PBN in Egypt

NANSC Team

Presented By: Ehab Raslan

Senior ATCO & ATM Expert - NANSC

Table of content

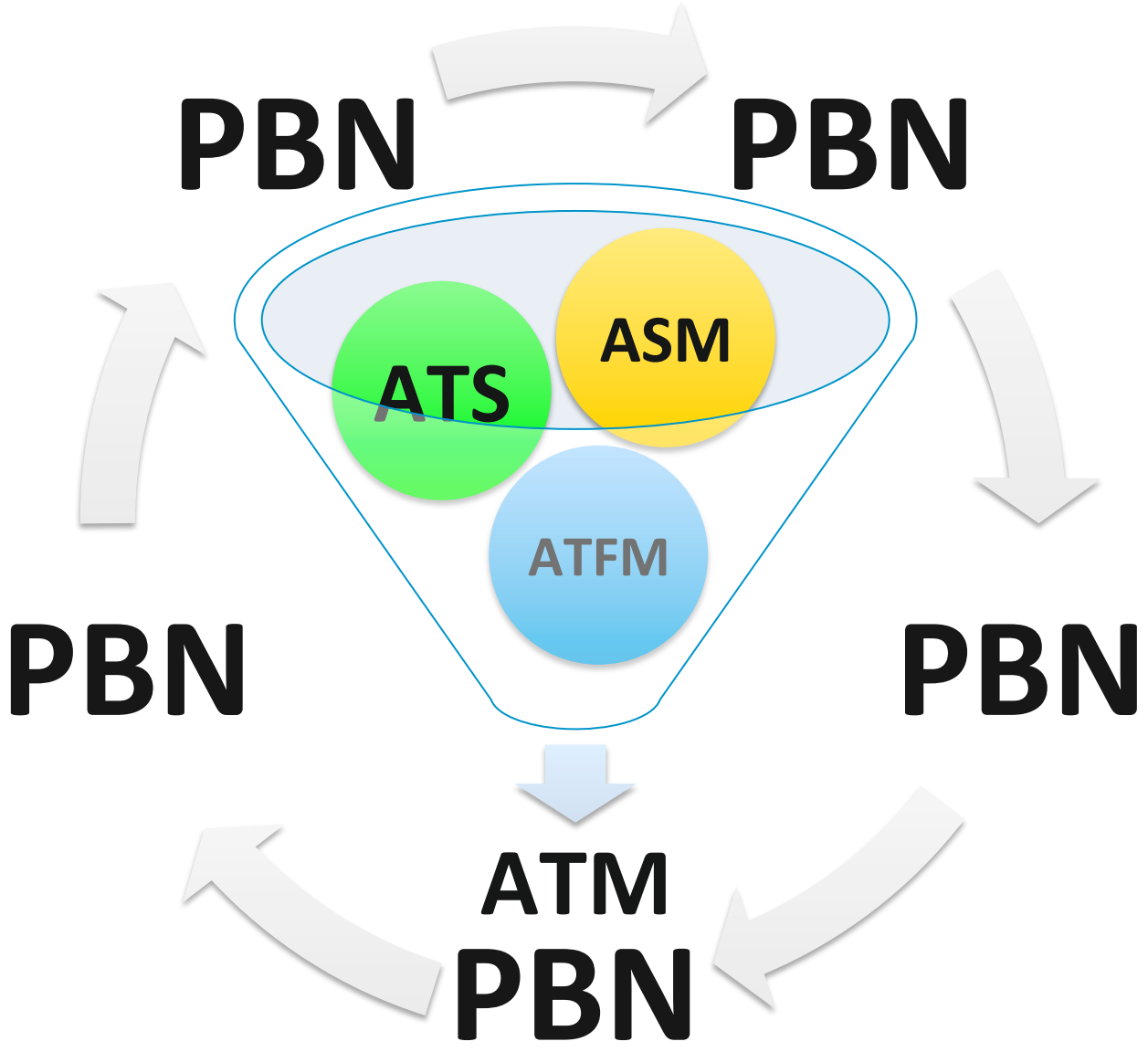
1.1why PBN implementation plan needed in Egypt

- facilitate an efficient, globally harmonized and coordinated transition from conventional navigation towards GNSS becoming the prime positioning source for RNAV and RNP applications in all phases of flight using **Galileo/GPS/GLONASS**, **GBAS and SBAS.**
- The ICAO MID Region is characterized by diverse air traffic volumes and densities, operational requirements and CNS/ATM capabilities, and thus different navigation applications may be applied by different homogeneous ATM areas TMAs and airports .
- The national plan will ensure coherent navigation planning by providing proper guidance and direction to NANSC, airports, airspace operators and users, (ECAA), and foreign operators who operate or plan to operate in Egypt.

1.2 Egyptian PBN Implementation Plan objectives

- Provide a high-level strategy for the evolution of the PBN applications to be implemented in Egypt in the short term (2014) and medium term (2014-2016).
- Provide a general description of the planned evolution of the PBN applications within the ASBU in the long term (2017 +).
- Ensure that the implementation of PBN in Egypt is based on clearly established operational requirements.

1.3 is it PBN plan itself?



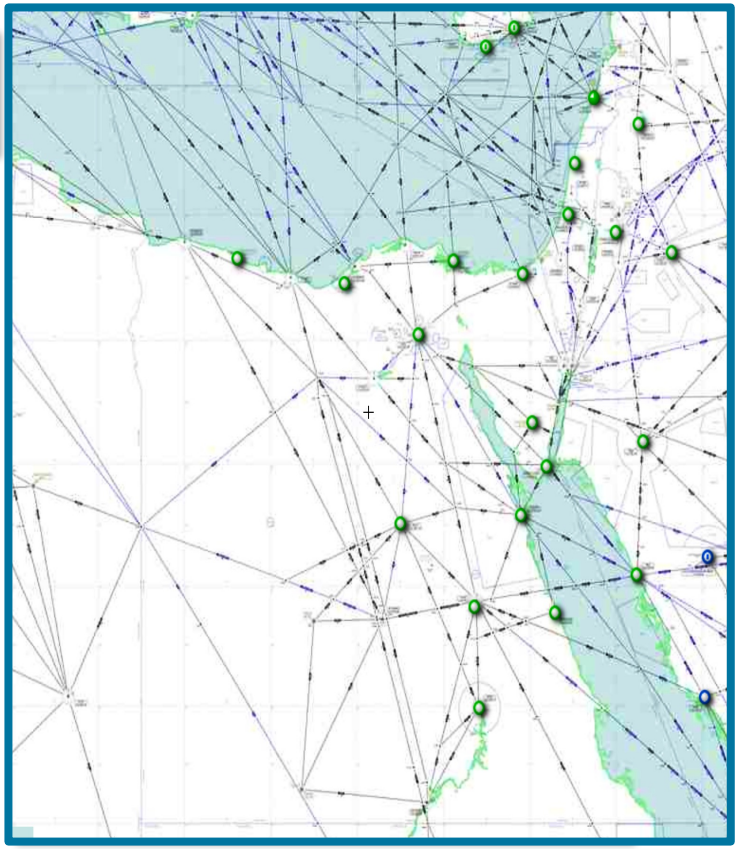
✓ 2 Current situation

3 PBN plan in Egypt

4 challenges

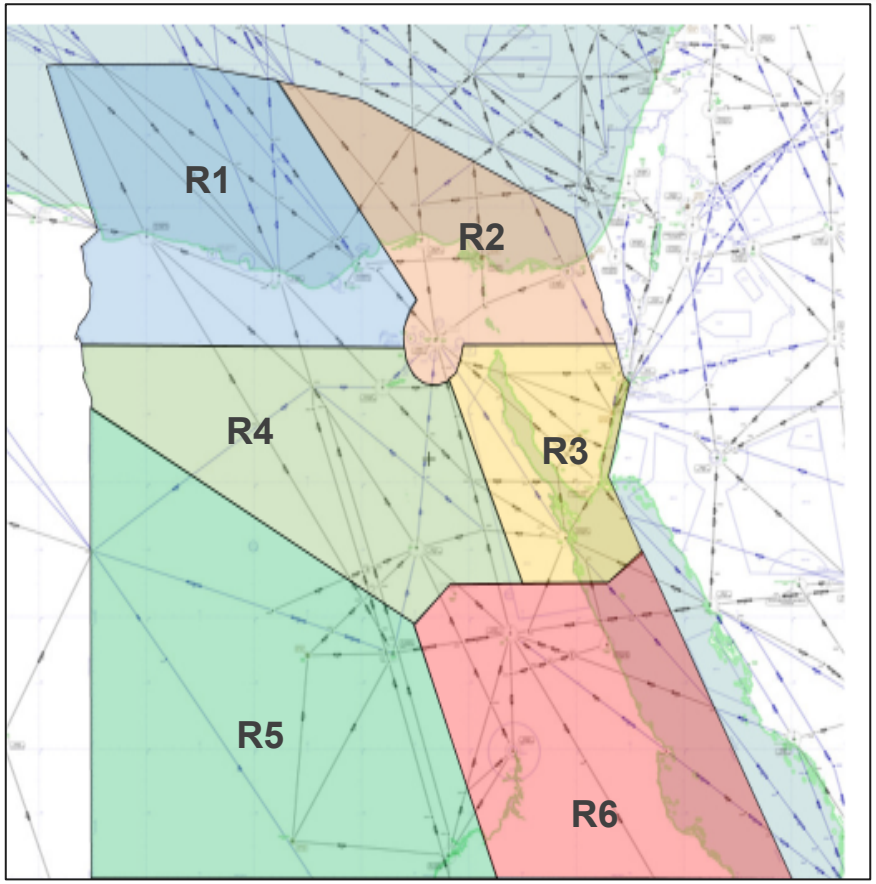
5 Strategy for PBN implementation & monitoring

6 Conclusion



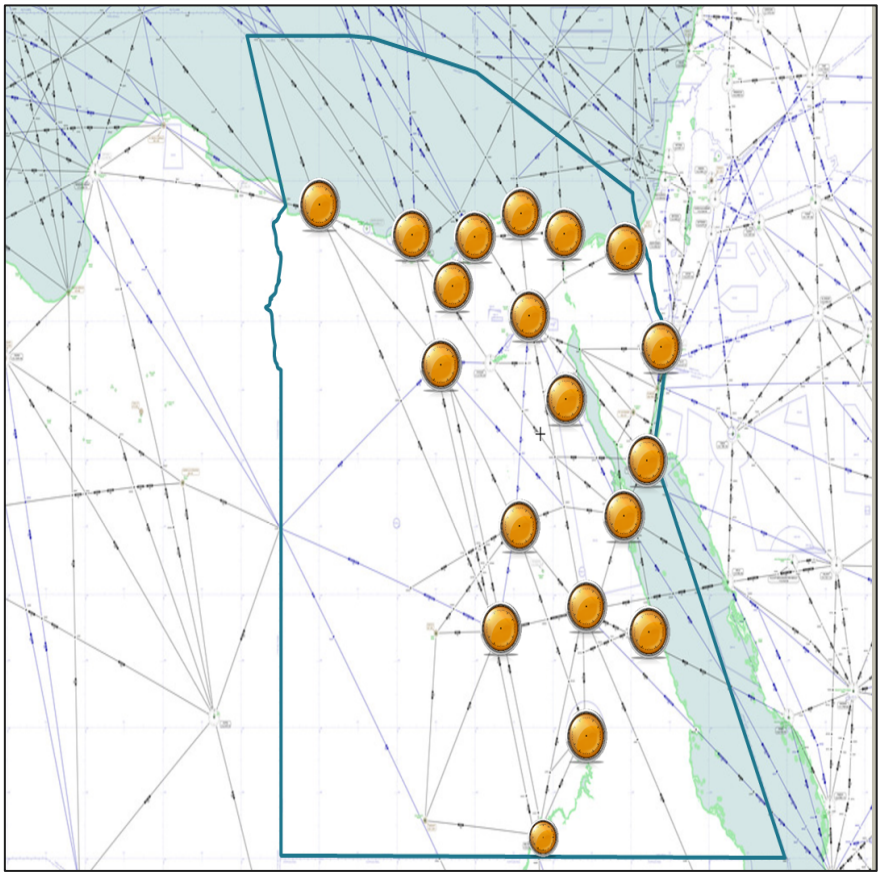
2.1 Egyptian charts:

CAIRO FIR



The charts illustrate Cairo FIR with 6 sectors upper.
2 sectors lower not active yet.

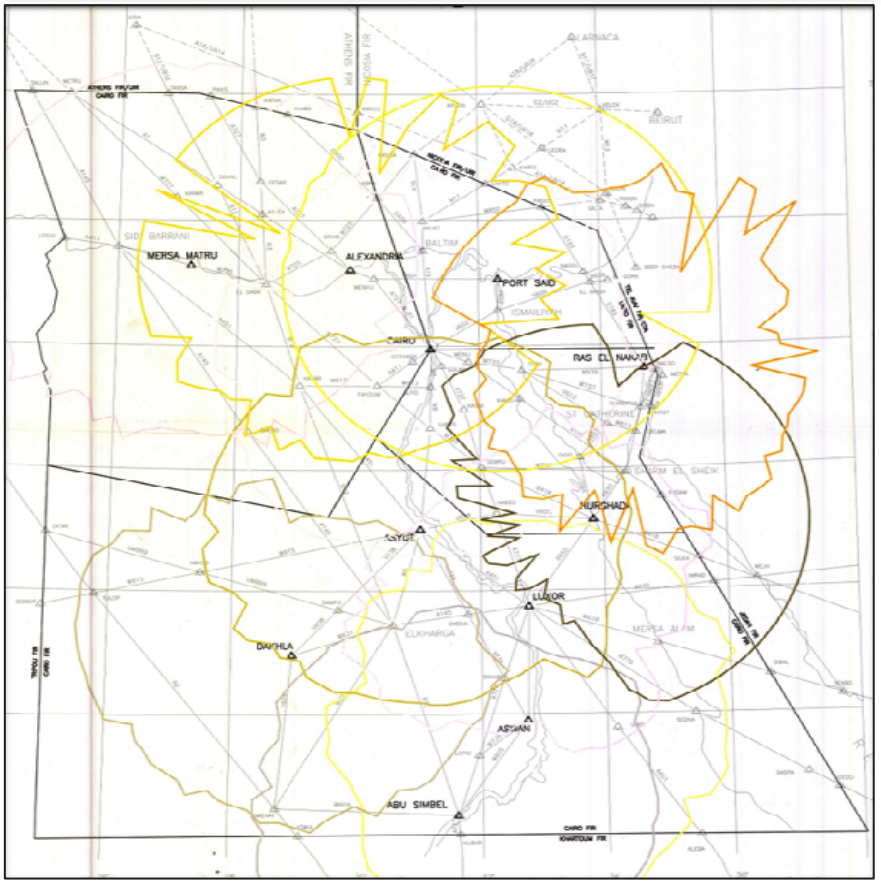
NAV. Aids infrastructure



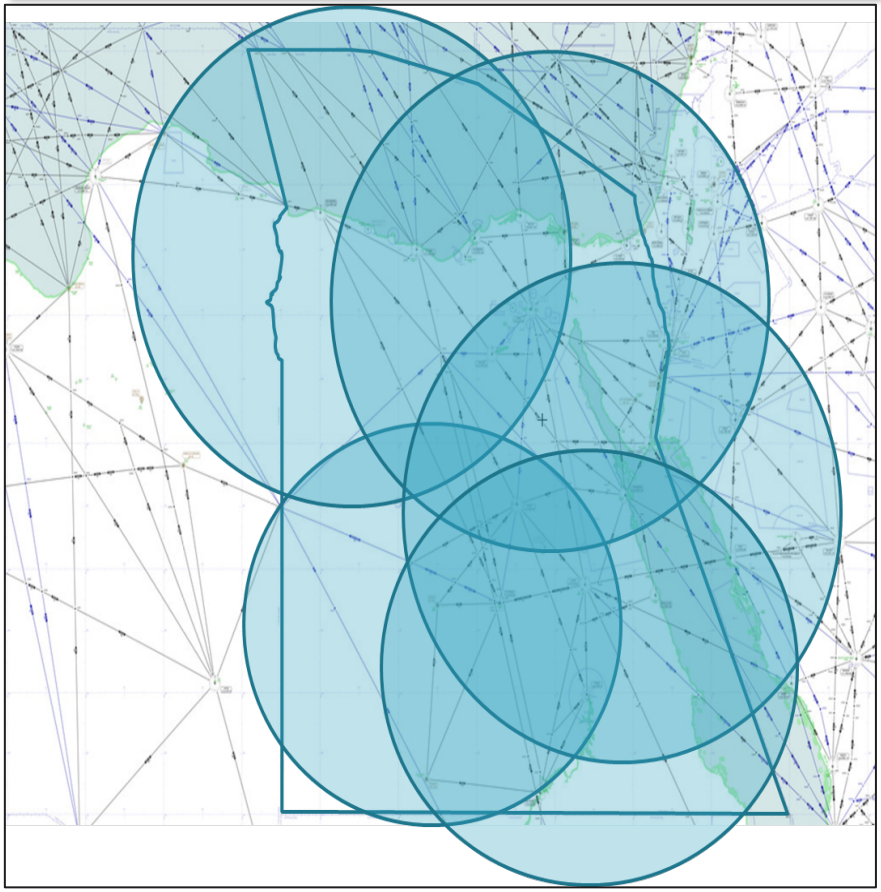
The charts illustrate NAV aids inside Cairo FIR:
8 DVOR/DME
12 VOR/DME
15 ILS

2.1 Egyptian charts:

Communication



Radar

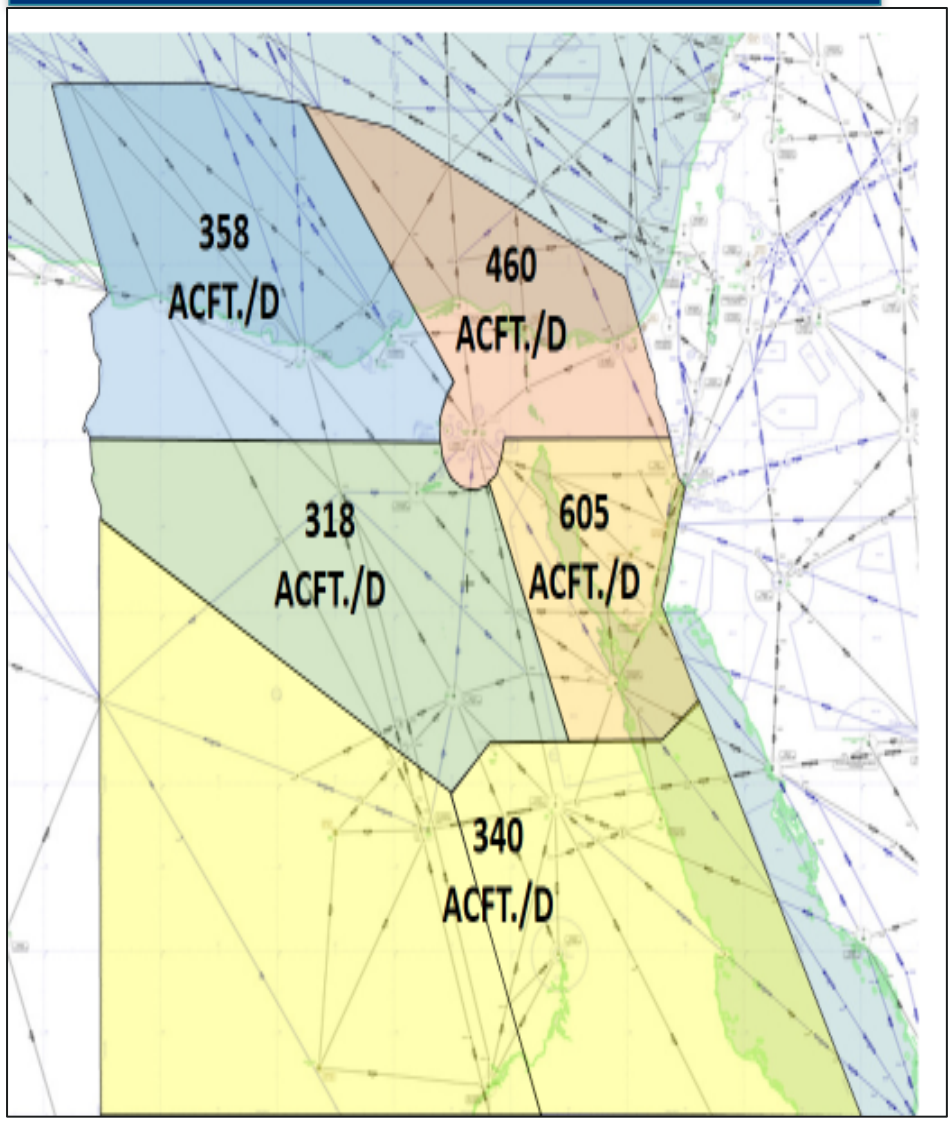


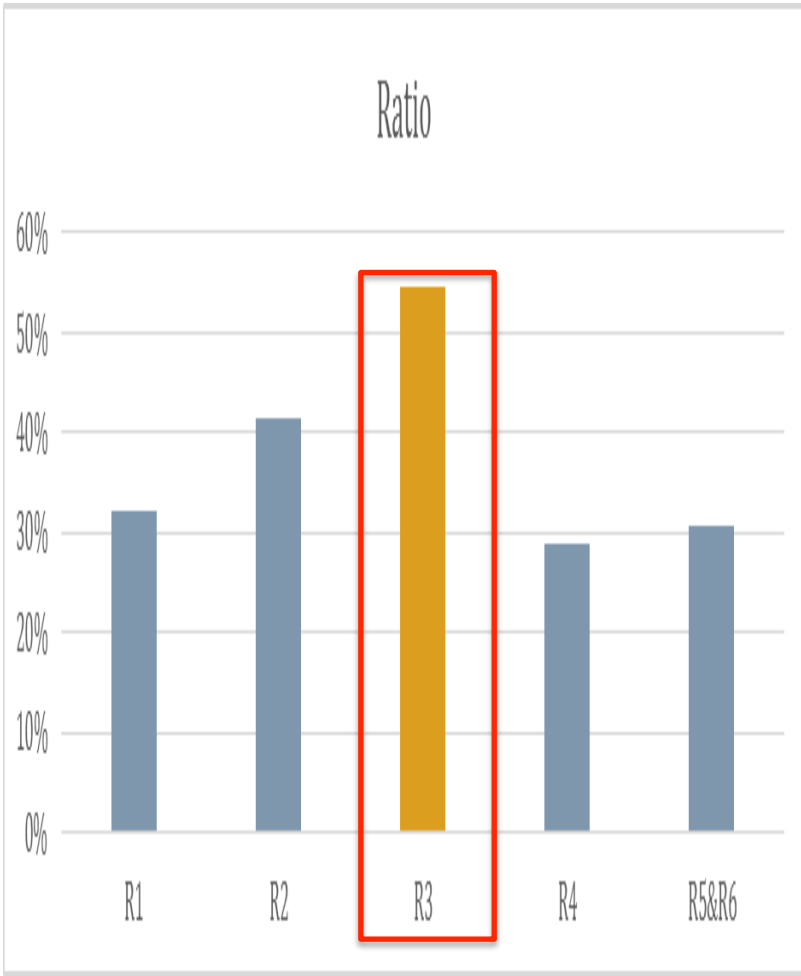
The chart illustrate Radar coverage within Cairo FIR.

Backup facilities is procedural separation.

2.2 Airspace sectors analysis:

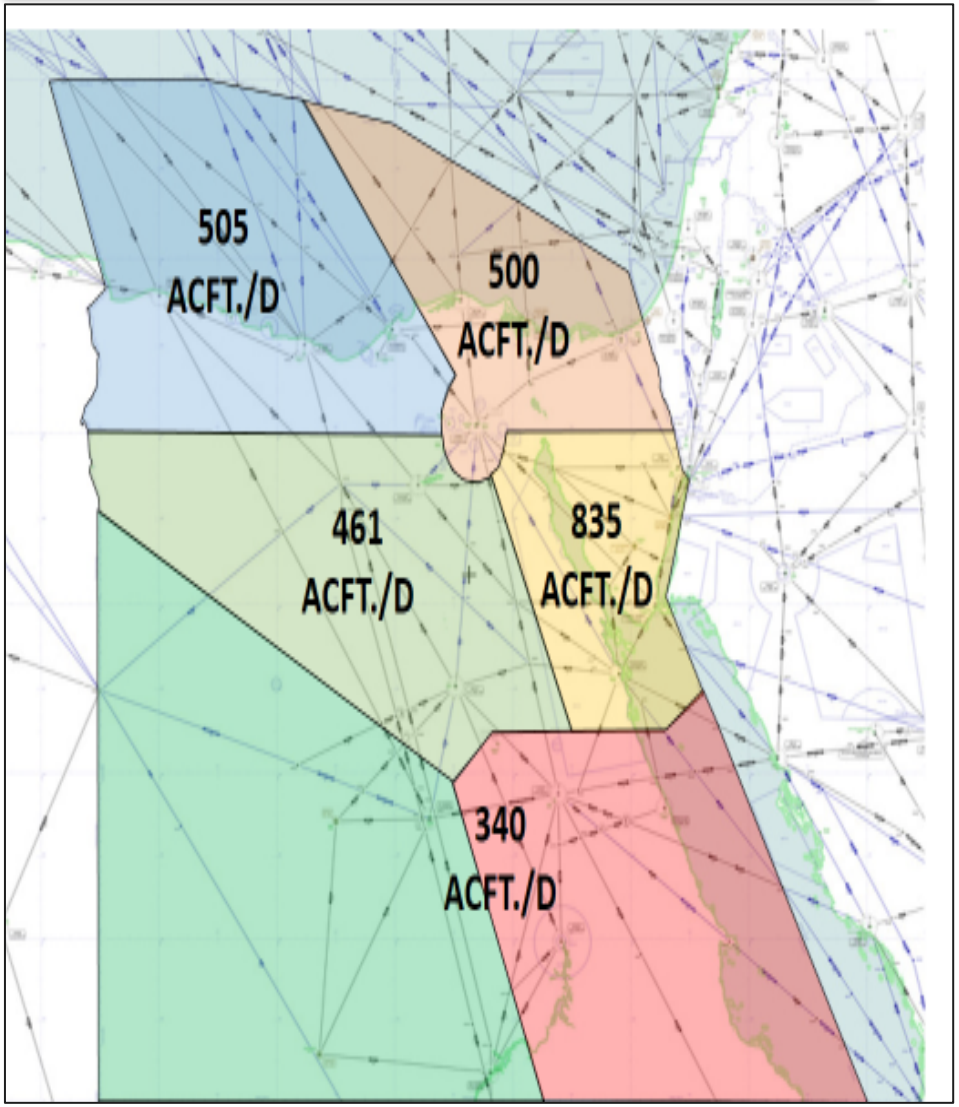
Average day (1107 acft/day)

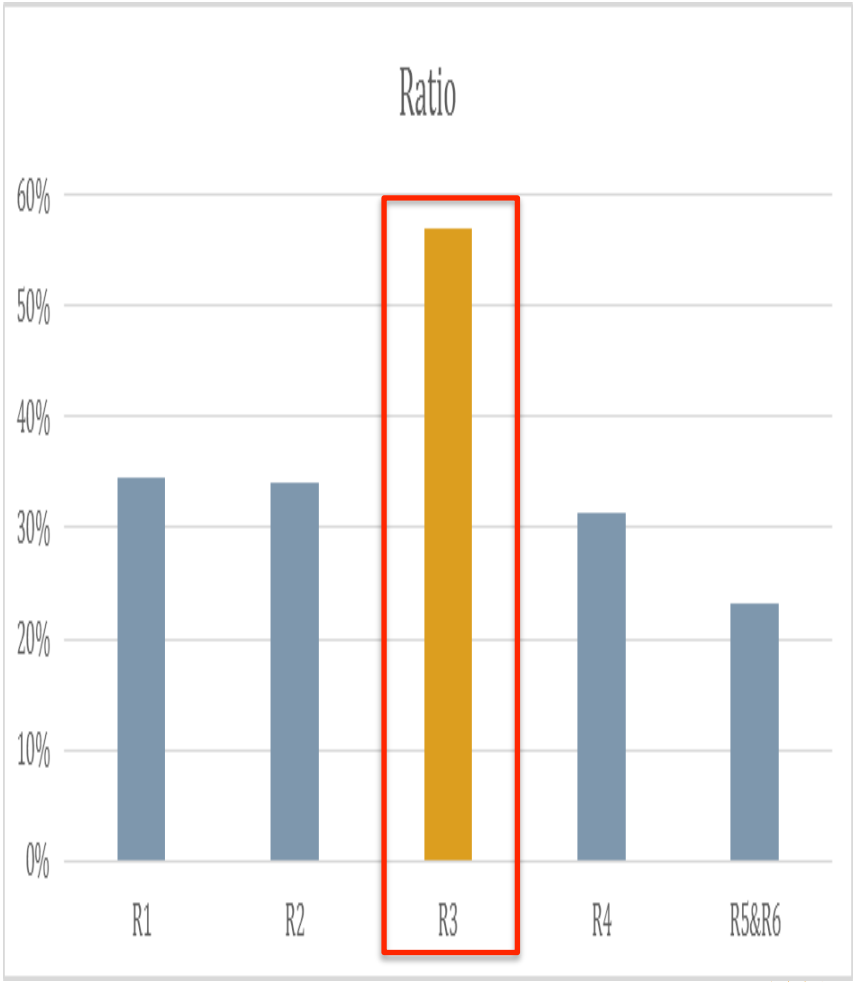




2.2 Airspace sectors analysis:

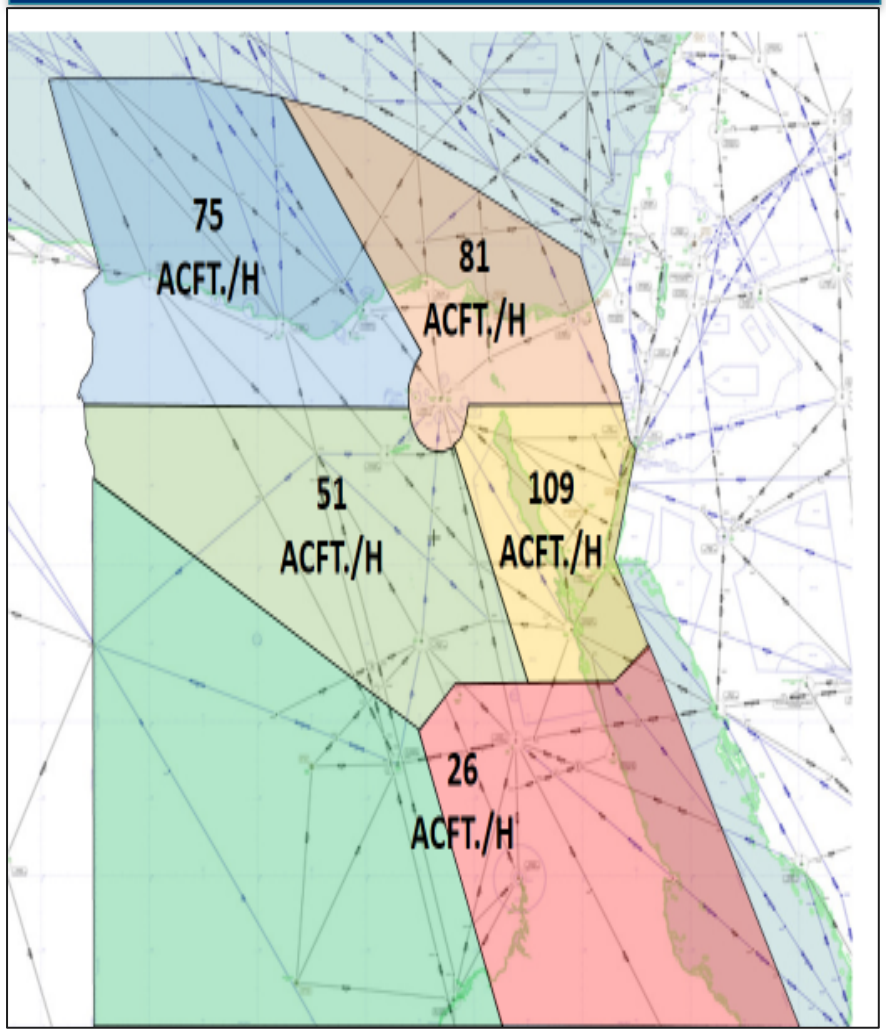
Busy day (1465)

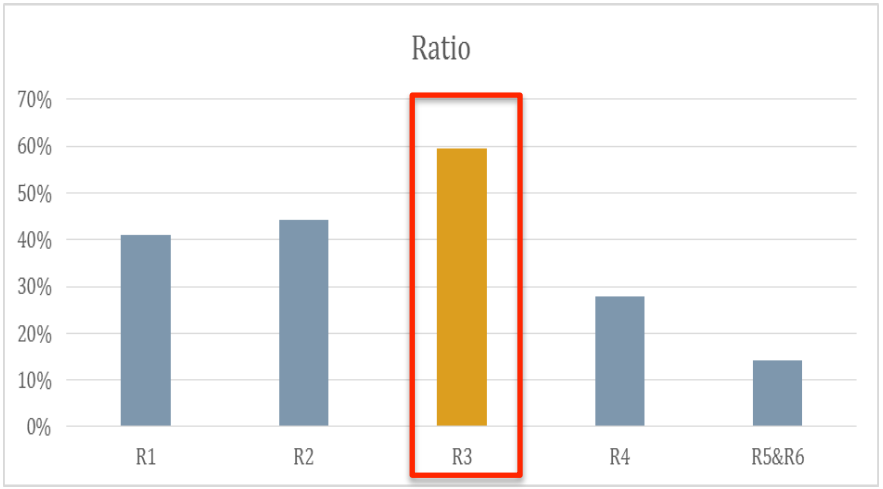


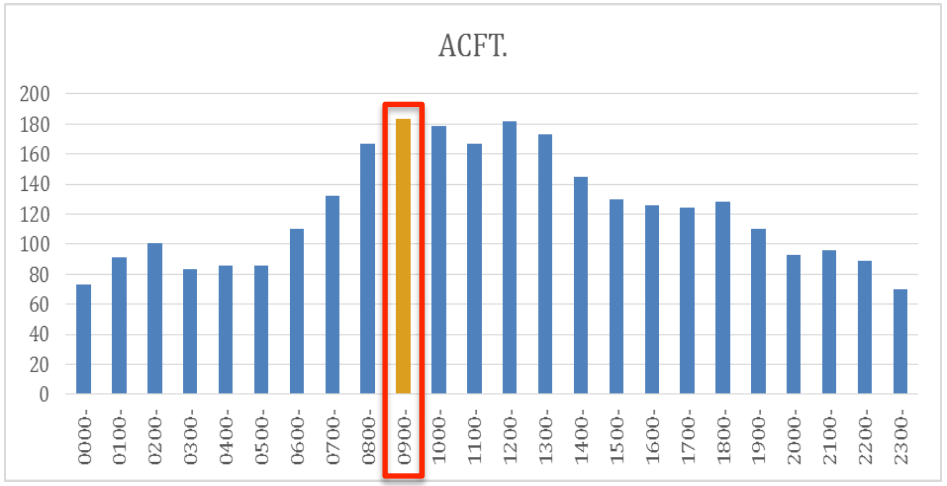


2.2 Airspace sectors analysis:

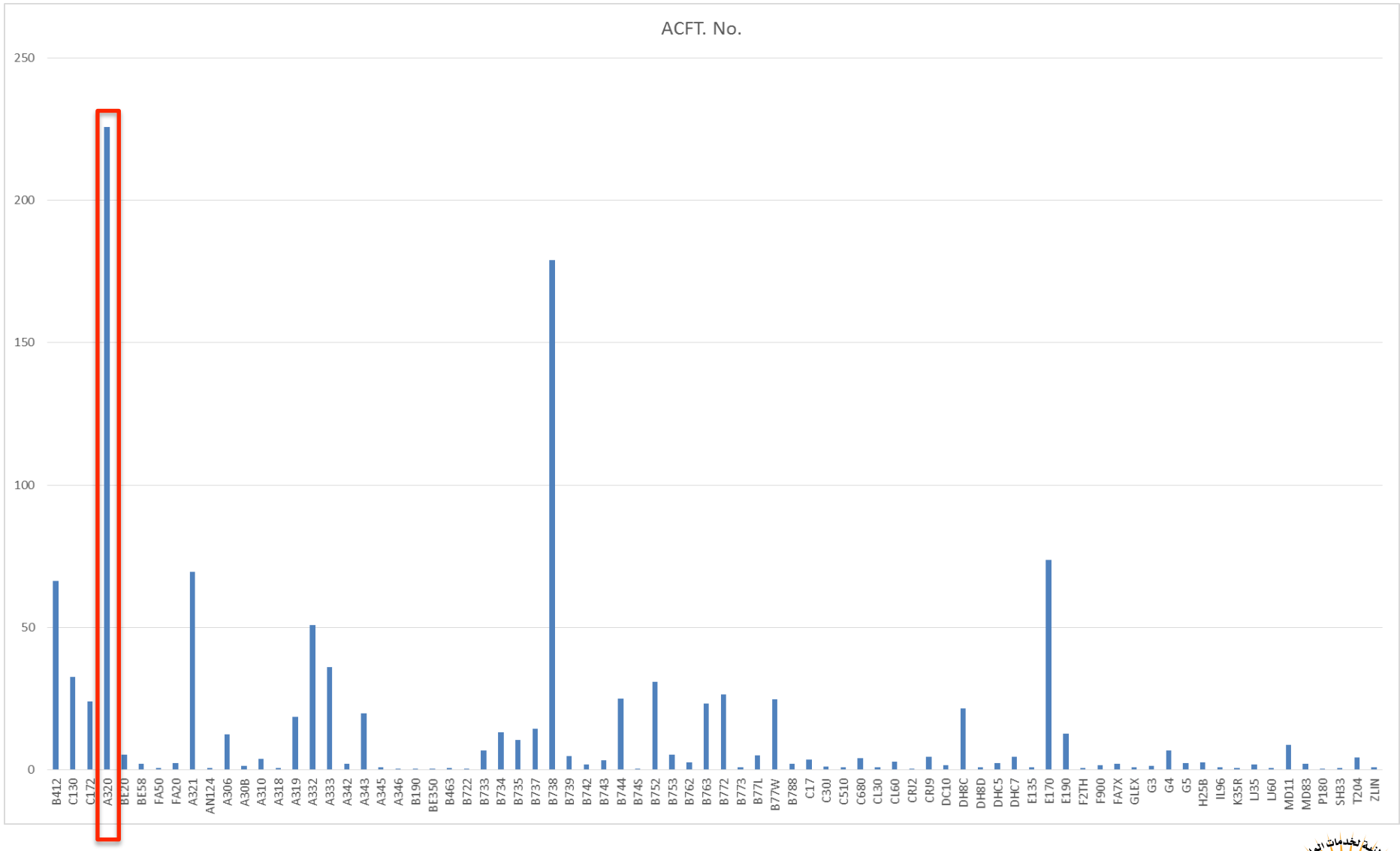
Busy hour (Sunday with score of 183 acft./hour





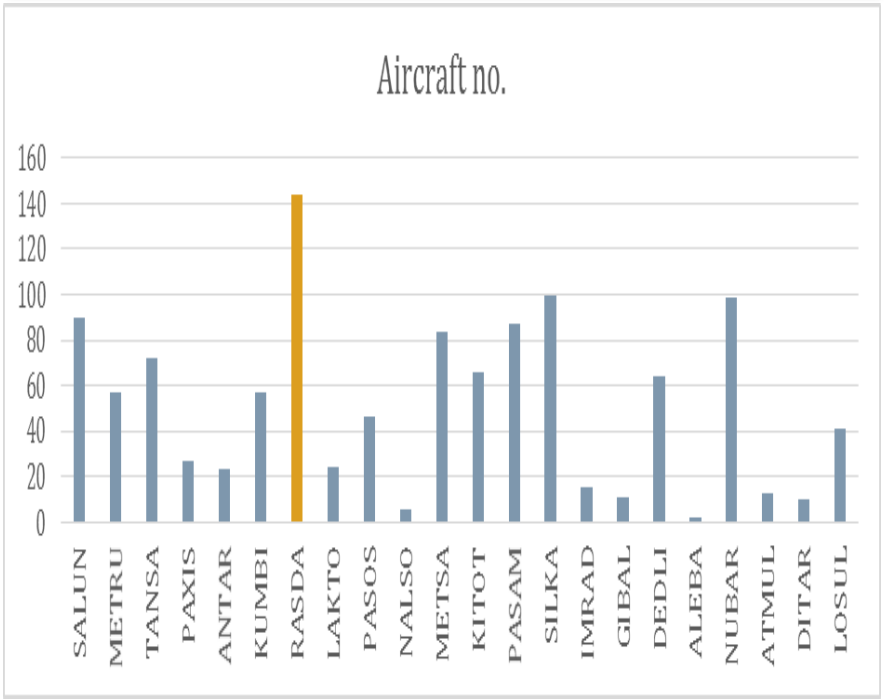


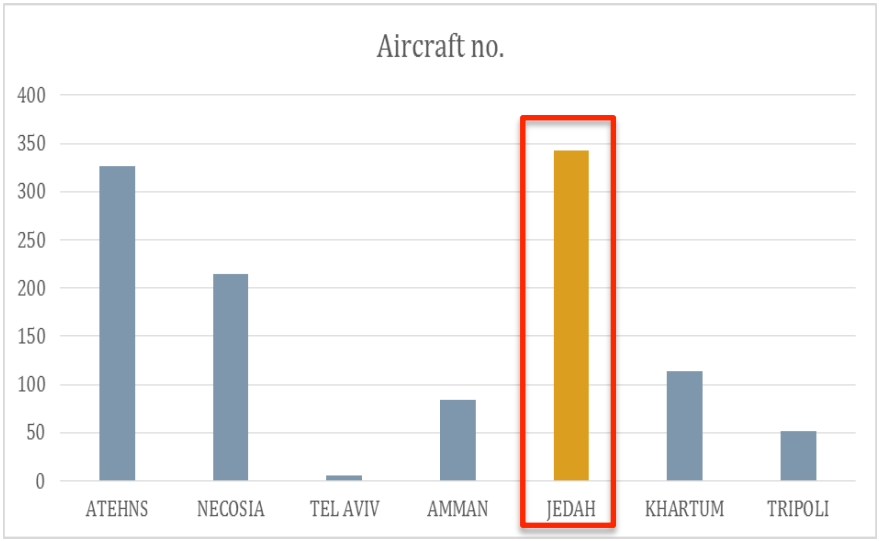
2.3 Aircraft:

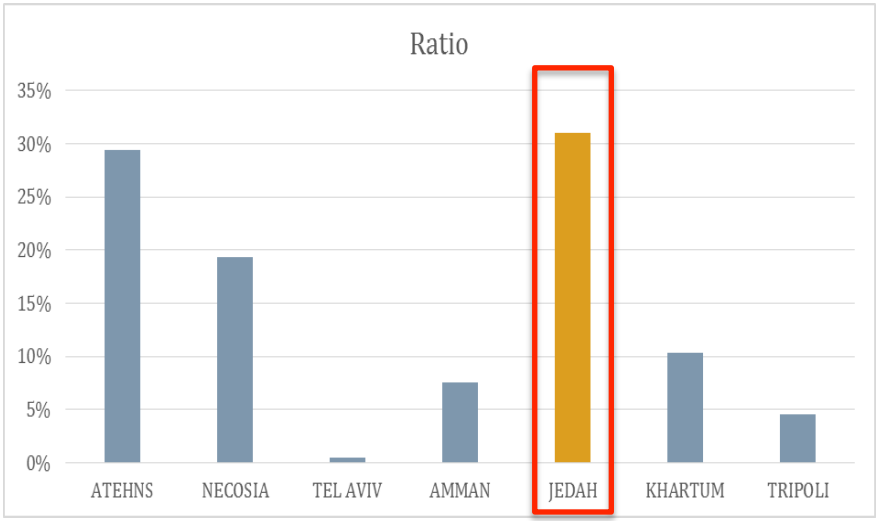

ACFT. No.
250
200
150
100
50
0
B412
C130
C172
A320
BE20
BE58
FA50
FA20
A321
AN124
A306
A308
A310
A318
A319
A332
A333
A342
A343
A345
A346
B190
BE350
B463
B722
B733
B734
B735
B737
B738
B739
B742
B743
B744
B745
B752
B753
B762
B763
B772
B773
B77L
B77W
B788
C17
C30J
C510
C680
CL30
CL60
CR2
CR9
DC10
DH8C
DH8D
DHC5
DHC7
E135
E170
E190
F2TH
F900
FA7X
GLEX
G3
G4
G5
H25B
IL96
K35R
LJ35
LJ60
MD11
MD83
P180
SH33
T204
ZLIN

2.4 traffic movements with adjacent FIRs:

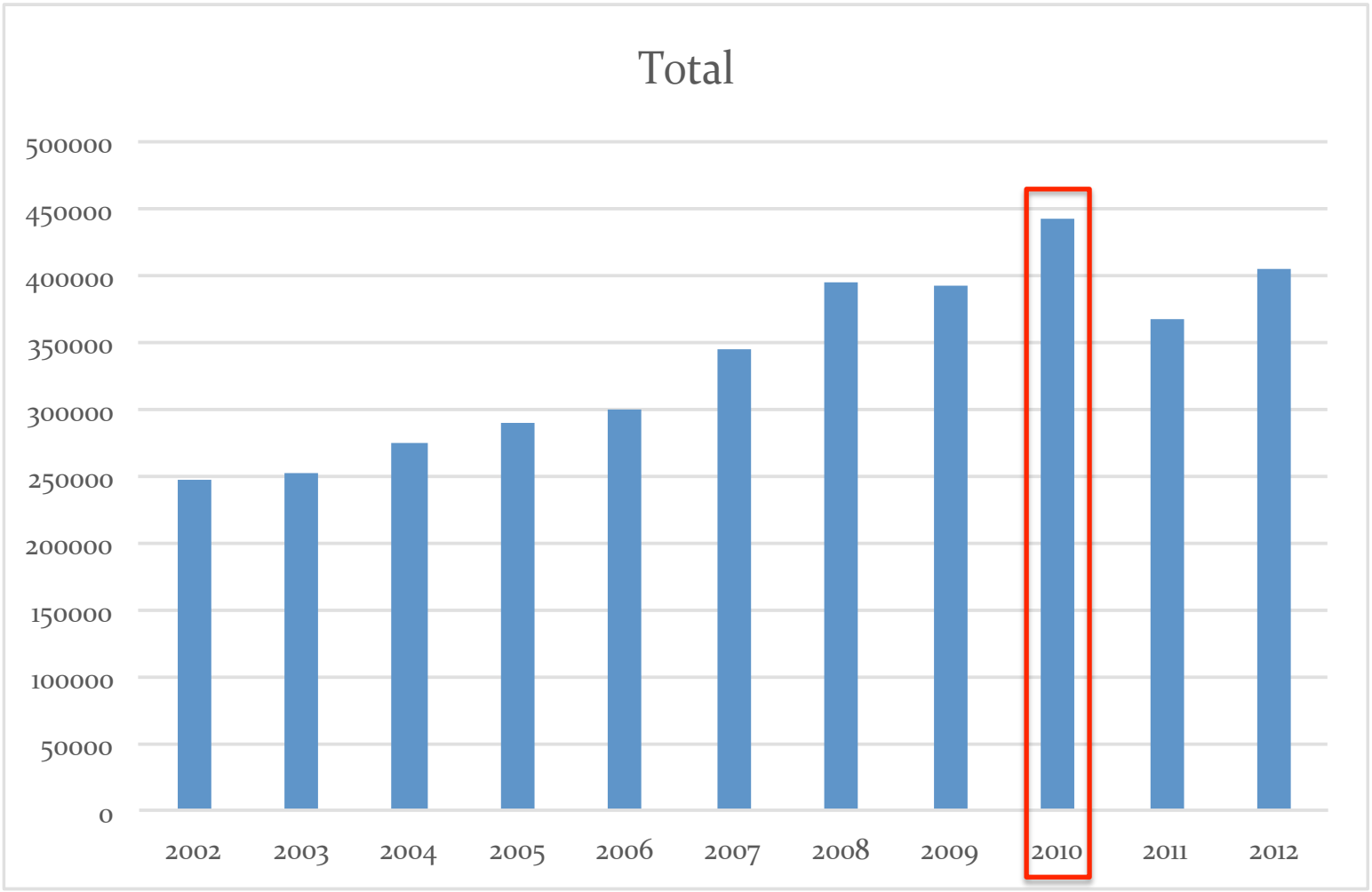
Traffic over Exit/Entry point







2.5 Annual Traffic movements:



2.6 current situation for PBN – EN-ROUTE:

- All CAIRO FIR is RNAV 5 (GNSS) & (GNSS,IRS/INS) and (INS or IRS) except the following :

RNAV route designation & not meet RNAV5 route lateral limits	Non RNAV route designation & meet RNAV5 route lateral limits	Non RNAV route designation & not meet RNAV5 route lateral limits
N675 (MENLI-SISIK)	A1 & A411 & A727 & A16	J863
	B12	R778 (FYM –CV0) R650
	G183	V604 (N0Z-ALPAM) & V602 & V606 & V603 & V608 (AST-NABED) & V730 (HGD-SOBEL-LORAS)
	J981	W725 (NANVO-BRN) & W613 & W796 & W611 & W727 & W605(LXR-GETOS-ASN) & W739 & W733
	R2 & R778 & R775	-
	V604 (PSD-DEGDI) & V608 except (AST-NABED) & V730 (MAK – MEMPO – ELELI – DANOG – GETOS) & V738	-
	W8 & W601 & W605 (SML-ALKED-OWT) & W615 & W725 (RASDA-LABNA-OTIKO-IMRUT-BOPED-DBA-NANVO) & W850 &	-

2.7 current situation for PBN – TMAs:

- 17 int. airports with 42 Runway threshold
- 8 domestic airports with 18 Runway threshold
- Total are 25 airports with 60 Runway threshold
- 15 SIDs & 14 STARs in progress based on RNAV1 (waiting for safety assessment) all of them related to international airports – represented 6 int. airports (ASYUT & HURGHADA & LUXOR & SHARM ELSHKEH & ASWAN and TABA)
- All domestic airports still not applicable
- The rest of international airports still not applicable
- Total RNAV 1 SID & STAR implemented is NIL.

2.8 current situation for PBN – Approach:

- 17 int. airports with 42 Runway threshold
- 8 domestic airports with 18 Runway threshold
- Total are 25 airports with 60 Runway threshold

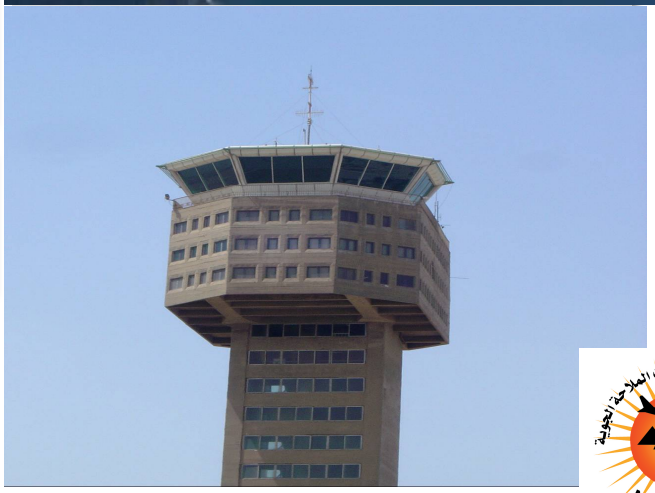
International airports	Domestic airports	Total	Percentage
24 LNAV app. Procedures (GNSS)	8 LNAV APP. Procedures (GNSS)	32 LNAV APP. Procedures (GNSS)	52 % implemented

✓ 3 PBN plan in Egypt

4 challenges

5 Strategy for PBN implementation & monitoring

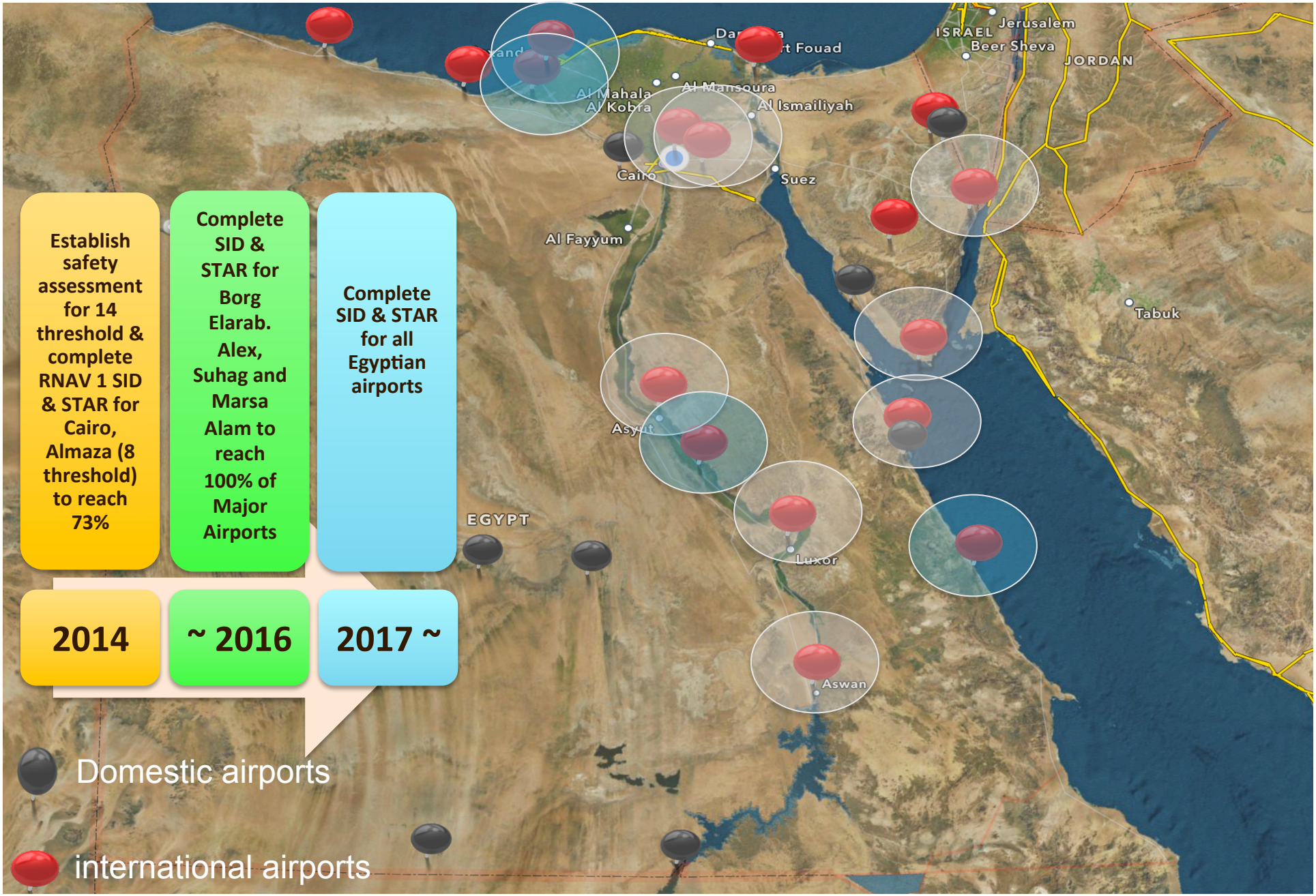
6 Conclusion



3.1 En-ROUTE / PBN plan :

- To be discussed in ATM/SG meeting

3.1 TMAs – PBN Plan:



3.1 TMAs – PBN Plan:

- 2014 (short term):

Depend on RNAV 1 SID & STAR based on (GNSS), (INS or IRS) and (GNSS/IRS or INS)

3.1 TMAs – PBN Plan:

- 2014 (short term):

Depend on RNAV 1 SID & STAR based on (GNSS), (INS or IRS) and (GNSS/IRS or INS)

- ~ 2016(Medium term):

Depend on RNAV 1 or RNP 1 (non – surveillance airports) SID & STAR and based on (GNSS) and (GNSS/IRS or INS)

3.1 TMAs – PBN Plan:

- 2014 (short term):

Depend on RNAV 1 SID & STAR based on (GNSS), (INS or IRS) and (GNSS/IRS or INS)

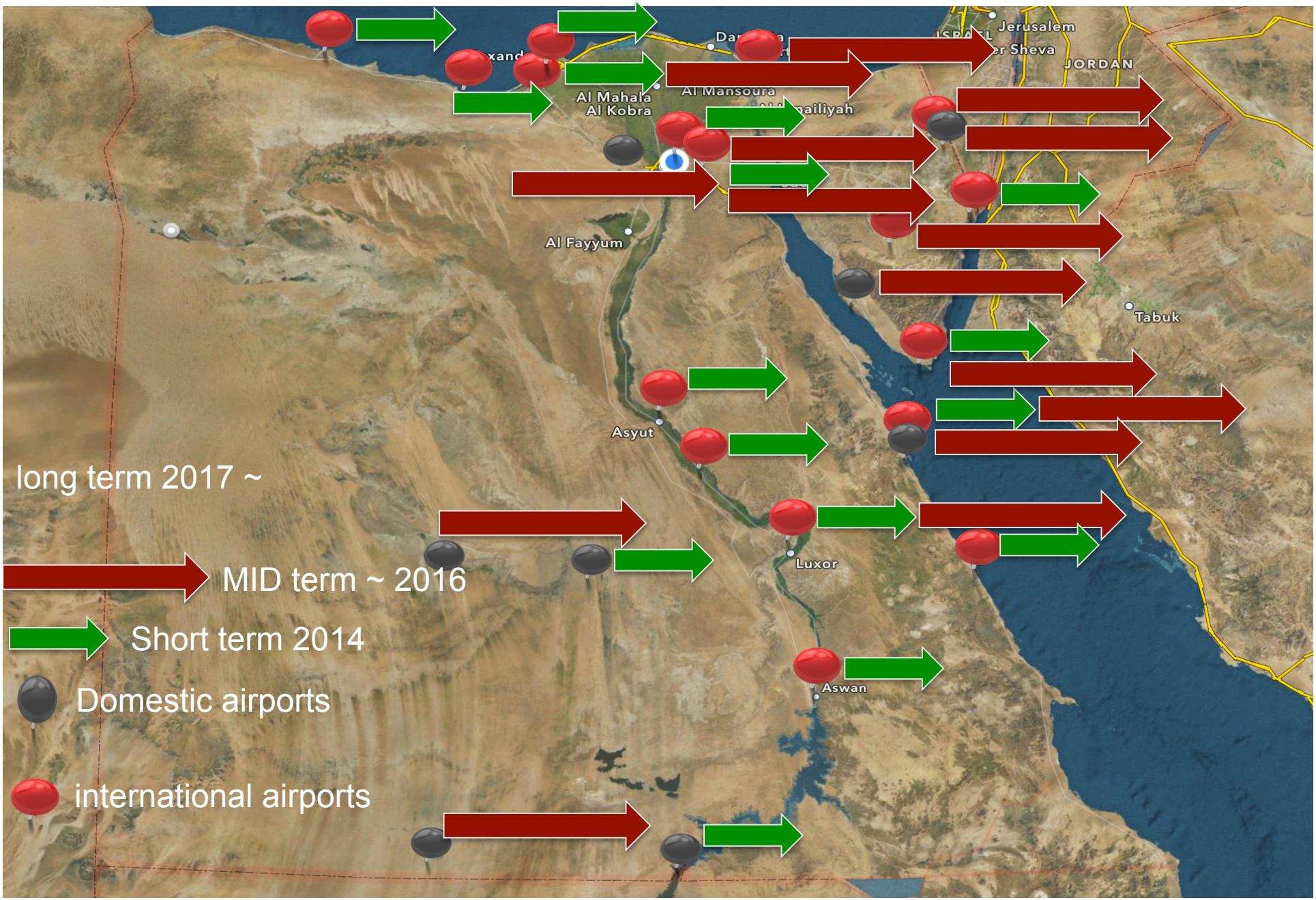
- ~ 2016(Medium term):

Depend on RNAV 1 or RNP 1 (non – surveillance airports) SID & STAR and based on (GNSS) and (GNSS/IRS or INS)

- 2017 ~ (Long term):

Depend on RNAV 1 or RNP 1 (non – surveillance airports) SID & STAR and based on (GNSS) and (GNSS/IRS or INS)

3.3 APP – PBN Plan:



3.3 APP – PBN Plan:

- 2014 (short term):

Depend on RNP APCH (L-NAV) non- precession approaches as :

- ❑ Complete LNAV approaches for 16 aerodromes (42 thresholds) to reach 70 % of total thresholds for all Egyptian airports.

Int. Airports	LNAV Completed	Domestic airports	LNAV Completed	Total airports	Total LNAV Completed
13 airports (34 thresholds)	24 threshold	3 airports (6 thresholds)	8 thresholds	16 airports (42 threshold)	32 thresholds
				Target (70%)	

3.3 APP – PBN Plan:

- ~ 2016 (MID. term):

Depend on RNP APCH (L-NAV) non- precession approaches and APV Baro-VNAV (LNAV/VNAV) – look like precision approach as :

- ❑ Complete LNAV approaches for the rest 9 aerodromes (18 thresholds) to reach 100% of total thresholds for all Egyptian airports.
- ❑ Complete APV Baro-VNAV (LNAV/VNAV) to 5 major int. airports (Cairo, Sharm Elshekh, Hurghada, Luxor and Borg Elarab) with (16 thresholds)

Int. Airports	LNAV To be Completed	Domestic airports	LNAV To be Completed	Total airports	Total LNAV To be Completed
17 airports (42 thresholds)	42 threshold	8 airports (18 thresholds)	18 thresholds	25 airports (60 threshold)	60 thresholds
				LNAV Target (100%)	
Int. Airports	**Baro-VNAV (LNAV-VNAV) To be Completed**	**Domestic airports**	**LNAV To be Completed**	**Total airports**	**Total LNAV To be Completed**
5 airports (16 thresholds)	16 thresholds	NIL	NIL	5 airports (16 thresholds)	16 thresholds

3.3 APP – PBN Plan:

- 2017 ~ (Long term):

Depend on RNP APCH (L-NAV) non- precession approaches, APV Baro-VNAV (LNAV/VNAV) – look like precision approach and APV SBAS (LPV) or GBAS CATII +III

This is an example text. Go ahead and replace it

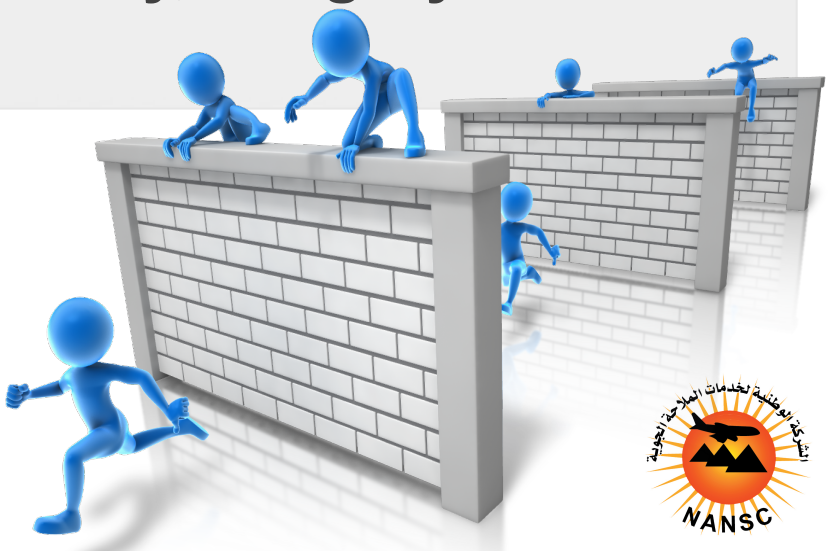
✓ 4 Challenges

5 Strategy for PBN implementation & monitoring

6 Conclusion

4. PBN Challenges 1/2:

- ❑ traffic and cost benefit analyses
- ❑ Necessary updates on automation
- ❑ Operational simulations in different scenarios
- ❑ ATC personnel training
- ❑ Flight procedure design training to include PBN concepts and ARINC-424 coding standard
- ❑ Enhanced electronic data and processes to ensure appropriate level of AIS data accuracy, integrity and timeliness



4. PBN Challenges 2/2:

- ❑ PBN QA Processes and Tools
- ❑ Airspace operational concept development
- ❑ Safety Assessment Methodology
- ❑ The need for mixed operations during the transition period
- ❑ Air Operator PBN equipage/approvals
- ❑ PBN Legislation/Regulations
- ❑ Mitigate the effect of ionosphere on GNSS

This is an example text. Go ahead and replace it

✓ 5 Strategy for PBN implementation & monitoring

6 Conclusion

5. Strategy for Egyptian PBN implementation & monitoring 1/3:

- Safety is the highest priority
- GNSS is the basic for future air navigation services
- Enhance ASM through PBN implementation
- airworthiness and operational approvals allowing the current GNSS applied for en-route and non-precision approach phases of flight without the need for augmentation services external to the aircraft
- Mitigate the effect of ionosphere on GNSS
- Align PBN plan with ASBU blocks
- Align PBN plan with Egyptian airspace program

5. Strategy for Egyptian PBN implementation & monitoring 2/3:

- ❑ Issuing altimeter charts and find the lowest temperature for last 5 years to apply Baro-VNAV as well as check any changes in altimeter each 5 years
- ❑ Establish KPIs for PBN implementation plan in term of :
  - ❖ Access
  - ❖ Capacity
  - ❖ Efficiency
  - ❖ Environment
  - ❖ Safety
  - ❖ Cost benefit analysis
- ❑ facilitate the use of GNSS; as enabler for PBN for en-route, terminal, approach and departure navigation

5. Strategy for Egyptian PBN implementation & monitoring 3/3:

- Call Military side in PBN implementation process as part of CDM
- Establish PBN national committee includes all stakeholders
- Establish awareness program for 18 months after each PBN implementation phase (1 awareness each 6 months) for all stakeholders
- Egypt will undertake education, training and R&D programs to provide necessary knowledge in PBN, GNSS, augmentation systems and operational application

This is an example text. Go ahead and replace it

✓ 6 Conclusion

Conclusion 1/2

1. Why PBN is important to Egypt
2. The current situation of Cairo FIR
3. Egyptian Airspace data analysis and evaluation
4. Different stages of PBN Plan in Egypt
5. Egyptian PBN road Map

Airspace	Short term (2014)	MID. Term (~ 2016)	Long term (2017 ~)
EN-ROUTE	RNAV 5 (GNSS) RNAV 5 (GNSS, INS or IRS) RNAV 5 (INS or IRS)	RNAV 5 (GNSS) RNAV 5 (GNSS, INS or IRS) RNAV 5 (INS or IRS)	RNAV 5 (GNSS) RNAV 1 (GNSS)
TMA	RNAV 1 (GNSS) RNAV 1 (GNSS, INS or IRS) RNP 1 (GNSS) RNP 1 (GNSS, INS or IRS)	RNAV 1 (GNSS) RNP 1 (GNSS) RNP 1 (GNSS, INS or IRS	RNAV 1 (GNSS) RNP 1 (GNSS)
APP.	RNP APCH (LNAV)	- RNP APCH (LNAV) - APV Baro-VNAV (LNAV/VNAV) – look like precision approach	- RNP APCH (LNAV) - APV Baro-VNAV (LNAV/VNAV) – precision Approach - APV SBAS (LPV) - GBAS Cat II+III

Conclusion 2/2

6 **Egyptian Challenges adapted to ICAO MID**

7 **PBN plan strategy with respect of ASBU**

8 **PBN monitoring**

THANK YOU any Question!

Ehab Raslan
Email:
ehab.raslan@nansceg.net
Ehab_raslan@ehcaan.com

PBN SG1 – Cairo 1-3 April, 2014