ACAC GNSS
Kingdom of Saudi Arabia
GNSS STRATGY

GNSS Workshop 05 - 04 - 2016

GACA®
الهيئة العامة للطيران المدني
General Authority of Civil Aviation

Presentation Content

1- ACAC GNSS Strategy

2- KSA GNSS Strategy

2-1 Overview

2-2 GNSS Performance Monitoring System (GPMS)

2-3 KSA PBN Status

3- Conclusion

ACAC objectives and strategy

ACAC Objectives

1. Develop a GNSS training policy, programme and plan.
2. Support states to reach the regional, and national PBN Objective.
3. Ensure The coverage of the whole ACAC states

ACAC Strategy

Approach

The policy context for the GNSS service implementation over ACAC is being developed around the following major axes:

- **ICAO GNSS policy - A37**
- **ICAO office and PIRG GNSS policy**
- **The Euro-Med PROJECT RTAP (Regional Transport Action Plan) action 27**

ACAC objectives and strategy

ACAC Strategy (Approach and Landing)

A36-23 & A37-11 Resolutions

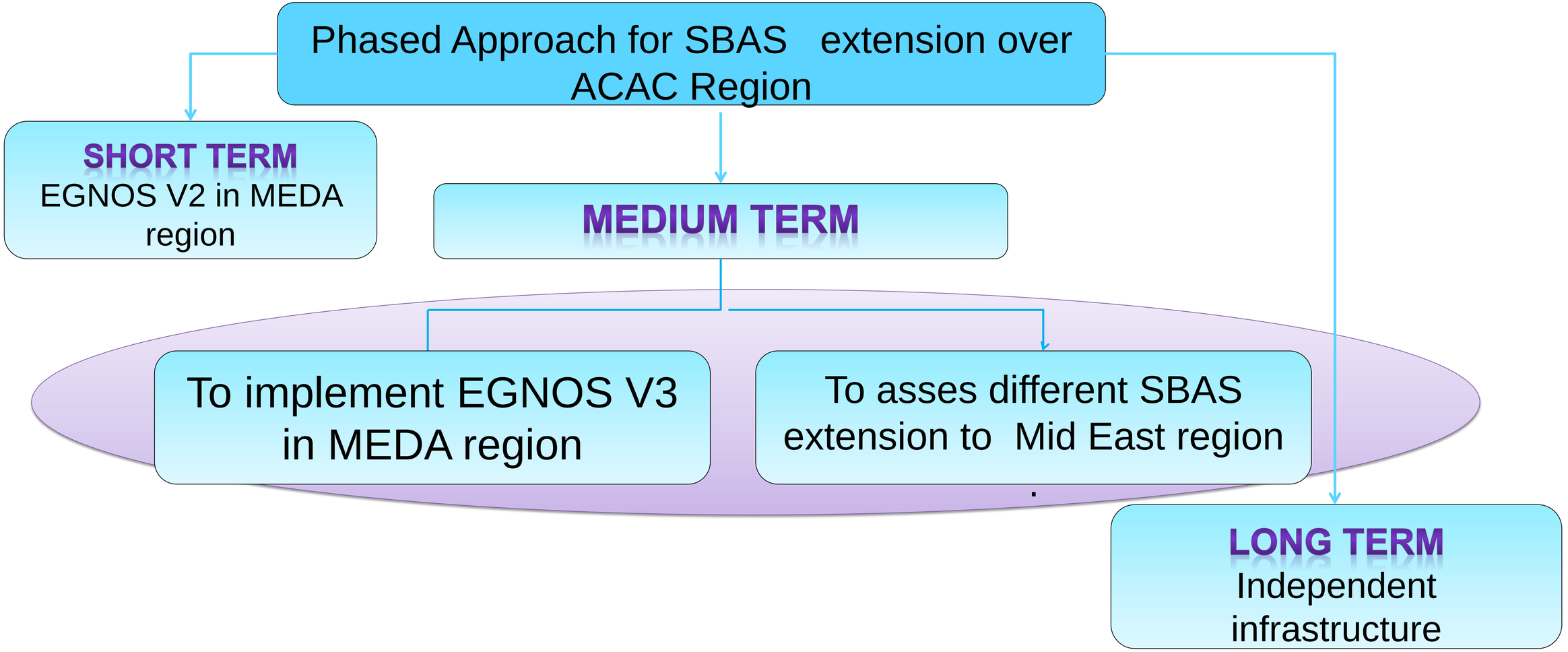
APIRG GNSS Strategy

•

MIDANPIRG GNSS Strategy (updated strategy)

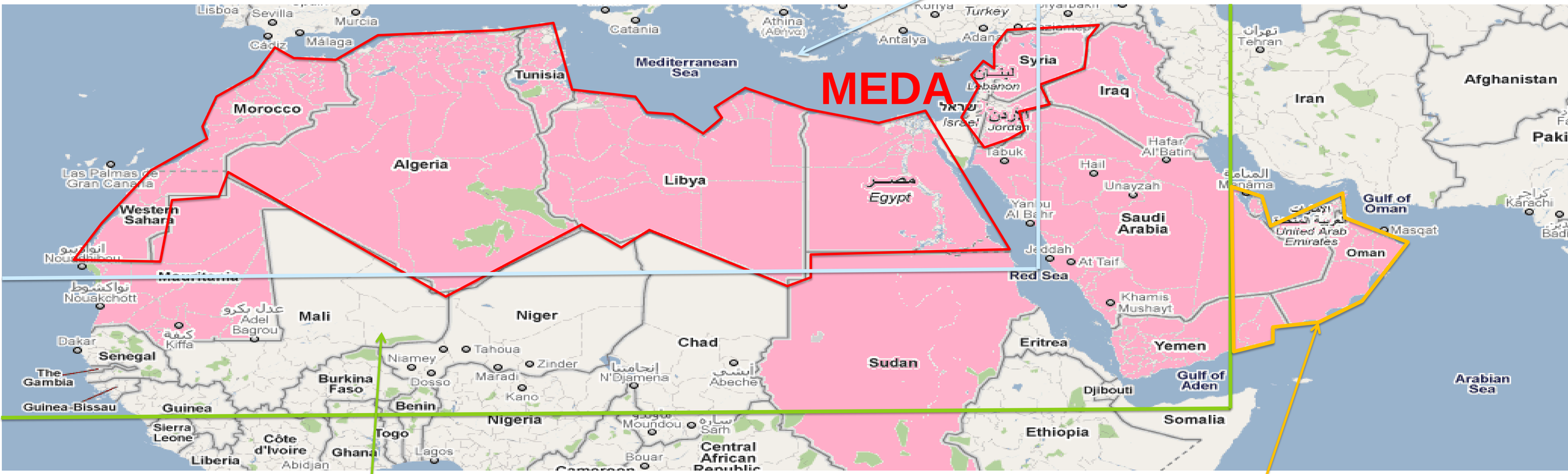
•

ACAC GNSS strategies v1(2014)



ACAC Aproach

Current possible coverage area



Medium term possible coverage area based on homogeneous extension (10°)

This area can only be covered thanks to REM module in the medium term (heterogeneous extension)

ACAC GNSS Strategies v2(2016)

Phased Approach for SBAS extension over ACAC Region

SHORT TERM
EGNOS V2 in MEDA region

LONG TERM
Independent infrastructure

ACAC Executive Council decision

(15 Mai 2014)

- Consider the SIRAJ Proposal action plan as a Working basis
- Activate a joint working group EC-ACAC to monitor the implementation of the Road map and action plan.
- Accentuate the focus on the Short term strategy (MEDA Country) and long term strategy (independent GNSS system).
- Continue the cooperation with the European Commission in order to achieve a global approach taking into account technical, institutional and funding aspect
- Open channel communication and cooperation with ASECNA (EGNOS system in Central and West Africa), and GAGAN (Indian) SBAS to assess the potential coverage of the East of the Arabian Peninsula.

ACAC Executive Council decision

(30 Oct 2014)

- decided to mandate ACAC to play a coordinating role in the negotiations between the European side and ACAC member States wishing to use the European EGNOS service in their respective airspace.

ACAC Road Map for GNSS

2016

Limited services

EGNOS V2 in MEDA region

2023

Full services

To implement EGNOS V3 in MEDA region

To asses other SBAS extension to Mid East region

2030

Independent infrastructure

Independent infrastructure and system

Presentation Content

1- ACAC GNSS strategy

2- KSA GNSS Strategy

2-1 Overview

2-2 GNSS Performance Monitoring System (GPMS)

2-3 KSA PBN Status

3- Conclusion & Recommendation

Presentation Content

1- ACAC GNSS strategy

2- KSA GNSS Strategy

- 2-1 Overview
- 2-2 GNSS Performance Monitoring System (GPMS)
- 2-3 KSA PBN Status

3- Conclusion & Recommendation

Back Ground

- The Kingdom of Saudi Arabia (KSA) had decided to implement GNSS.
- Decision was followed by a consultation study on GNSS implementation in KSA. The consultation study was conducted by DFS, Business Unit Consulting. The consultation report included recommendations for the implementation in KSA.
- Based on the above study results and recommendations, a team was formed with members from Air Navigation Services Sector Directorates: Systems Engineering Directorate (SED), Air Traffic Management (ATM) and Aeronautical Information Services (AIS), Safety & Quality Assurance (S&QA) and Safety & Economic Regulations (S&ER) Sector.

GNSS STRATEGY IMPLEMENTATION STEPS

- Preparation of GNSS (GPS) Implementation in the KSA
- Implementation of GNSS (GPS) in the following steps:
- Non-Precision Approaches (NPA)
- En-route Navigation
- Terminal Areas
- Precision Approaches (PA)
- Analyse and review the structure of KSA Airspace based on GNSS and in accordance with GACA PBN Strategy

Preparation of GNSS Implementation in the KSA

- GNSS in the KSA requires preparatory measures. This covers mainly establishment of GNSS regulatory framework, strategic planning respectively the development of a GNSS strategy
- Conduct of Safety Plan & Safety/Risk Assessment
- Availability of all coordinates in WGS-84 and other preconditions for the safe and efficient use of GNSS as a means of navigation.

Analyze and review the structure of KSA Airspace

- Analyze and review the structure of KSA Airspace based on GNSS and in accordance with GACA PBN Strategy. In order to optimize the airspace capacity and flexibility in KSA, the airspace structure need to be analyzed and restructured based on GNSS services and other elements of CNS/ATM systems

KSA Strategy of GNSS Implementation

- Establishment of GPMS in KSA to comply with ICAO requirements.
- Implement core GNSS (without augmentation) for en-route and terminal operations.
- Implement GBAS (GLS) in coordination with users.
- Continue participation in ACAC activities for SBAS system for the region.

Presentation Content

1- ACAC GNSS strategy

2- KSA GNSS Strategy

2-1 Overview

2-2 GNSS Performance Monitoring System (GPMS)

2-3 KSA PBN Status

3- Conclusion & Recommendation

GNSS Performance Monitoring System (GPMS)

GACA/ANS

GACA®
الهيئة العامة للطيران المدني
General Authority of Civil Aviation

GNSS Work Shop 05 - 08 - 2016

GNSS Performance Monitoring System (GPMS)

- Comply with ICAO – Annex 10.
- Monitoring and Recording of GNSS Data.
- Wide Area RAIM Prediction .
- GNSS NOTAMs.

GNSS Performance Monitoring System (GPMS)

It is an ICAO requirement for:

- ATC shall be provided with operational status of radio navigation aids authorized to be used for civil aviation. This will include GNSS.
- State approving GNSS operations should ensure relevant GNSS data are recorded to be used in incident/accident investigation.
- State approving GNSS shall issue NOTAMs for changes on the operational status.

GNSS Performance Monitoring System (GPMS)

- GPMS continually monitors actual GNSS (GPS) satellites in view, determining real-time availability of GNSS (GPS) and alerts during periods of unavailability.
- GNSS (GPS) data recorded for playback and analysis.
- GPMS predicts GNSS (GPS) Receiver Autonomous Integrity Monitoring (RAIM) for FIR regions and airports.

KSA GPMS Architecture

GPMS composed of:

- (5) Local Monitors (LM) subsystem.
- Performance Processing (PP) subsystem.
- (2) Performance Display (PD) subsystem.
- Data Link (DL) subsystem.

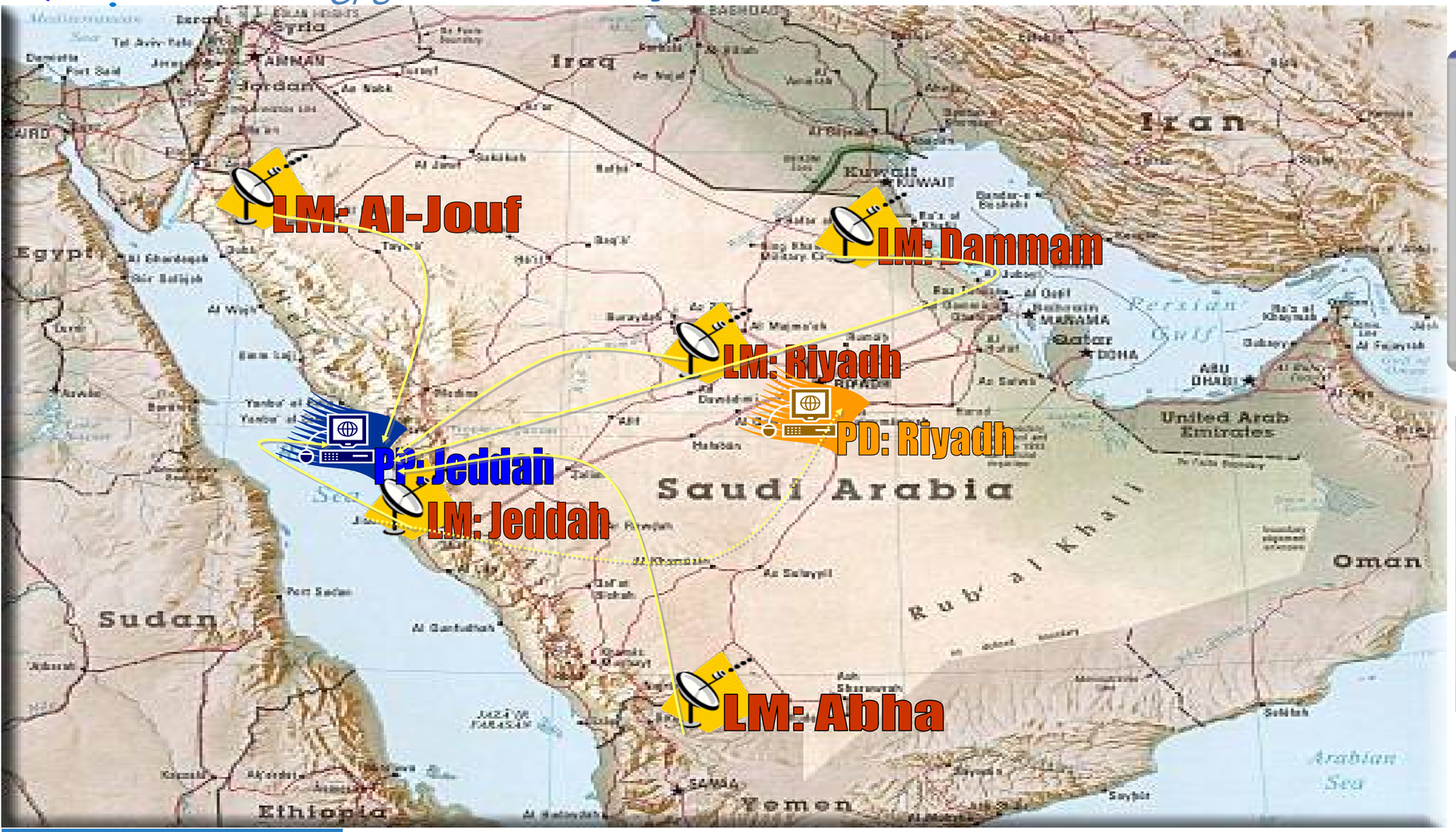
KSA GPMS Functional Description

- System to monitor GPS performance in real time
- Store data for historical assessment
- Built-in GPS RAIM prediction capability
- 5 LM sites deployment:
  - ✓ Receiver Sites: GPS receiver + Antenna at:
  - ✓ Jeddah, Riyadh, Dammam, Abha, Al Jouf
  - ✓ Central Database Server at Jeddah
  - ✓ Performance Display at:
  - ✓ Jeddah
  - ✓ Riyadh

KSA GPMS System Overview

GNSS
GPS

System

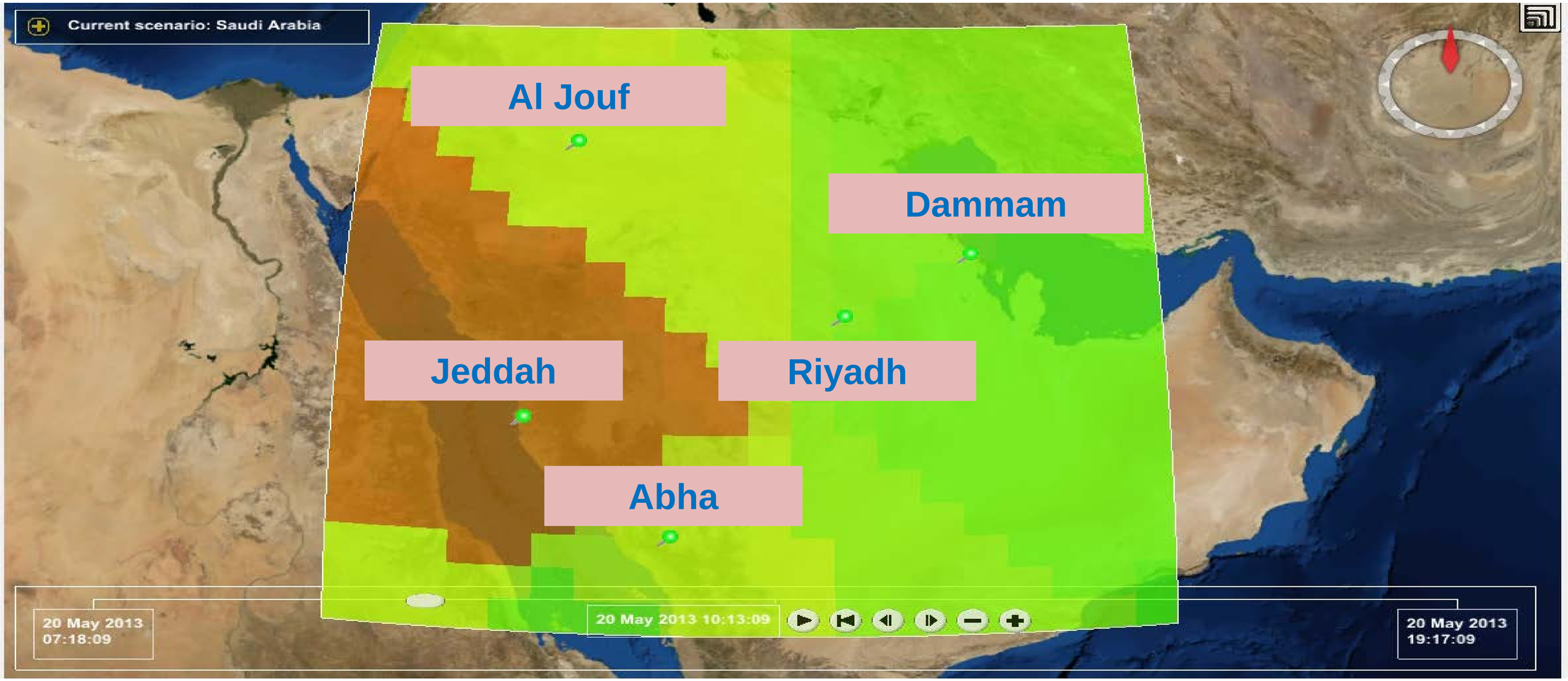


Applications

LM: Local Monitor
PP : Performance Processing
PD: Performance Display

GACA

Saudi Arabia GPMS



GACA

NOTAM Post Processing

GPMS has the ability to generate GPS NOTAMs based on outages predicted in a calculation scenario, usually airport 0.3 NM RNP approach (NPA) NOTAMs are generated for point predictions only and are automatically sent to the GACA AIS system

Presentation Content

1- ACAC GNSS strategy

2- KSA GNSS Strategy

2-1 Overview

2-2 GNSS Performance Monitoring System (GPMS)

2-3 KSA PBN Status

3- Conclusion & Recommendation

PBN Status in KSA

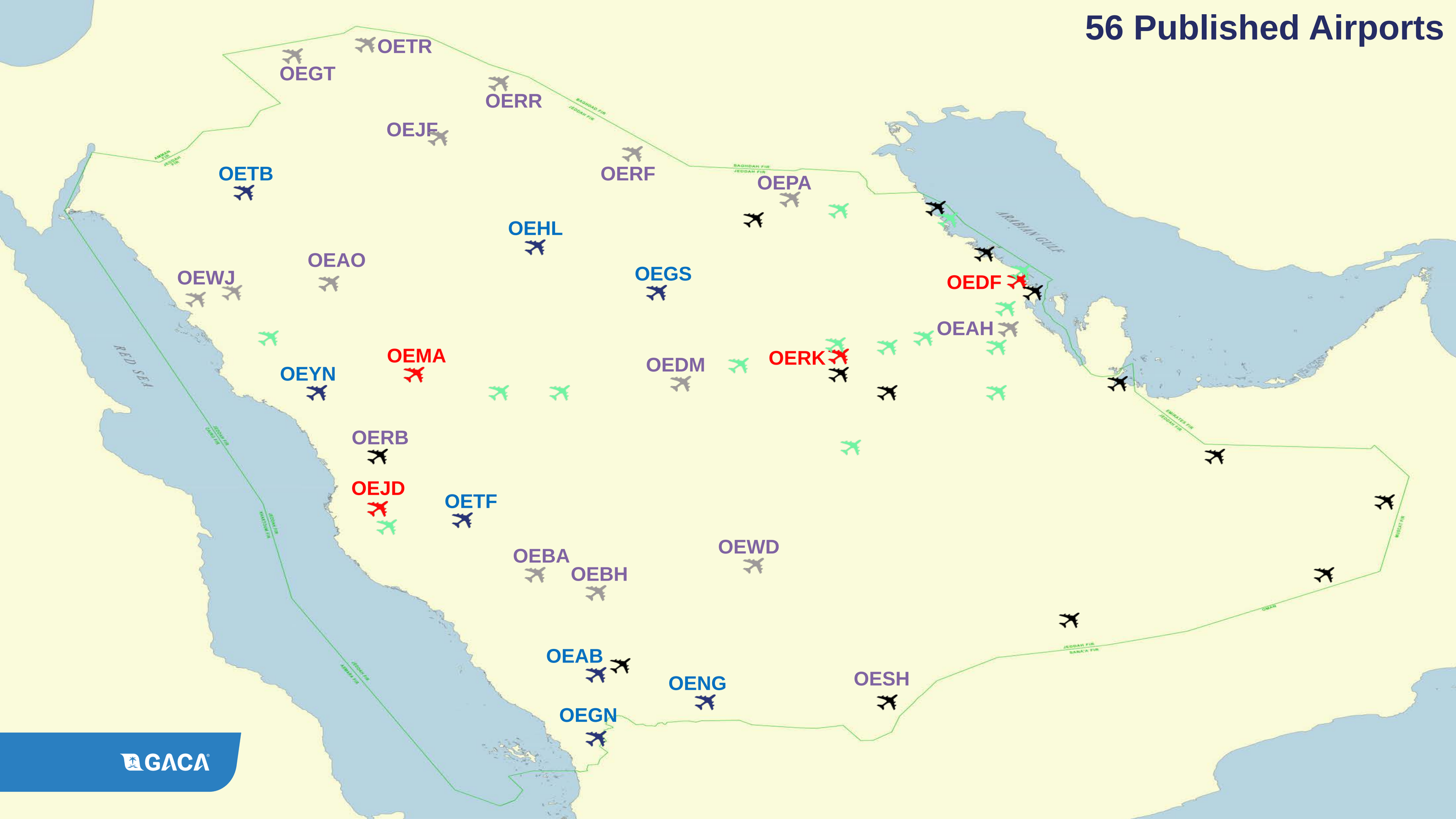
GACA®
الهيئة العامة للطيران المدني
General Authority of Civil Aviation

Airports

International airports	Regional airports	Domestic airports	Other Airports with IFP	Other Airports without IFP
4	8	15	12 airports	17
Dammam	Abha	Al Ahsa	Dhahran	Abqaiq
Jeddah	Jazan	All Baha	King Saud	Harad
Madinah	Gassim	Al Jouf	Jubail	Jeddah King Faicel NB
Riyadh	Hail	Arar	Khamis Mushait	Pump station 3
	Tabuk	Bisha	Ras Mishab	Pump station 6
	Taif	Al Dawadmi	Riyadh Airbase	Pump station 9
	Nejran	Guriat	Al kharj	Pump station 10
	Yenbo	Qaisumah	Batha	Ras tanura
		Rabigh	Shabitah	Ras tanajib
		Rafha	Thablotin	Ummlejj
		Sharura	Aradah	Al hawta
		Turaif	Om El Melh	IPSA 3
		Wadi Al Dawasir		Shaibah
		Wejh		Udhailah
		Alula		Khurais
				Thumamah
				Jubal (OEJL)
27 airports			12 airprorts	17 airports
Total 56 airports				

GACA

56 Published Airports



GACA

2016 -2018

Request for proposal (RFP) Air Navigation Systems & Procedures Development Project

19 Airports	PBN status
• **Dammam / King Fahd International Airport** • Hail Airport • Gassim / Prince Nayef bin Abdulaziz Airport • Al-Ahsa Airport • Abha Airport • Jazan/King Abdullah bin Abdulaziz Airport • Bisha Airport • Nejran Airport • Taif Airport • Al-Baha Airport • Tabuk Airport • Yenbo/Prince Abdulmohsin bin Abdulaziz Airport • Al-Jouf Airport • Wadi Al Dawasir Airport • Wejh Airport • Alula/Prince Abdulmajeed Bin Abdulaziz Airport • Guriat Airport • Al-Dawadmi/King Salman Bin Abdulaziz Airport • Arar Airport	- 22 RWY Ends - Redesign from FAA-TERPS to ICAO PANS-OPS - RNP APCH - LNAV/VNAV - RNAV 1 SID - RNAV 1 STAR TO BE PUBLISHED BETWEEN 2016 and 2018

Presentation Content

1- ACAC GNSS strategy

2- KSA GNSS Strategy

2-1 Overview

2-2 GNSS Performance Monitoring System (GPMS)

2-3 KSA PBN Status

3- Conclusion & Recommendation

Conclusion & Recommendation

- Establishment of GPMS in KSA to comply with ICAO requirements.
- Implement core GNSS (without augmentation) for en-route and terminal operations.
- Implement GBAS (GLS) in coordination with users.
- Continue participation in ACAC activities for SBAS system for the region.

Thank you

GACA