

**Applications of Global Navigation Satellite Systems  
Workshop  
Baku, Azerbaijan, 11 – 15 May 2009**

**Perspectives of  
GNSS  
application in  
AZERBAIJAN AIR NAVIGATION  
SERVICES**



**AZƏRAERONAVİQASIYA**

# INTRO

- ◆ **AZANS – is subsidiary of “Azerbaijan Hava Yollary” CJSC and responsible for the Air Navigation Services within the airspace of Azerbaijan Republic.**

**AZANS was established in 1996.**

- ◆ **Airspace area of Azerbaijan Republic:**

**Land - 86,6 ths. sq.km**

**Above Caspian sea area - 78,8 ths sq.km.**

**Total - 165,4 ths. sq.km**

- ◆ **Air Route network – total length 8000 km.**

- ◆ **Average annual movements – 90 000**

# Main goals of AZANS

- ◆ To guarantee safety of the flights and high-quality air navigation services to meet the international standards;
- ◆ To flexibly utilize new international standards and recommendations, develop and modernize technical systems and information services;
- ◆ To train and equip qualified personnel;
- ◆ To provide quick and high-quality information that meets the demands of operators;

# ATC CENTRE



- ◆ Heydar Aliyev International Airport at Baku



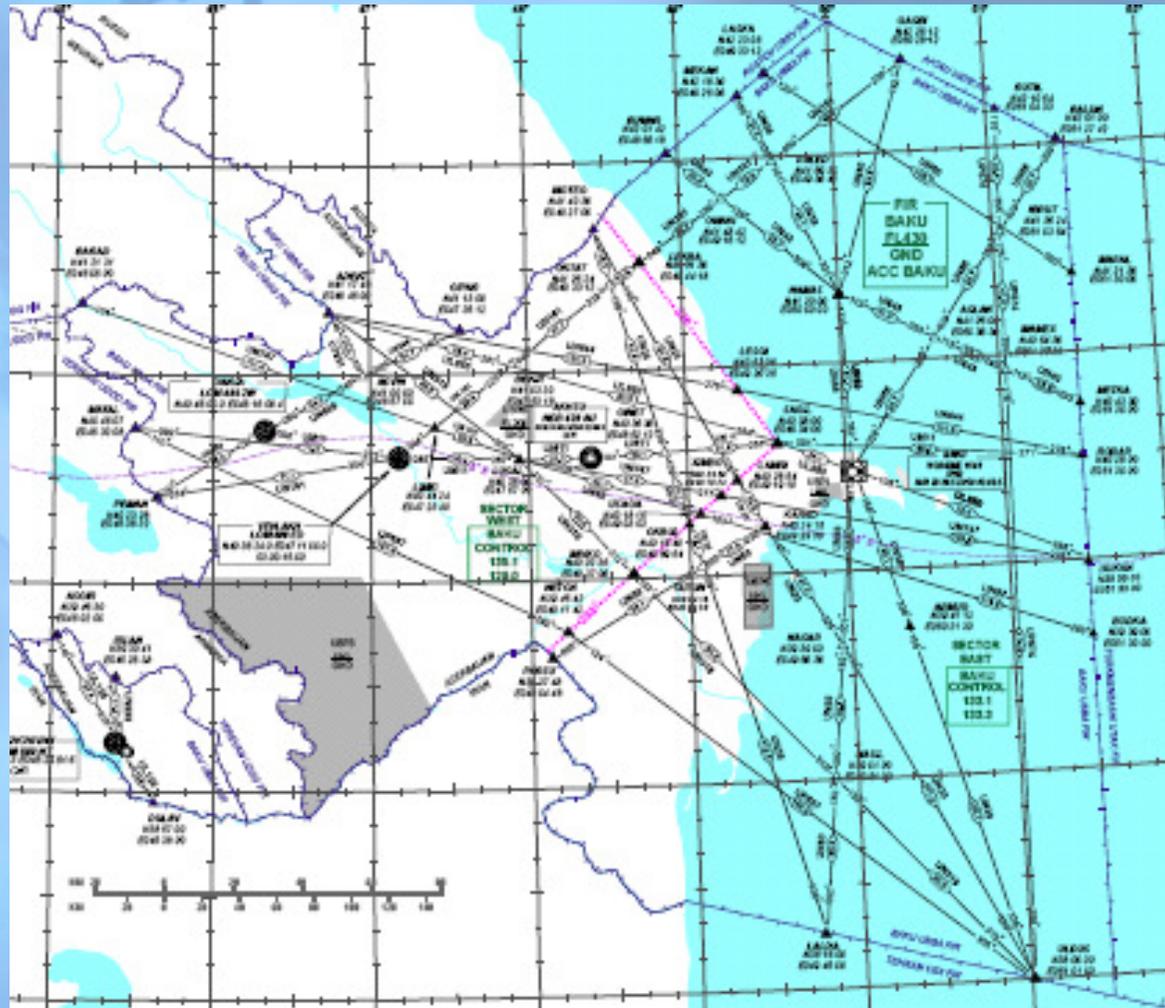
- ◆ Fitted out with highest standards level ATC system
- ◆ ATC services according to ICAO SARP's
- ◆ RVSM zones



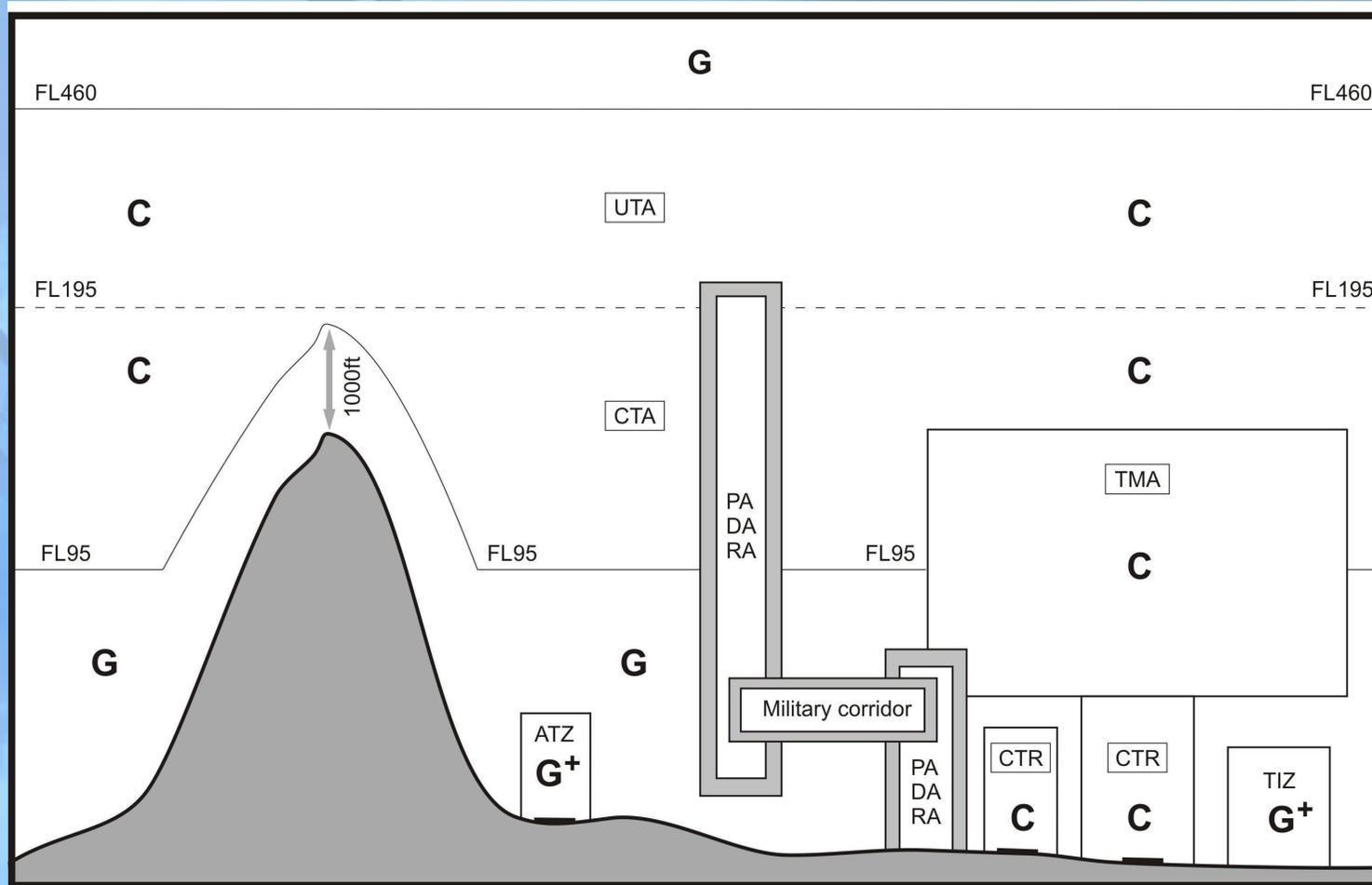


# Baku FIR

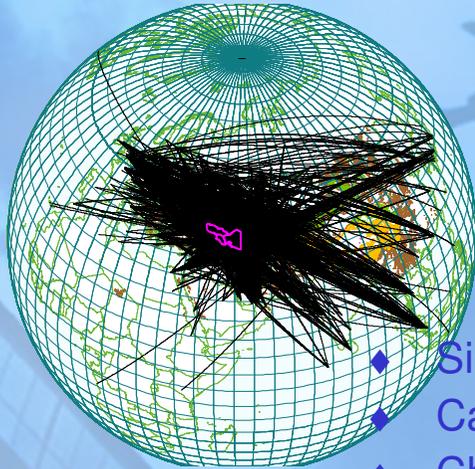
(AIP AZ 12 April 2007)



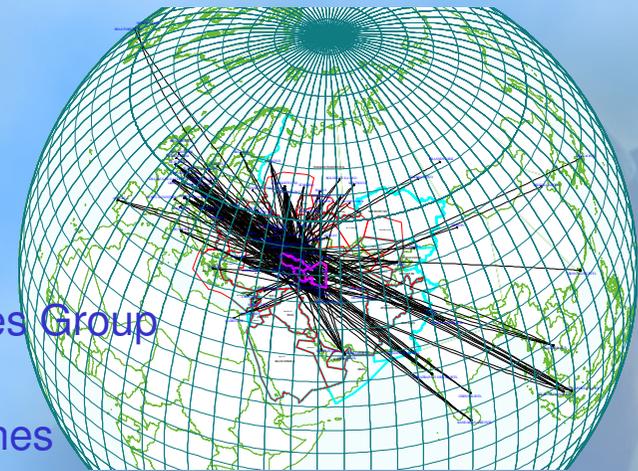
# Airspace Classification AZ



# Overflights picture

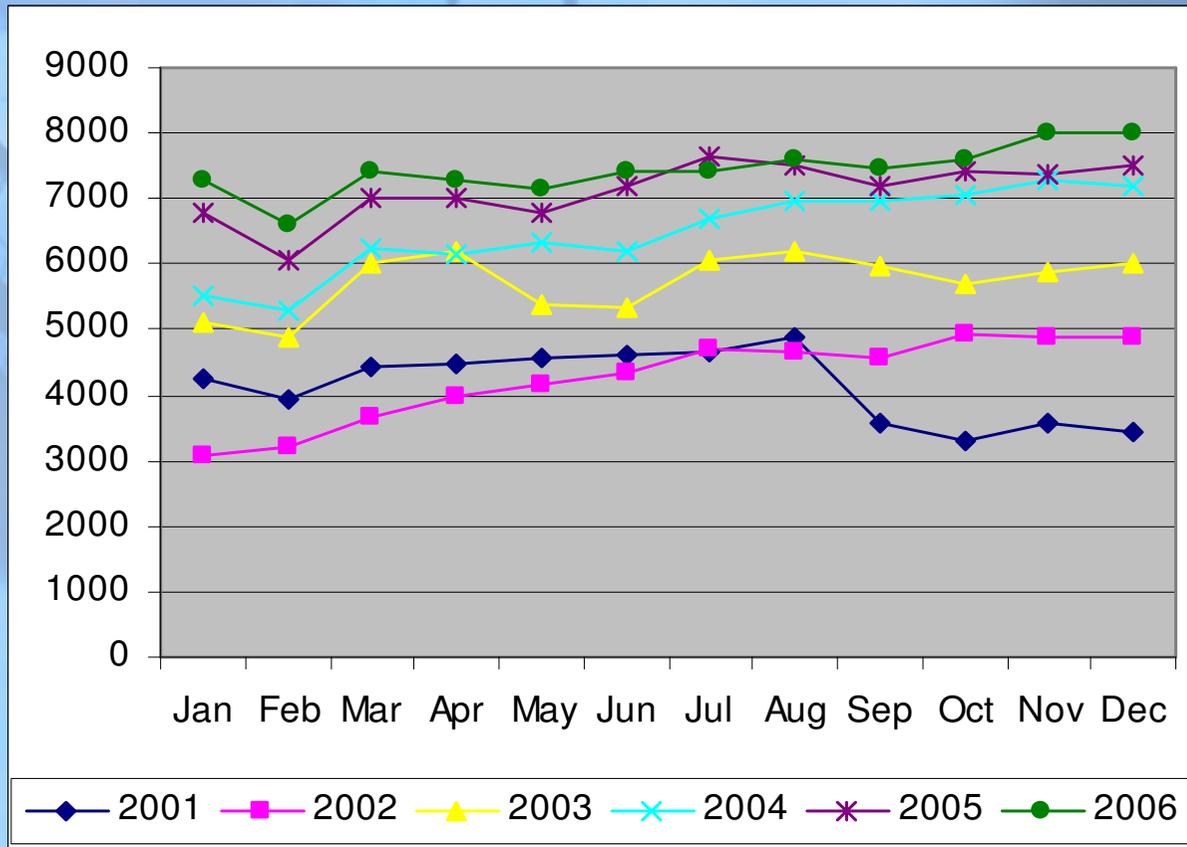


- ◆ Singapore Airlines
- ◆ Cathay Pacific
- ◆ China Sothern
- ◆ Thai Airways
- ◆ Lufthansa
- ◆ Air France
- ◆ Turkish Airlines
- ◆ Azerbaijan Airlines
- ◆ Aeroflot
- ◆ Korean Airlines
- ◆ Pakistan Intl
- ◆ ElAl Israel Air
- ◆ Silk Way Airlines
- ◆ Uzbekistan Airways
- ◆ Air Ukraine
- ◆ Kazakhstan Airlines
- ◆ Malaysia Airlines
- ◆ British Airways
- ◆ Condor
- ◆ Cargolux
- ◆ Egypt Air
- ◆ KLM
- ◆ Finnair
- ◆ Asiana Airlines Group
- ◆ Lauda Air
- ◆ Austrian Airlines



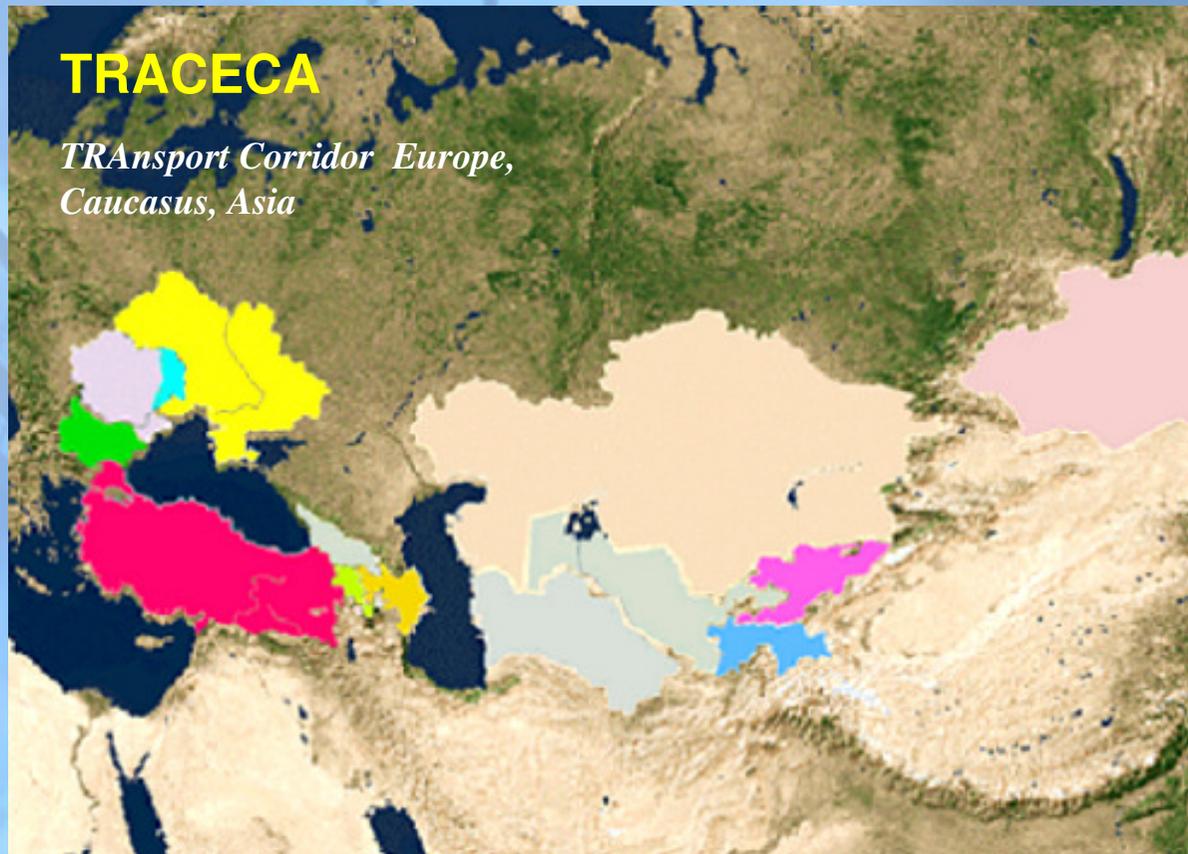
# STATISTICS

## Traffic Evolution (2001 – 2006)



Year	Traffic
2006	87 983
2005	85 436
2004	77 925
2003	68 724
2002	51 098
2001	49 711

# Strategic role of Civil Aviation of Azerbaijan in international transport infrastructure



Ancient Silk Way  
Renaissance

Cargo&Passengers  
Airport Hub

Caspian Sea natural  
resources exploration

Caspian Sea as important  
Transport linkage

A blue-tinted collage of aviation-related images. In the upper left, a small airplane is seen in flight against a cloudy sky. In the center, a larger airplane is shown from a front-on perspective, flying over a runway. In the lower right, a close-up of an airplane engine is visible. The overall background is a mix of these elements, creating a sense of motion and flight.

# ◆ Surveillance

# RADAR

- ◆ **Currently the main surveillance system in use is – RADARS**

## **Advantages:**

- ◆ **Reliable**
- ◆ **Independent**
- ◆ **Passive mode detection**
- ◆ **Airborne equipment**

## **Disadvantages:**

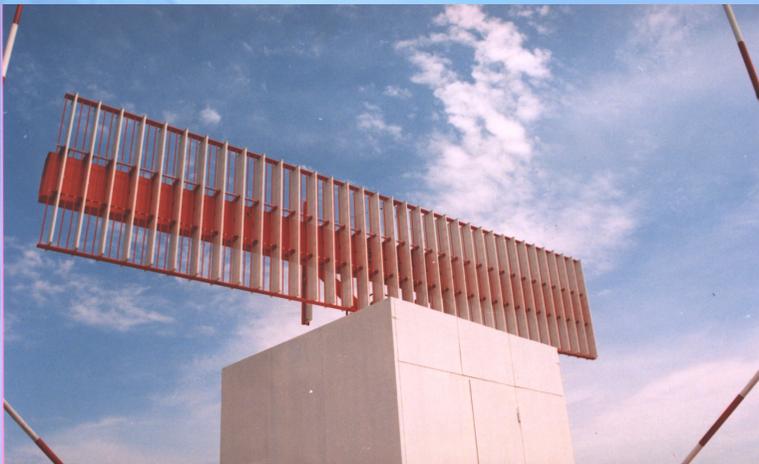
- ◆ **Expensive equipment,**
- ◆ **Data transmission lines**
- ◆ **Expensive in operation/power consumption**
- ◆ **Mechanical part failures**
- ◆ **Coverage problems**



# Modernization program



- ◆ Heydar Aliyev International Airport at Baku is equipped with modern en-route control radar RSM 970S



- ◆ Although there is yet the need to provide sufficient aerodrome radar control at Baku, Gyanja and Nakhchivan

# Radar Modernization

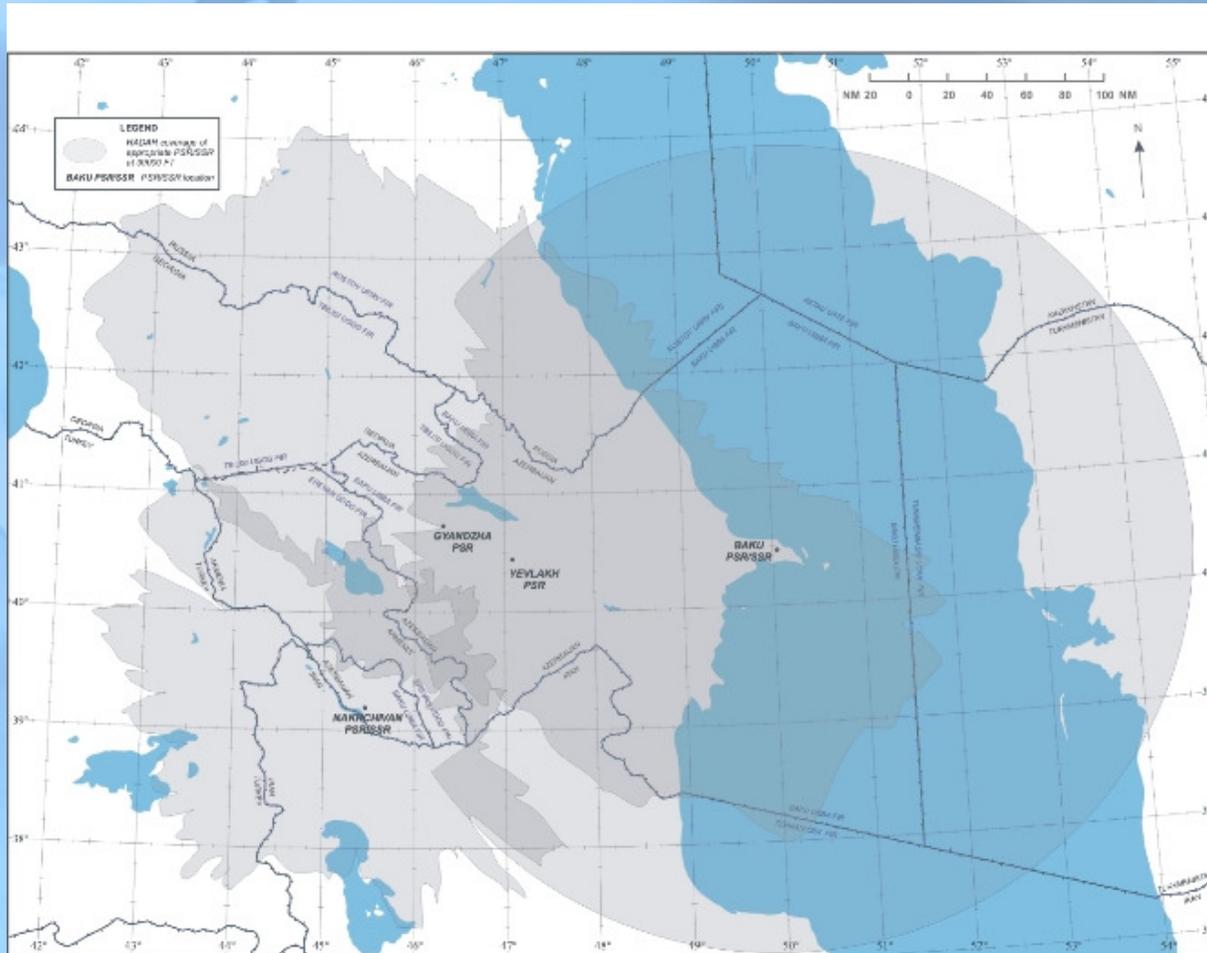
- ◆ Modern en-route control MSSR in Evlakh



- ◆ Installation of PSR/SSR is ongoing at Heydar Aliyev Int. Airport

# Radar coverage.

SSR @ 30,000' (AIP AZ 13 May 04)



# ADS – B

## Disadvantages

- ◆ Not all aircrafts is equipped
- ◆ Ground augmentation system
- ◆ Dependence (GPS/GLONASS/GALILEO)
- ◆ Accuracy
- ◆ Transmitting (Mode S ES, VDL Mode 4, UAT)
- ◆ Harmonization of the requirements

## Advantages

- ◆ ICAO Global CNS/ATM Concept - Future of the Air Navigation
- ◆ Availability (En-route and on the Ground)
- ◆ Helicopter operations (onshore/offshore)
- ◆ Search and rescue
- ◆ Minimum ground infrastructure
- ◆ RNAV, RNP, P- RNAV facilitation
- ◆ Time Synchronization



◆ **Surveillance**

◆ **Navigation**

# NAV AIDS

- ◆ DVOR
- ◆ DME
- ◆ ILS
- ◆ NDB
- ◆ VNF ADF

## Advantages

- ◆ Accurate
- ◆ CAT III
- ◆ Independent

## Disadvantages

- ◆ Terrain requirements
- ◆ Limited coverage
- ◆ Narrow approach path (ILS)

# **GNSS**

## **Disadvantages**

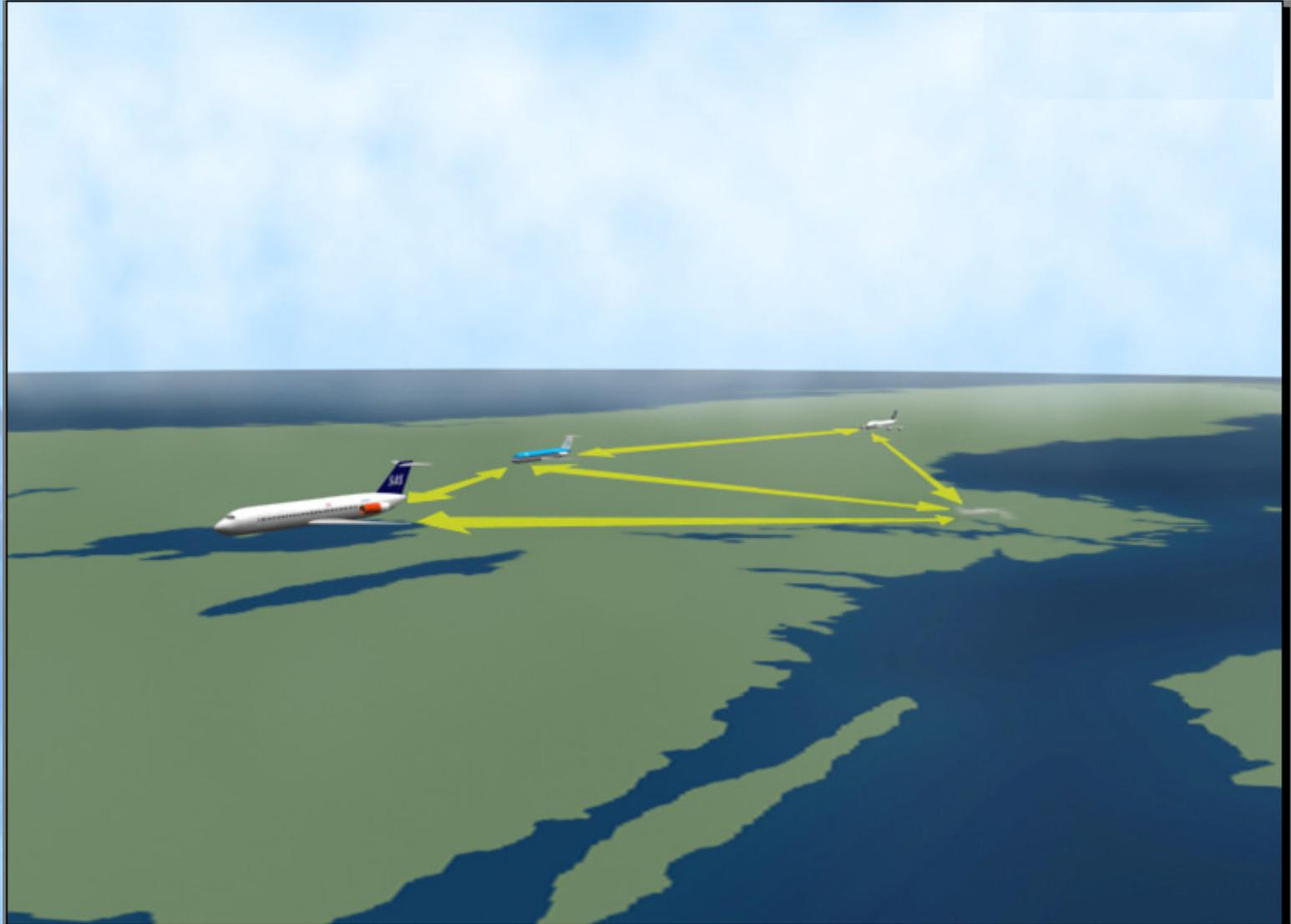
- ◆ **CAT I**
- ◆ **Dependence**
- ◆ **Airborne equipment**
- ◆ **Ground infrastructure**
- ◆ **Uniformity of the standards**

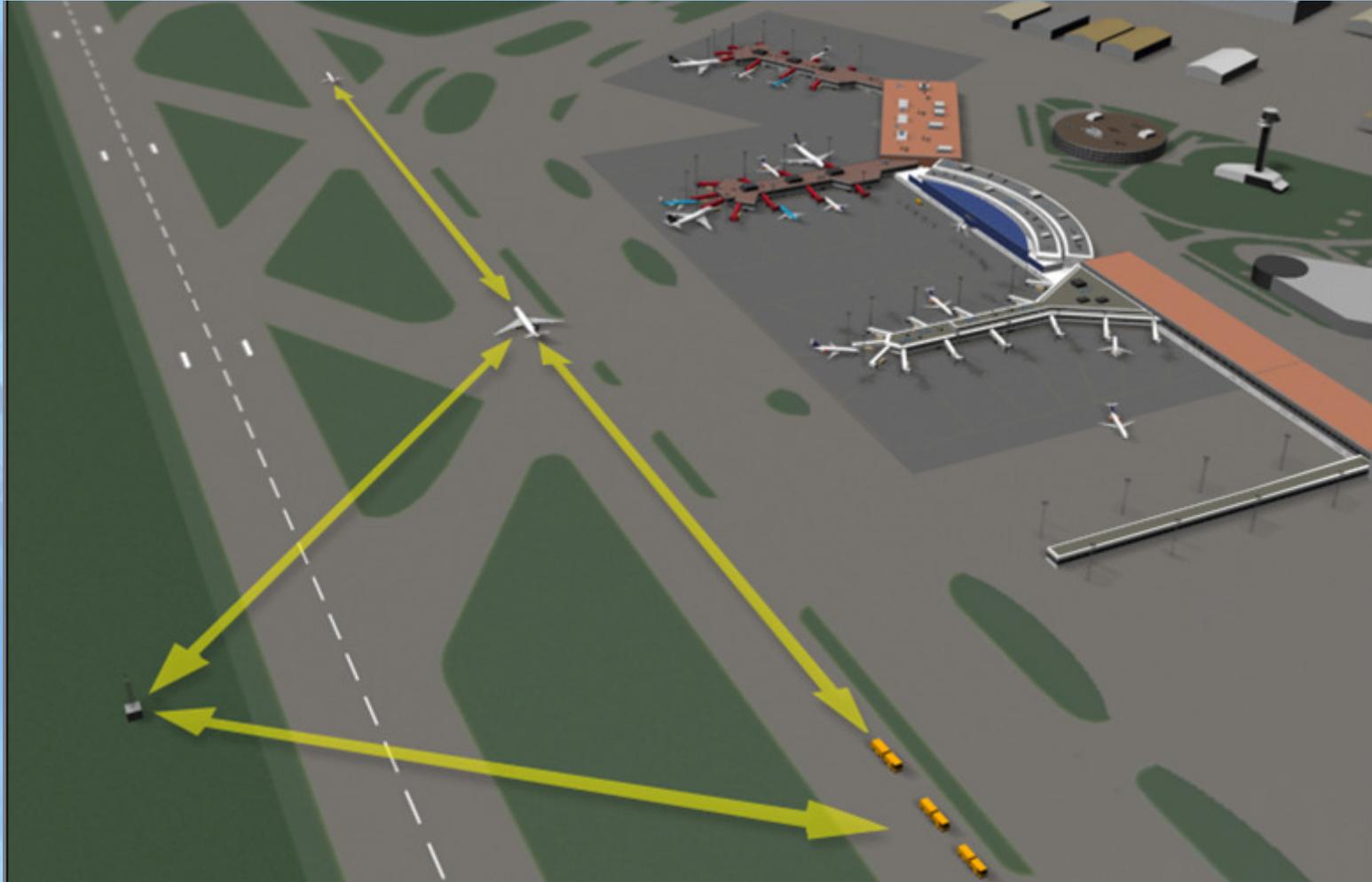
## **Advantages**

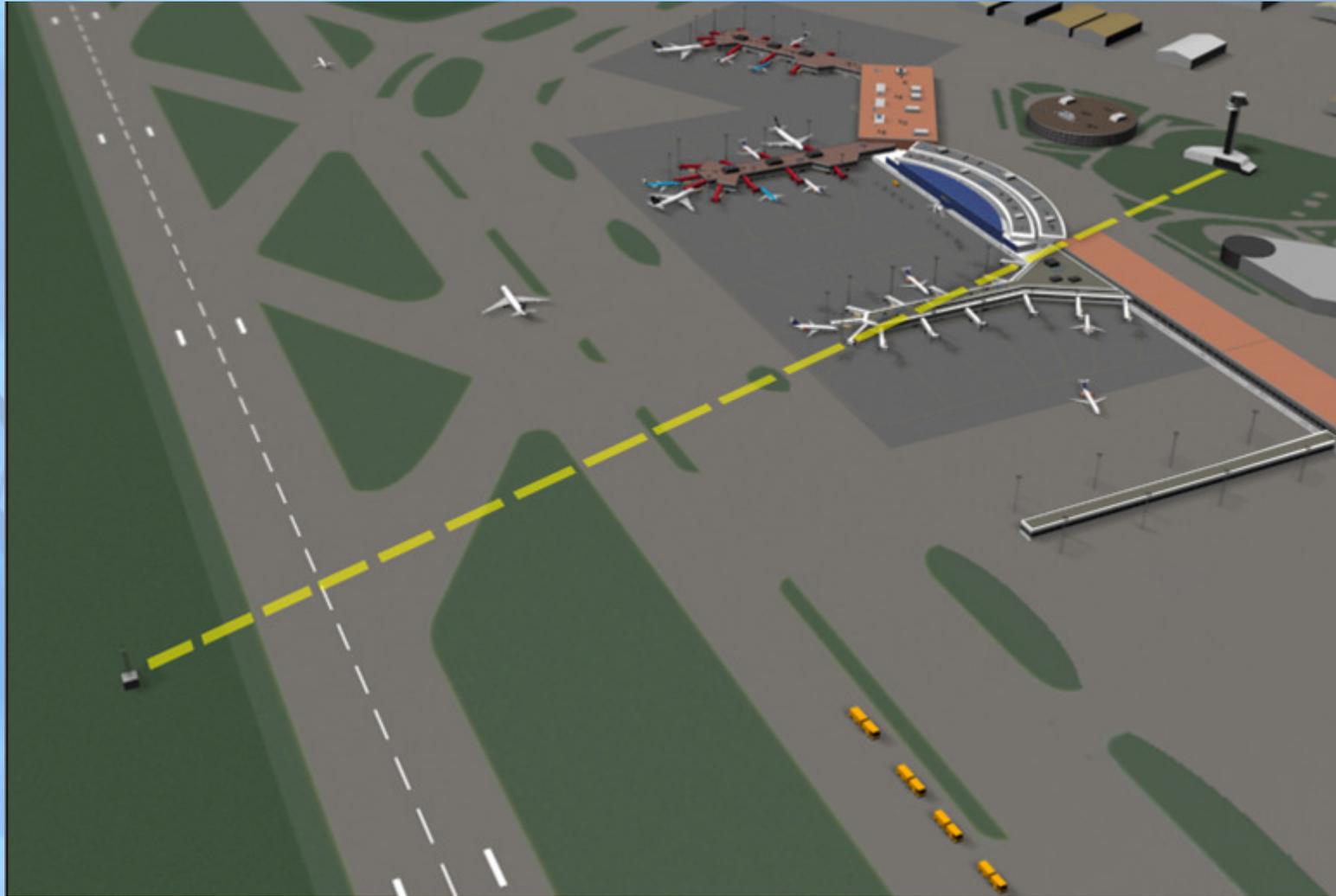
- ◆ **RNAV**
- ◆ **RNP**
- ◆ **Availability**

# GNSS Projects in AZANS

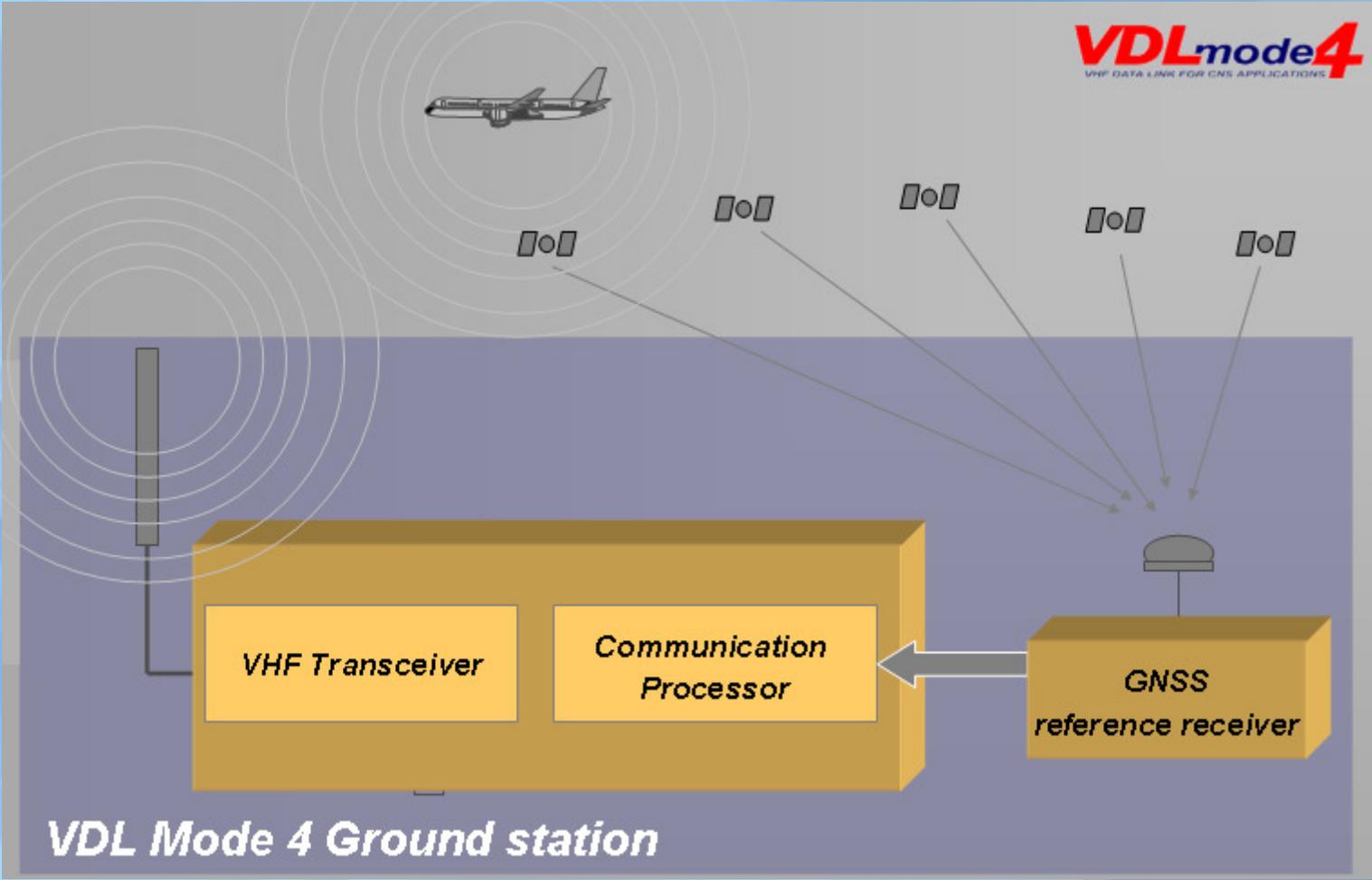
- ◆ 2001 in frame of EU Southern Ring II Project ADS – B trails in Baku
- ◆ Satellite Meteorological Services
- ◆ ATC VSAT Communication
- ◆ A-SMGCS (MLAT/ADS-B) Implementation projects at Heydar Aliyev International Airport
- ◆ WAM and ADS for Helicopter operations
  - Onshore and for Offshore oil and gas exploration
  - Along the oil/gas pipelines
  - Search and Rescue







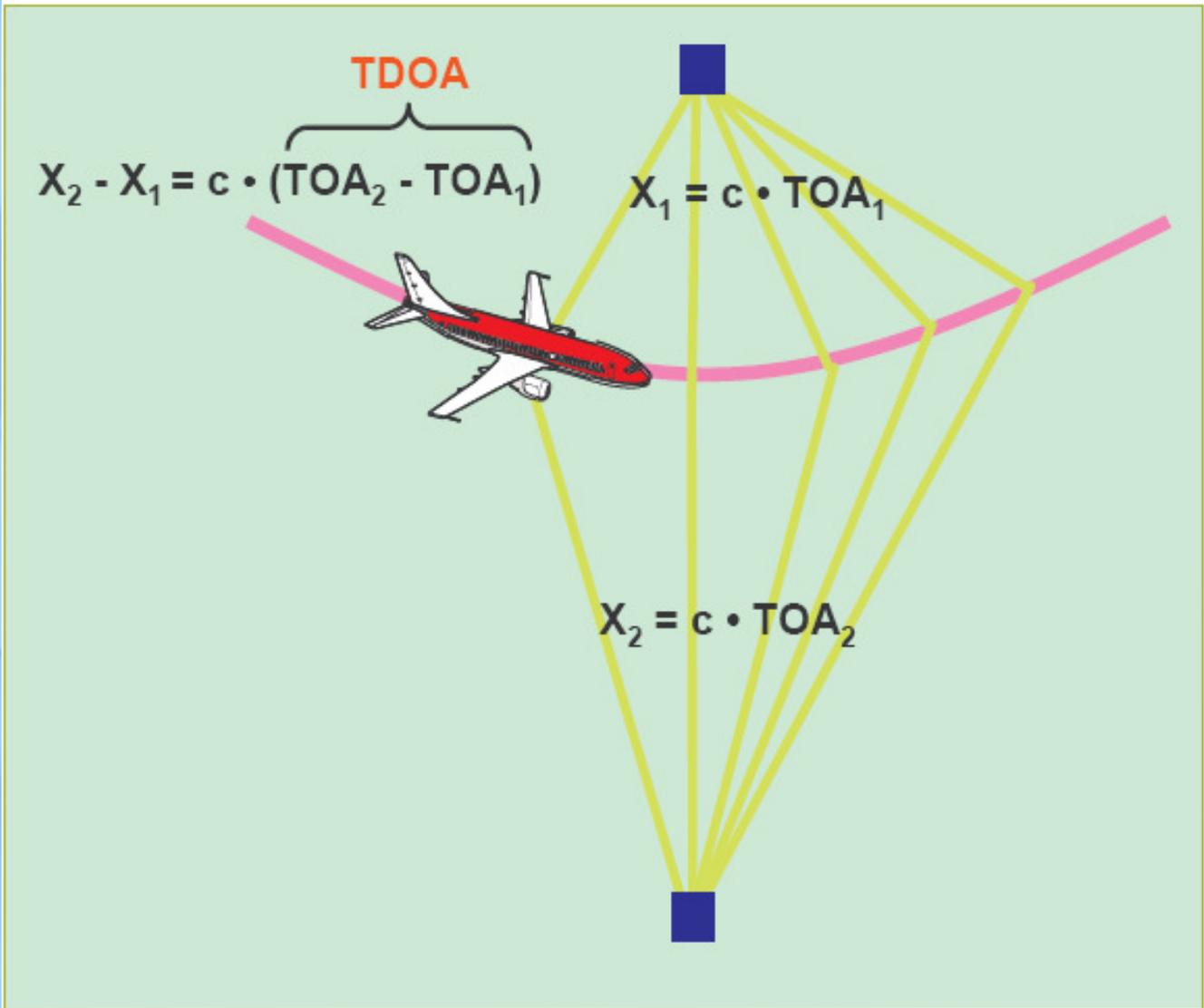


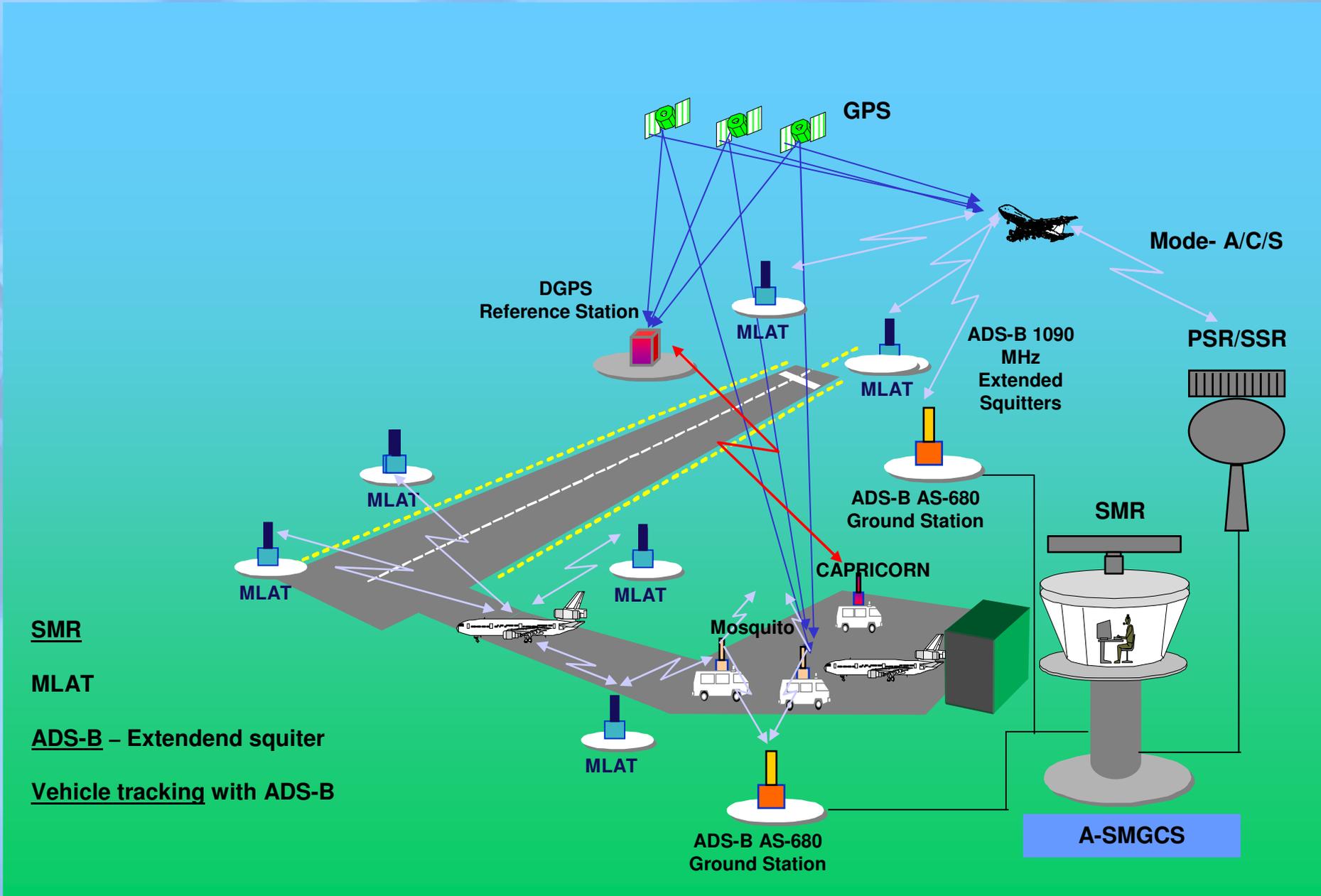




# A-SMGCS

- ◆ **MLAT system is a failsafe, highly reliable system for surveillance and monitoring from the final approach through to parking areas in all weather conditions**
- ◆ **Permits to:**
  - Track vehicles and aircraft using one or more sensors (SMR, Gap Filler, ADS-B, multilateration ...etc)
    - at 1-second rate
    - with an accuracy of 5 metres
  - Present airport movements on controller's consoles
  - Determine in advance possible conflicts
  - Perform legal recording of the controller's consoles
  - Supervise the status of the single units





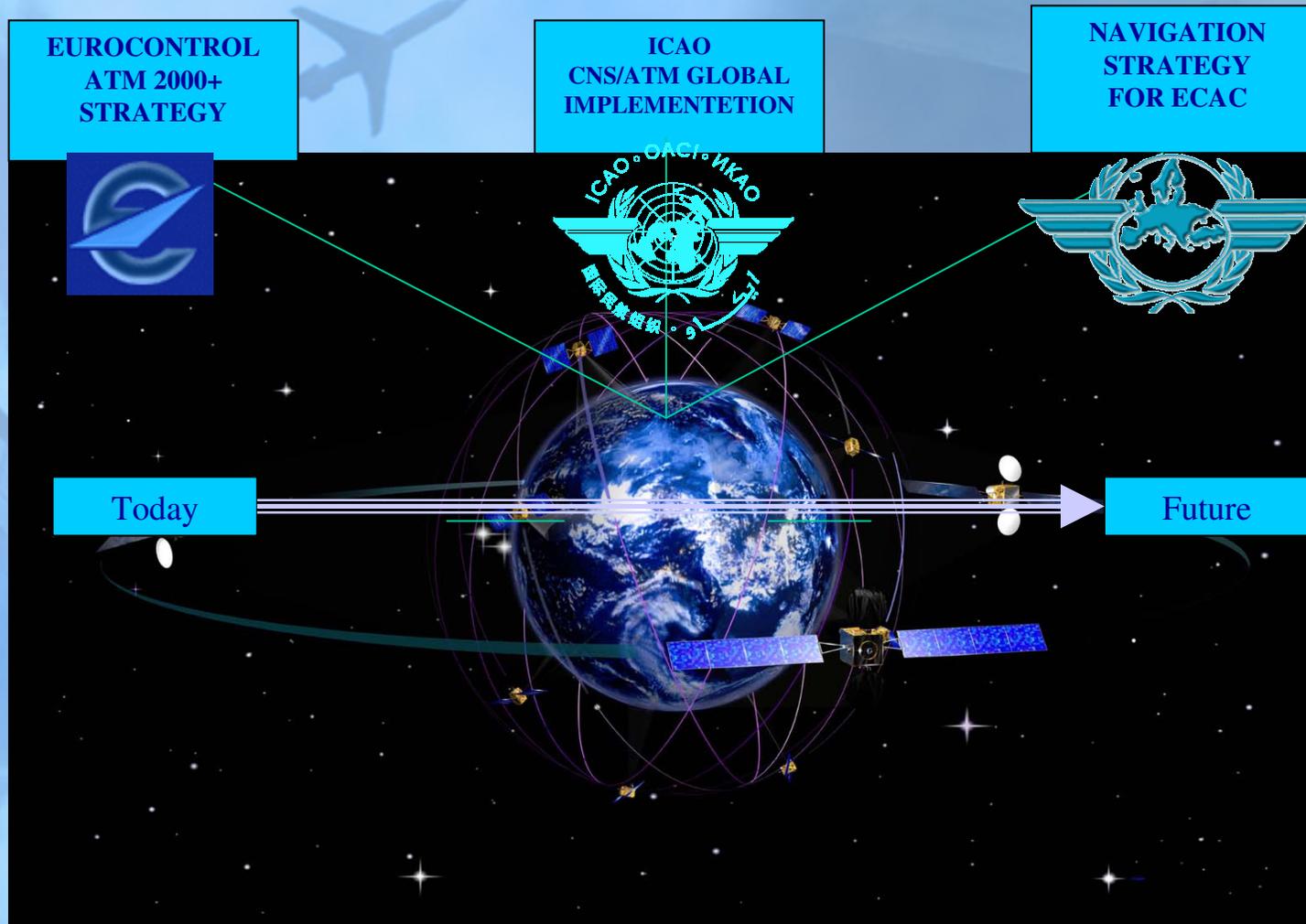
**SMR**

**MLAT**

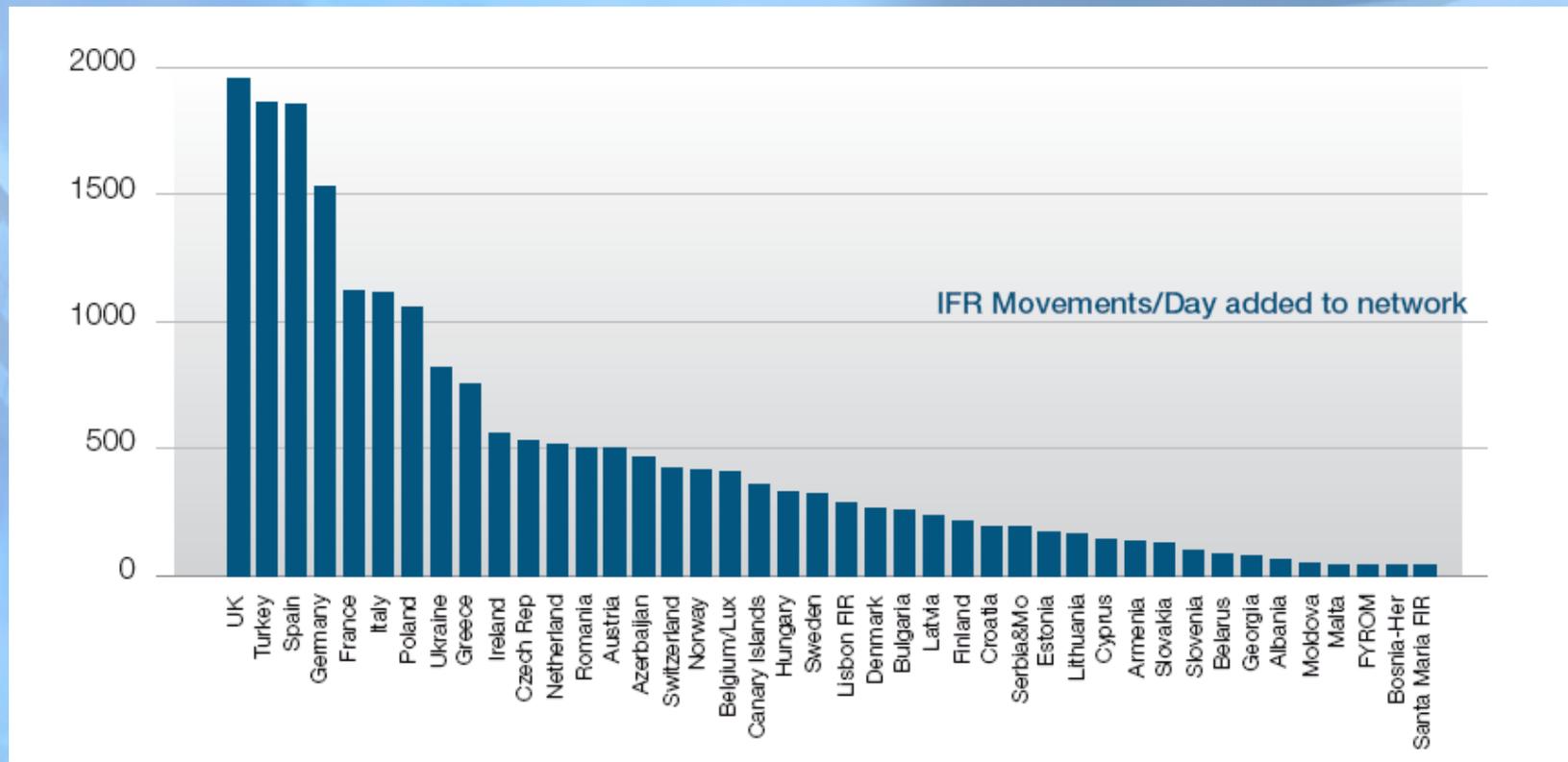
**ADS-B – Extended squiter**

**Vehicle tracking with ADS-B**

# CNS/ATM concept



# (2007 vs. 2030 in the Regulation & Growth scenario.



# FUTURE

- ◆ GNSS systems provide independent navigation, where the user performs on-board position determination from information received from broadcast transmissions by a number of satellites. **GNSS** provides highly reliable, highly accurate and high integrity global coverage independently. Although the **RNP** concept allows for more than one satellite navigation system to be in use simultaneously, from an aircraft equipment point of view maximum interoperability is essential as it would significantly simplify avionics and thereby reduce cost. It would also be attractive if satellite navigation systems could serve as complementary to and/or in a back-up role for each other.
- ◆ The introduction of **air-ground data links**, together with sufficiently accurate and reliable aircraft navigation systems, present the opportunity to provide **surveillance services** in areas which lack such services in the present infrastructure, in those areas where the current systems prove difficult, uneconomic, or even impossible, to implement.
- ◆ **ADS** is a function for use by ATS in which aircraft automatically transmit, via a data link, data derived from on-board navigation systems. As a minimum, the data should include the four-dimensional position. The ADS data would be used by the automated ATC system to present information to the controller. ADS will find beneficial application in other areas, including high-density areas, where ADS may serve as an adjunct and/or back-up for secondary surveillance radar and thereby reduce the need for primary radar.

# FUTURE

- ◆ Unification of the standards,
- ◆ Interoperability of the GNSS / airborne equipment
- ◆ Certification, State support, Interstate agreements
- ◆ Harmonization on the regional levels
- ◆ Safety assessments



**Benefit from - Smooth implementation of GNSS in Air Navigation**

# Thank you for your attention



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