local plan and internal strategy related. Input expected also from NOC and ATFM
14	2	WG11	Local plan and internal strategy related. Input expected also from NOC and ATFM

REGIONAL			
Rec. number	priority	WG	Actions/ comments
47	2	WG12	Local plan and internal strategy related. Input expected also from NOC and ATFM
48	2	WG12	Local plan and internal strategy related. Input expected from ARP project

CIVIL/MILITARY			
Rec. number	priority	WG	Actions/ comments
43	2	WG12	Local plan and internal strategy related. Best practice sharing (website to be considered)
44	2	WG11/WG12	Local plan and internal strategy related. Best practice sharing (website to be considered)
45	2	WG12	Local plan and internal strategy related. Best practice sharing (website to be considered)
46	2	WG12	Local plan and internal strategy related. Best practice sharing (website to be considered)

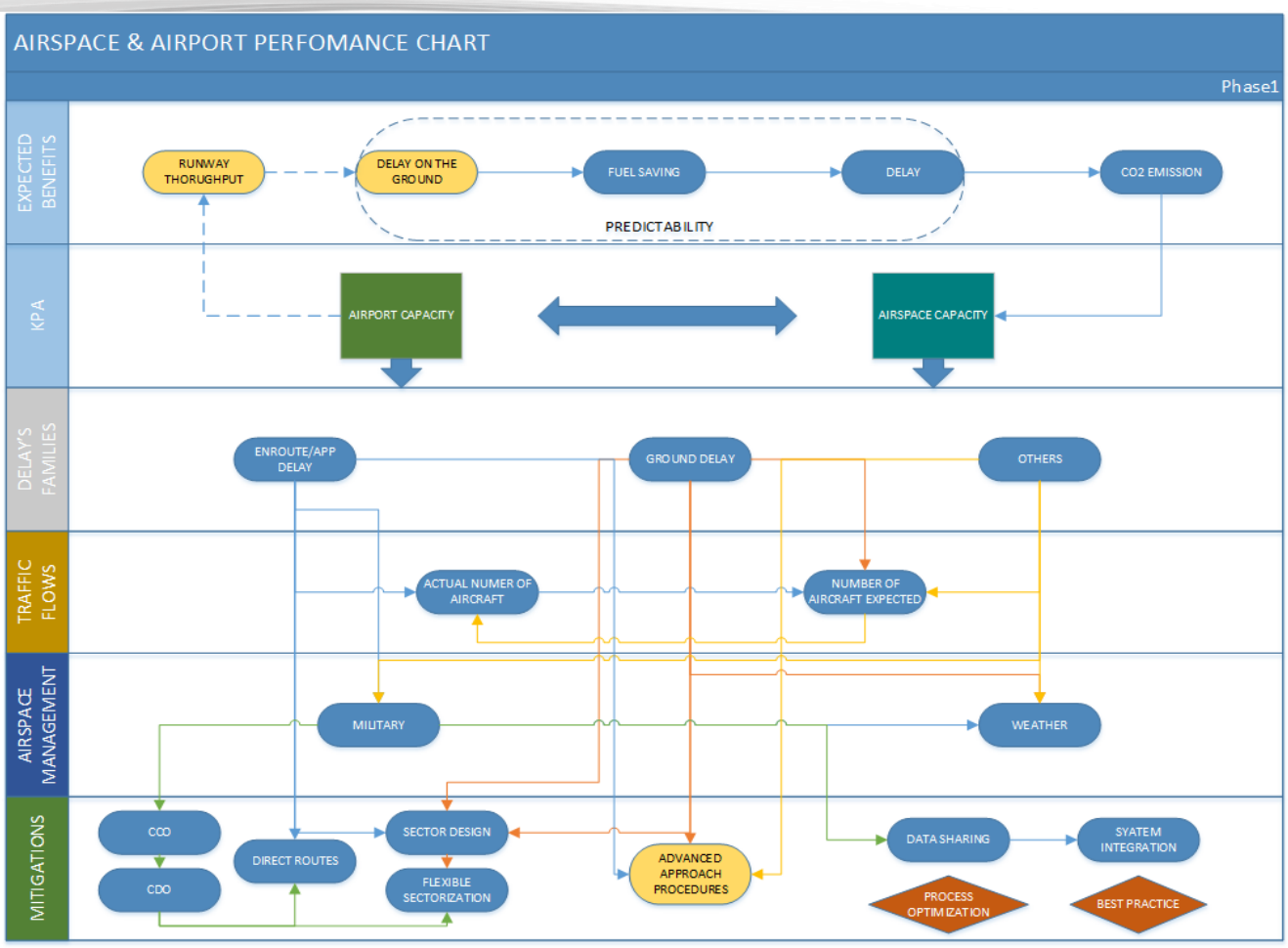
REGULATOR			
Rec. number	priority	WG	Actions/ comments
15	1	ANA	Local plan and internal strategy related. Best practice sharing (website to be considered)
16	1	WG11/ANA	Local plan and internal strategy related. Best practice sharing (website to be considered)
17	2	ANA	Local plan and internal strategy related. Input expected from ARP project
18	1	ANA	Local plan and internal strategy related.
19	1	ANA	Local plan and internal strategy related.
20	1	WG11/ANA	Local plan and internal strategy related.

ATFM/CDM/NCO			
Rec. number	priority	WG	Actions/ comments
21	1	WG12	Local plan and internal strategy related. Input expected also from NOC and ATFM
22	2	WG12	Local plan and internal strategy related. Best practice sharing (website to be considered)
23	2	WG14	Local plan and internal strategy related. Input expected from ARP project
24	2	WG14	Local plan and internal strategy related.
25	1	WG14	Local plan and internal strategy related.
26	1	WG12	Local plan and internal strategy related. Input expected also from NOC and ATFM and CDM
27	2	WG12	Local plan and internal strategy related. Input expected also from NOC and ATFM and CDM

Higher priorities are highlighted in green in the lists above, are listed below with a link with the major projects in place, process and proposal expected:

PRIORITY 1			
Rec. number	WG	Actions	
30	WG11/WG12	ARP	The project will provide a common baseline for airspace and airport capacity to be agreed and used for capacity, cost & benefit comparison. WGs to endorse the recommendations as part of their tasks and link the internal projects with ARP.
32			
41			
35	WG11		
52A			
52B			
53C			
53D			
53E			
53F			
53G			
36	WG12	ATFM/CDM/NOC	WGs will provide recommendations and proposal to NASAC fully aligned and coordinated.
21			
26			
31	WG13		
39	WG12/WG13		
40			
25	WG14		
16	WG11/ANA	BEST PRACTICE	Best practice proposal and process will be recommended to NASAC
15	ANA		
18		PROCESS	
19			
20			

All the recommendations identified as priority 1, listed above and linked with projects and process and proposal, are summarized in the chart below with the aim to monitor and enhance performances :


AIRSPACE & AIRPORT PERFOMANCE CHART
Phase1
EXPECTED BENEFITS
RUNWAY THORUGHPUT
DELAY ON THE GROUND
FUEL SAVING
DELAY
CO2 EMISSION
PREDICTABILITY
KPA
AIRPORT CAPACITY
AIRSPACE CAPACITY
DELAY'S FAMILIES
ENROUTE/APP DELAY
GROUND DELAY
OTHERS
TRAFFIC FLOWS
ACTUAL NUMER OF AIRCRAFT
NUMBER OF AIRCRAFT EXPECTED
AIRSPACE MANAGEMENT
MILITARY
WEATHER
MITIGATIONS
CCO
CDO
DIRECT ROUTES
SECTOR DESIGN
FLEXIBLE SECTORIZATION
ADVANCED APPROACH PROCEDURES
DATA SHARING
SYATEM INTEGRATION
PROCESS OPTIMIZATION
BEST PRACTICE