ENAV

Space Based ADS-B Seminar
Singapore, 11th November 2014

Michele Carandente

enav.it

ENAV

Italian Company for Air Navigation Services
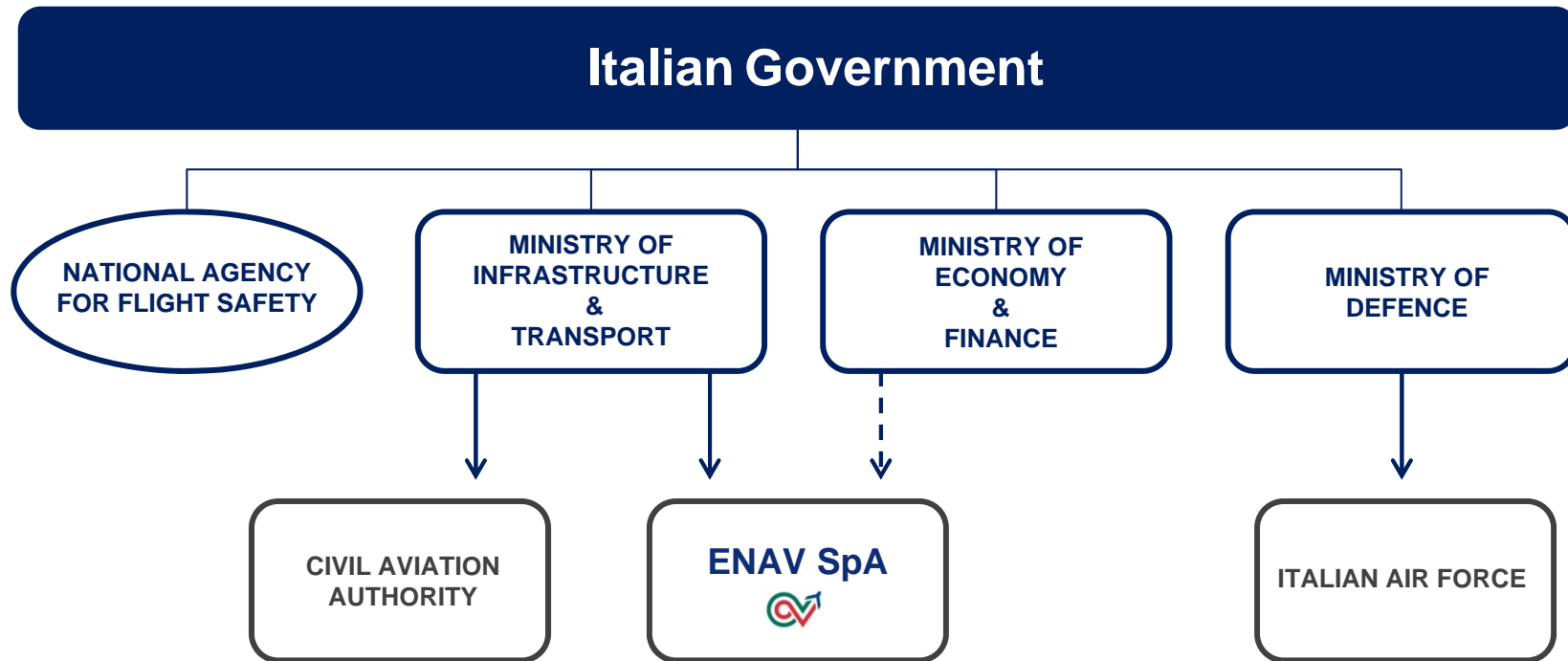
enav.it

Company Profile

ENAV is **responsible for the provision of Air Traffic Management and Control services**, as well as other essential services for air navigation **within the Italian skies and airports**, ensuring the best technical and system standards of flight safety.

ENAV's main mission is to contribute to the **efficiency of the national transport system** by guaranteeing the **safety** and **regularity** of transportation for all categories of users within the Italian airspace, respecting the Country's international agreements.

This objective must be reached by achieving the **cost efficiency of the Company** and advantage of the demand expressed by users in terms of effectiveness and quality of services.

Institutional Positioning

ENAV

```
┌─────────────────────────────────────────────────────────────────┐
│                      Italian Government                            │
└─────────────────────────────────────────────────────────────────┘

  ⬭ NATIONAL AGENCY    ┌ MINISTRY OF ┐   ┌ MINISTRY OF ┐   ┌ MINISTRY OF ┐
    FOR FLIGHT SAFETY  │ INFRASTRUCTURE│ │  ECONOMY    │   │  DEFENCE    │
                       │     &        │   │     &       │   └─────────────┘
                       │  TRANSPORT   │   │  FINANCE    │
                       └──────────────┘   └─────────────┘

                       ┌──────────────┐   ┌─────────────┐   ┌─────────────┐
                       │ CIVIL AVIATION│  │  ENAV SpA   │   │ ITALIAN AIR │
                       │  AUTHORITY   │   │             │   │   FORCE     │
                       └──────────────┘   └─────────────┘   └─────────────┘
```

Ownership and Partnership

ENAV

Techno Sky
ENAV Company

Engineering
The company ensures round-the-clock technical and operational management of 4 Area Control Centres, 49 airports, the Academy, 41 radar systems, 95 telecommunications centres, 76 meteo systems, 198 navigation aid systems (ILS, VOR, DME) and 71 software systems.

SICTA
ENAV

Research and Development
ATM Systems and Architectures
R&D Validation
  ✓ ATC/ATM Simulation
  ✓ HMI Prototyping
  ✓ Aerodrome Real Time Simulation
  ✓ FTS Tools
Airspace Engineering
  ✓ Planning, Design & Management
  ✓ Model Base Simulation

ENAV Asia Pacific

ATM Services
ENAV company for the Oriental market

ESSP
16,67%

Satellite Services
Service Provider of the European Satellite multimodal Service EGNOS

Aireon
12,5%

Satellite Services
Service Provider for satellite-based aeronautical ADS-B surveillance system

ENAV in a snapshot

(ENAV) Revenues for 2013:	799.6 M€
(ENAV) Net Profit for 2013:	50.5 M€
Control Towers:	41
Area Control Centres (ACCs):	4
Airspace under ENAV responsibility:	751,728 Km^2
Flights controlled in 2013: (IFR GAT Instrumental Flight, General Aviation)	1,524,019
Punctuality index of ATM :	0.0003 average delay per flight assisted ENR
Peak of flights managed in one day in 2013:	6,054
Employees :	4,196
Hours of training imparted in 2013:	164,064

ENAV Services

Aeronautical Consulting & Design

Flight Inspection

Engineering

Training

Research & Development

Worldwide presence

ENAV provides services of Engineering, Aeronautical Consulting, Training and Flight Inspection for its customers in Italy and around the world
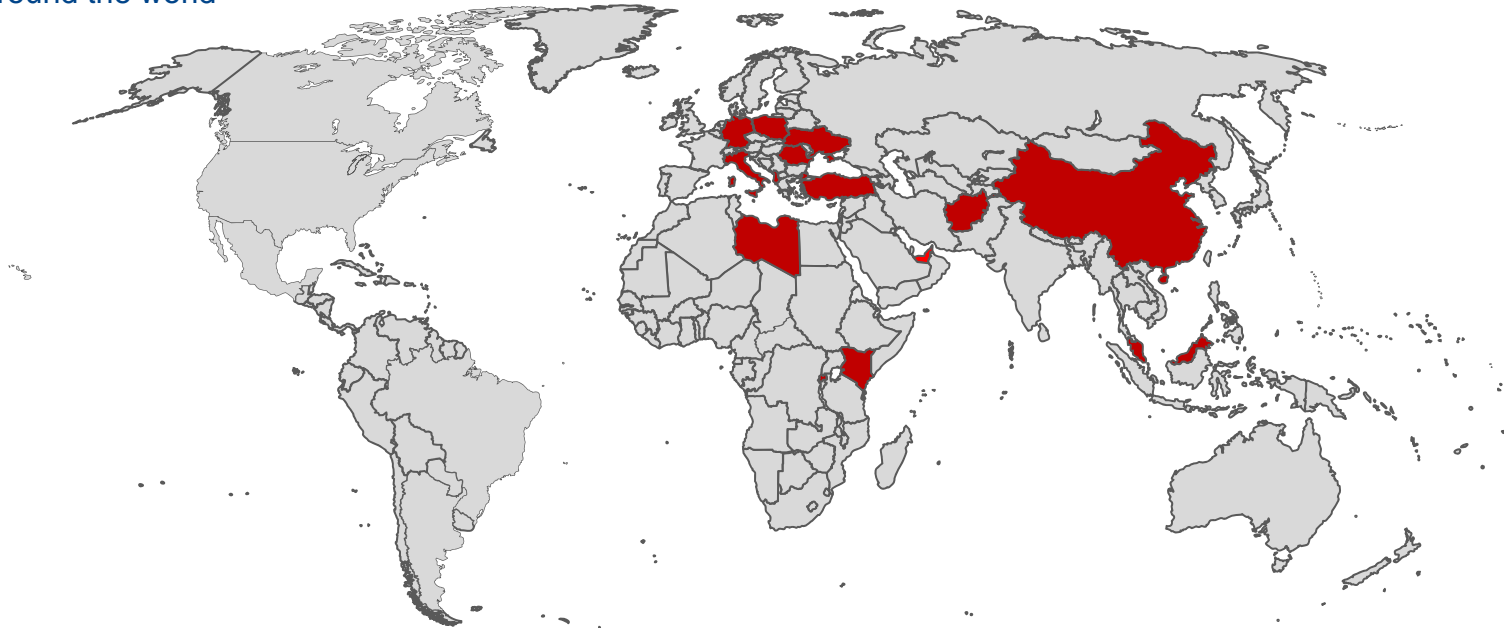
The countries where ENAV Group is present:
Afghanistan, Albania, China, Cyprus, Dubai (UAE), Germany, Kenya, Kosovo, Libya, Malaysia, Malta, Poland, Romania, Rwanda, Trinidad & Tobago, Turkey, Ukraine

2013 KPI capacity dashboard
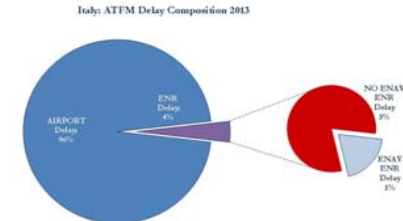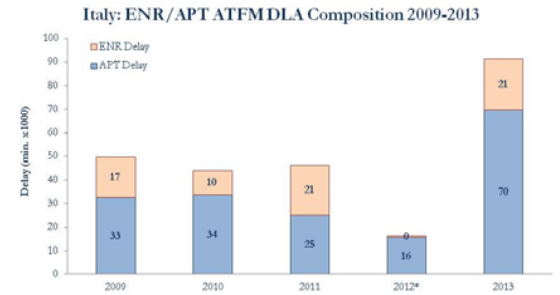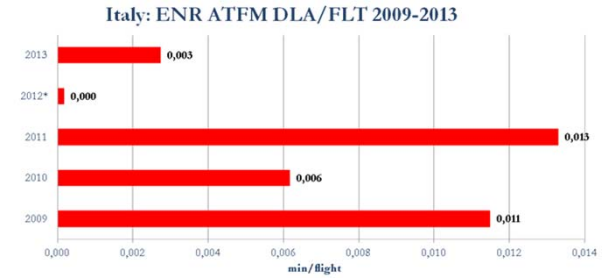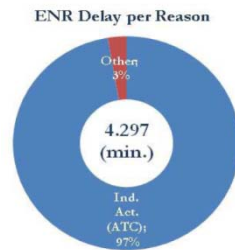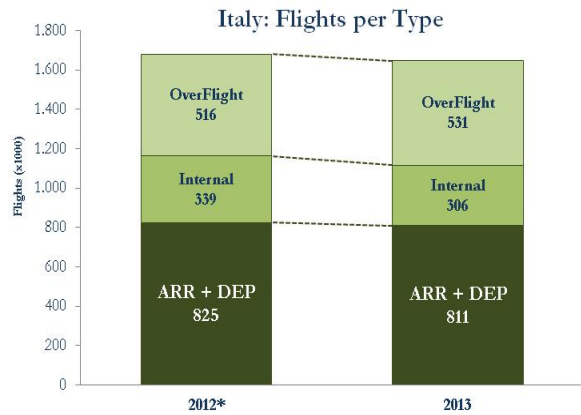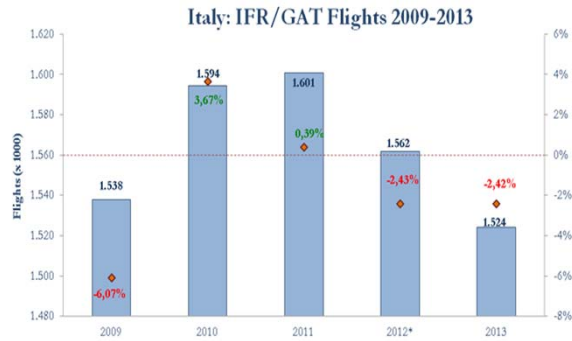
ENAV's Flight Efficiency Plan

7.15 M€

Outcomes from 2013 FEP actions

2013	Distance saved (NM)	Fuel saved (Kg)	CO2 saved (Kg)
En route Design and Network Availability	154.244	1.279.157	4.029.344
Terminal Area	131.553	950.243	2.857.372
Airport Taxi-Out	-	7.709.700	24.285.555
Total outcomes	285.797	9.939.100	31.172.271
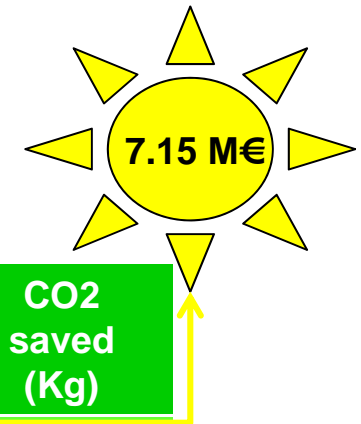
International Activities

➢ ENAV is one of the European leading actors in air navigation services across Europe and globally provides key contribution to European and international organizations in the sector.

➢ In Europe, it participates in important multilateral partnerships, programmes and projects and activities promoted by the **European Commission** and **EUROCONTROL**, while internationally it is strongly involved in relevant bilateral partnerships as well as in panels and working groups led by **ICAO** and **CANSO**.

➢ ENAV is fully committed to the SESAR Programme and as **Member of the SESAR Joint Undertaking** is strongly determined to support the successful outcome of this European initiative.

➢ ENAV plays a **leading role in the Mediterranean Area** by **promoting synergies with other Service Providers of neighbouring regions in support of the Single European Sky Implementation**.

➢ ENAV has promoted the **BLUE MED** project aimed at creating an expanded Functional Airspace Block (FAB) in the Central/South-East of the Mediterranean, with the involvement of non-EU States.

BLUMED

Regional ATM development project aiming towards the creation of a **Functional Air Block (FAB)** in the South East Mediterranean area **under the Single European Sky Objectives**

Harmonize a large portion of the Mediterranean airspace joining the EU core area with the African and Middle-East borders

Design an optimized Route Network for the upper airspace (above FL195) for the BLUE MED FAB with different implementation steps (2012, 2015, 2020), starting from the indications of the Feasibility Study, taking into account the work undertaken within available European Network Design forums.

www.bluemed.aero

BLUEMED: Countries involved
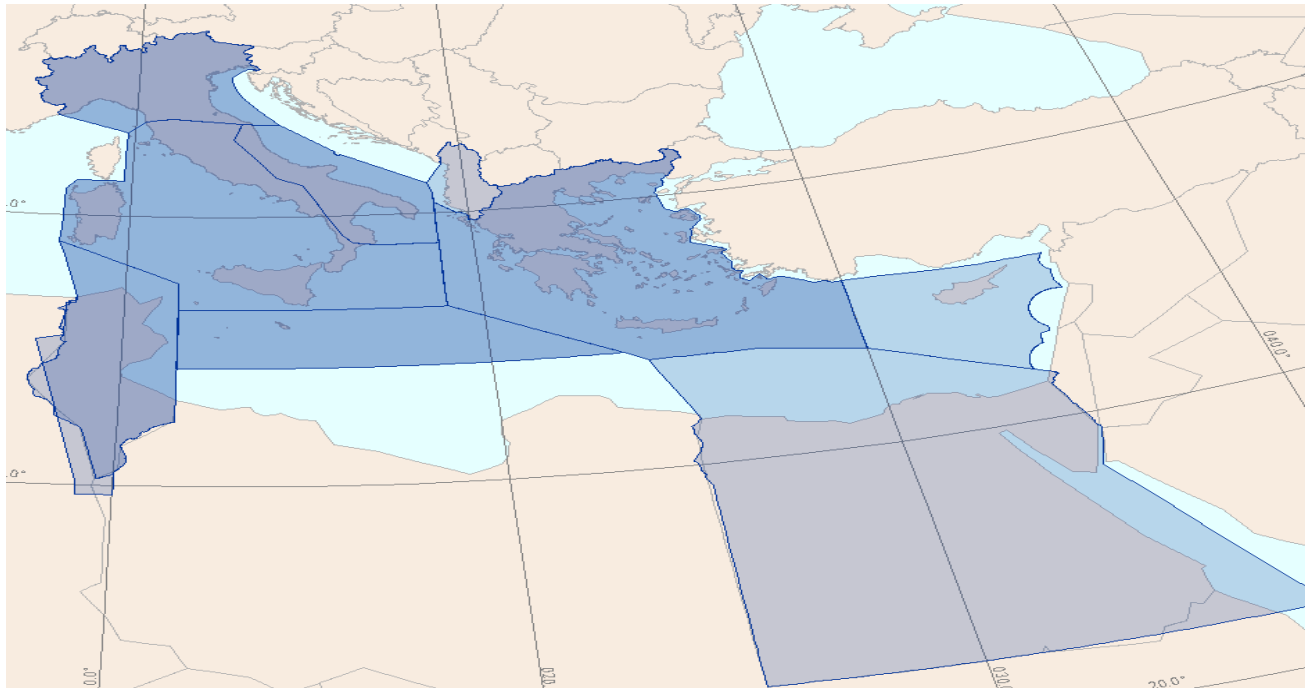
- Italy
- Greece
- Cyprus
- Malta
- Tunisia (associated partner)
- Albania (a.p.)
- Egypt (a.p.)
- Jordan (observer)
- Lebanon (observer)

ENAV Surveillance Infrasctructure

APP + ENR Surveillance

- 9 ENR Radar (PSR+SSR)
- 3 ENR Radar (SSR only)
- 18 APP Radar (PSR+SSR)

Total Radar

- 30 SSR
- 27 PSR

Ground ADS-B

- 20 ground stations already installed

ENAV Coverage Analysis Results

Aireon℠

Overview

- ENAV scenario description

- Reference targets

- UI results for reference targets

- Traffic model scenario
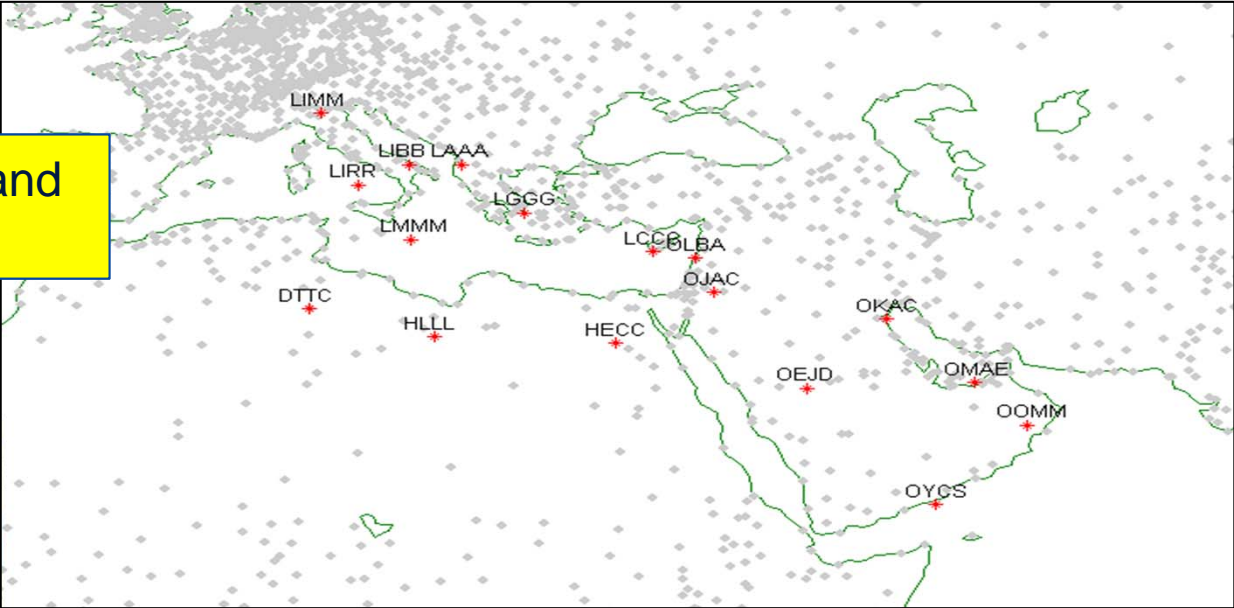
- UI results for real traffic

ENAV Scenario Description

- Goal: Provide Tile Center analysis showing the 95th UI by FIR and Tx Type over the whole scenario
  - Coverage: Global
  - Timing/Duration: Twenty-four (24) hours starting
  - Target Antenna: Diversity (Top and Bottom) with the gain pattern based on measured data
  - Targets: A low (125W), medium (250W) and high (500W) transmitter placed in the centers of the following FIRs.
    - BLUE MED FIRs:
      - LIMM
      - LIRR
      - LIBB
      - LMMM
      - LGGG
      - LCCC
    - BLUE MED AoI FIRs
      - DTTC
      - HLLL
      - HECC
      - OJAC
      - LAAA
      - OLBA
    - Middle East FIRs:
      - OMAE
      - OKAC
      - OOMM
      - OEJD
      - OYCS

Aireon
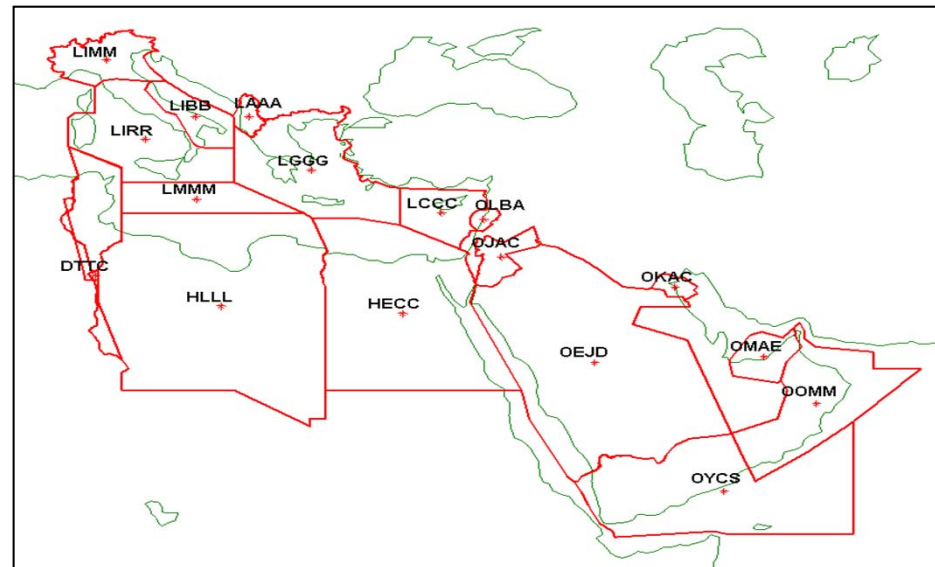
ENAV FIRs

Tile Centers and Airports

Map Context

Aireon Proprietary Information – See Title Page for Use and Disclosure
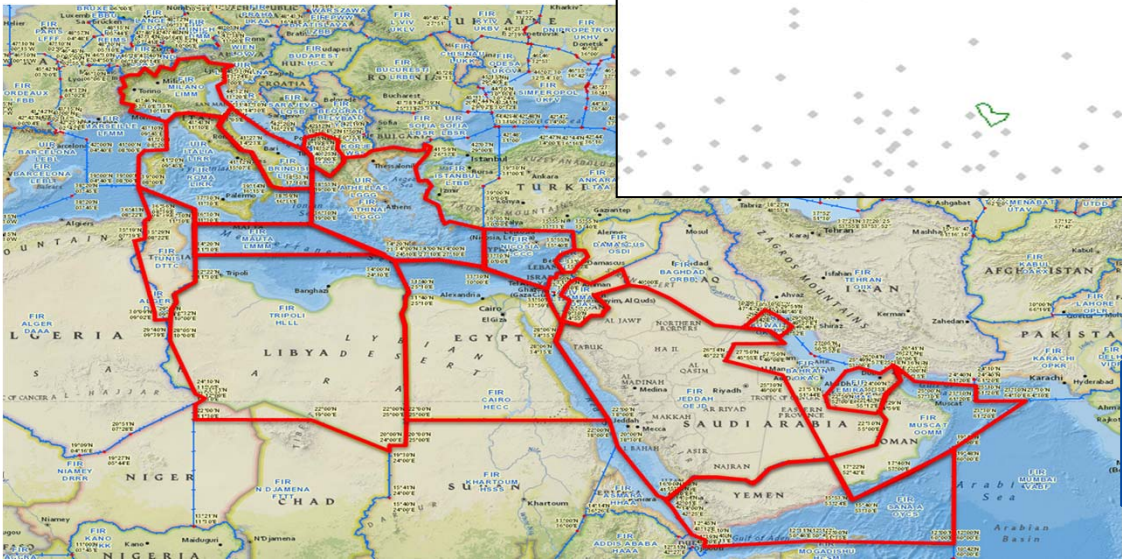
ENAV Traffic Model Scenario

- A subset of world traffic is used, comprising all airports in Europe, North Africa, and the Middle East
  - This represents about 36% of all airports in the world
- Traffic is generated using flights at these airports over the 24 hour simulation
  - Traffic actually generated starting several hours prior to scenario start to account for flights that are already airborne at the simulation start time
- Targets are assigned a transmit power based on previously discussed distribution
  - 25% low power, 50% medium power, 25% high power

Airports Used

One Hour of Traffic for ENAV Scenario

Traffic Example
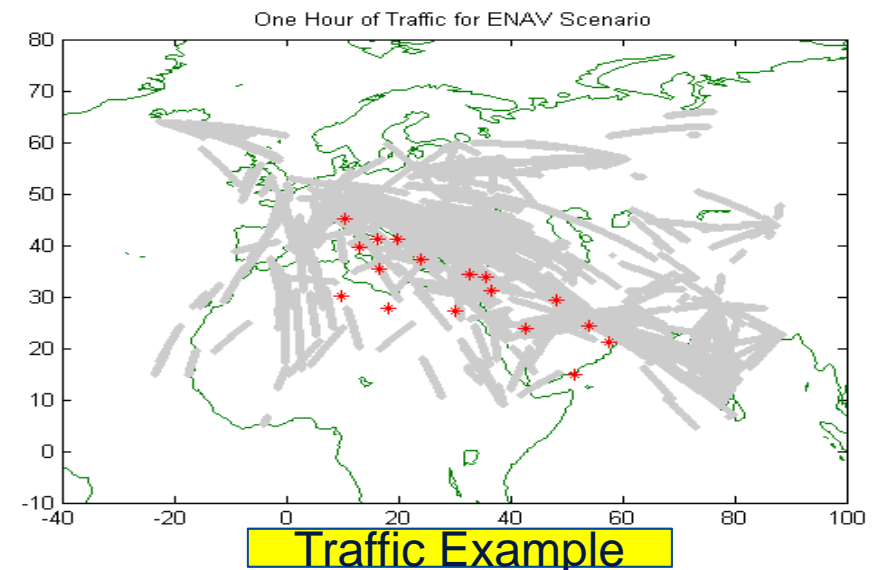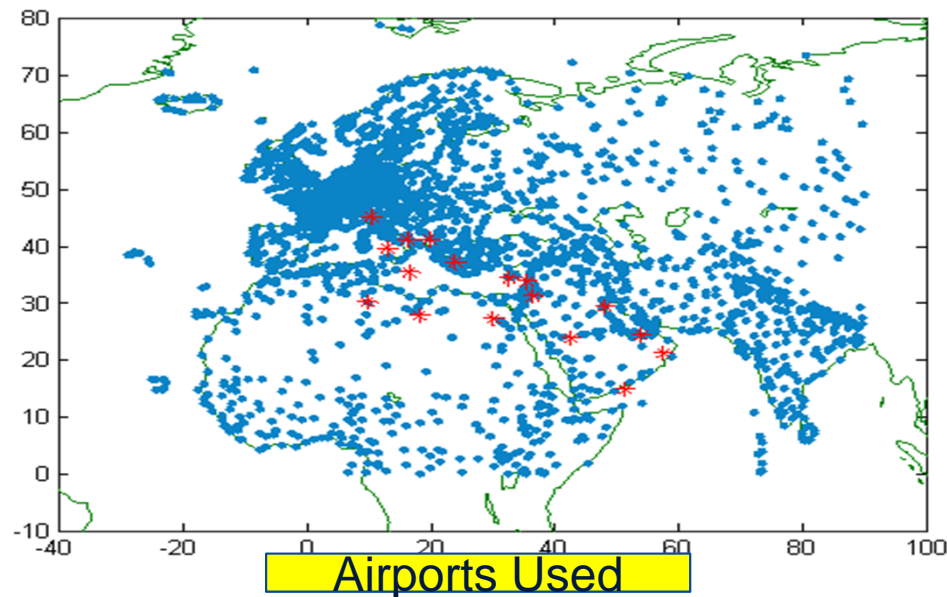
UI Results for Reference Targets

- Low Power Targets (results shown below)
  - UI performance for the low power targets is still relatively good
  - The worst performing FIRs are all closer to the Equator than the better performing FIRs
- Medium Power Targets
  - UI performance for the medium power targets is very good
- High Power Targets
  - As we should expect, UI performance for the high power targets is excellent
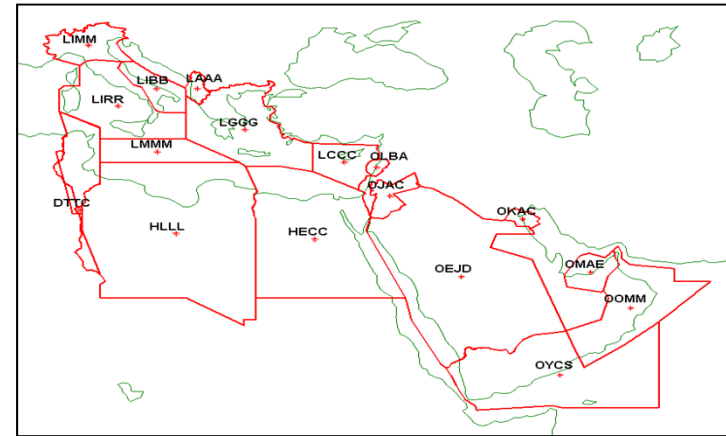
95th UI for each Tile Index in the Service Volumes over the scenario
Aircraft Tx Power = low
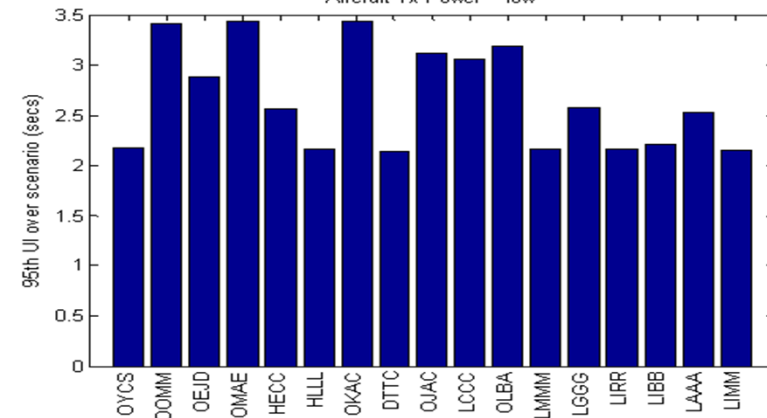
UI Results for Real Traffic

- In general, using real traffic in the model, UI performance in the analyzed FIRs is *predicted* to be better than the design goal, even for the 125W aircraft

- Further analysis will be performed during on-orbit testing to validate/calibrate the model (results need to be validated to determine actual level of operational performances once the deployment of payloads occurs during 2015 – 2017)

95th UI for each Service Volume
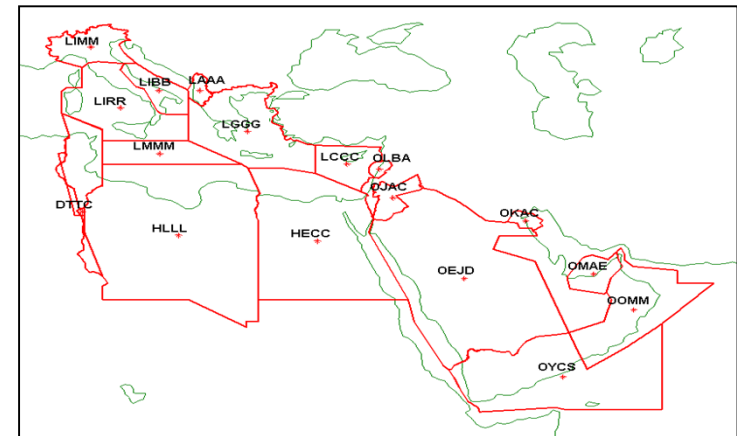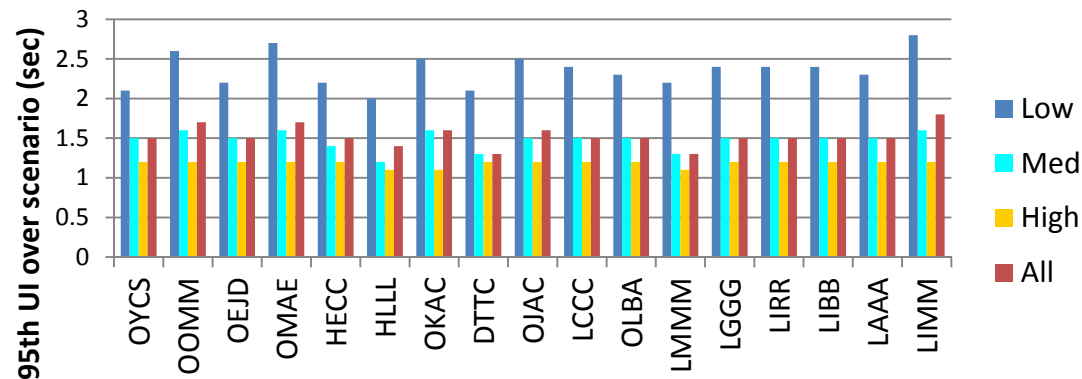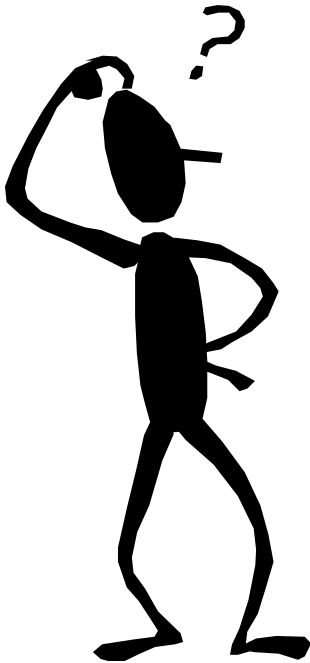
ENAV

Michele Carandente
International Strategies
SESAR Unit

ENAV

ENAV S.p.A
Via Salaria, 713 - 00138 Rome - Italy
Ph. +39 06 81662774
Mob. +39 335 1938192
michele.carandente@enav.it
www.enav.it

THANK YOU!