
AIRPORTS & ATC

Critical telecommunication and information systems



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Presentation & key figures



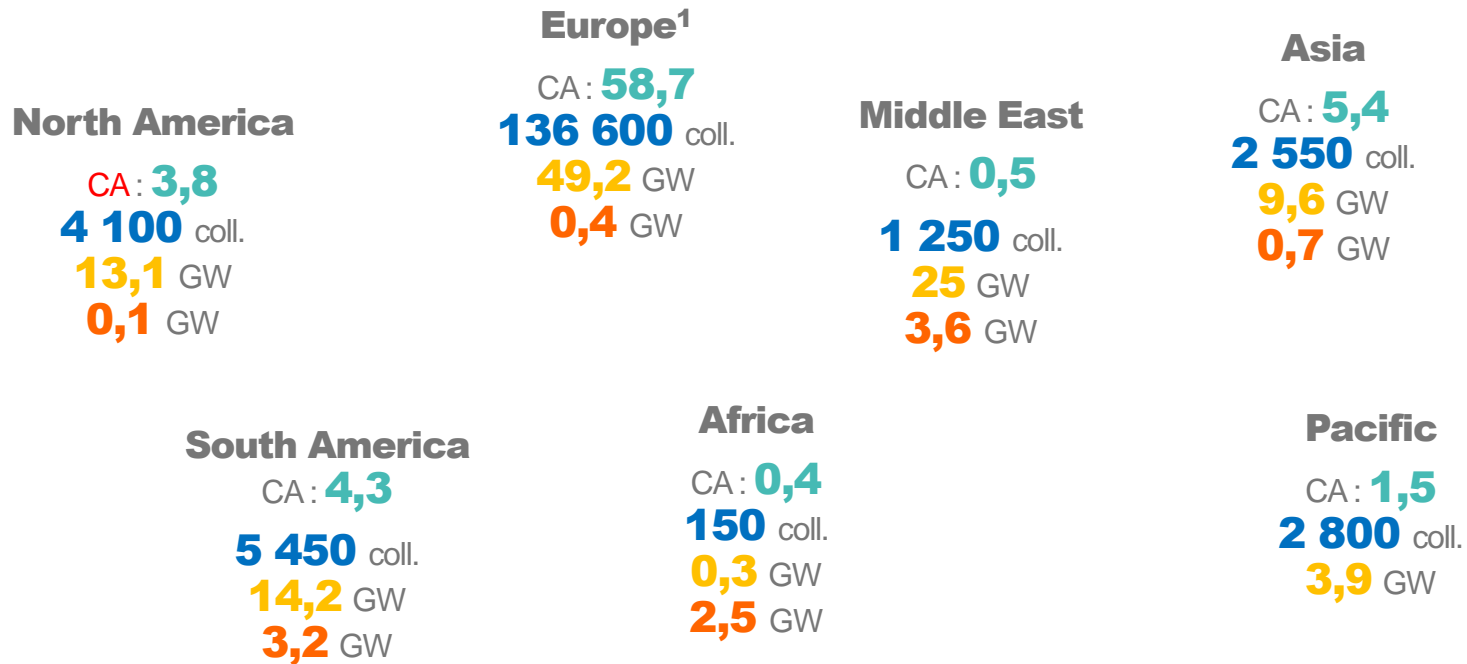
ENGIE : Turnover, effectives and capacities by region

74,7 Bn €
of turnover in 2014

152 900
employees

115,3 gigawatts
of power installed

10,5 gigawatts
in construction



* 100% of assets integral Capacity Held by the Group at December 31, 2014 , regardless Whether Either the detention rate . (1) INCLUDING Turkey.

ENGIE : Three promising businesses

Electricity

- **1st** independant producer in the world.
- **6st** supplier in Europe.
- **115,3 GW** capacities of production installed. **
- **10,5 GW** capacities of production in construction. **

Natural Gas

- **3st** seller of natural gas in Europe.
- **3st** portfolio of GNL in the world.
- **1st** network of distribution in Europe.
- **2nd** network of transport in Europe.
- A supplying portfolio of **1 296 TWh**.

Services

- **1st** supplier of energetic efficiency services in the world.
- **230** urban networks heating and cooling in the world.
- **140** million m² managed in the tertiary sector.



- *Independent Power Producer*
- **Including 100 % of the capacity of assets held by the Group at December 31, 2014 , regardless of the percentage holding .

ENGIE Ineo : Fields of Activity & Know-How

Key Figures : **15 355** Employees
300 Locations
2,4 Bn € Turnover 2015



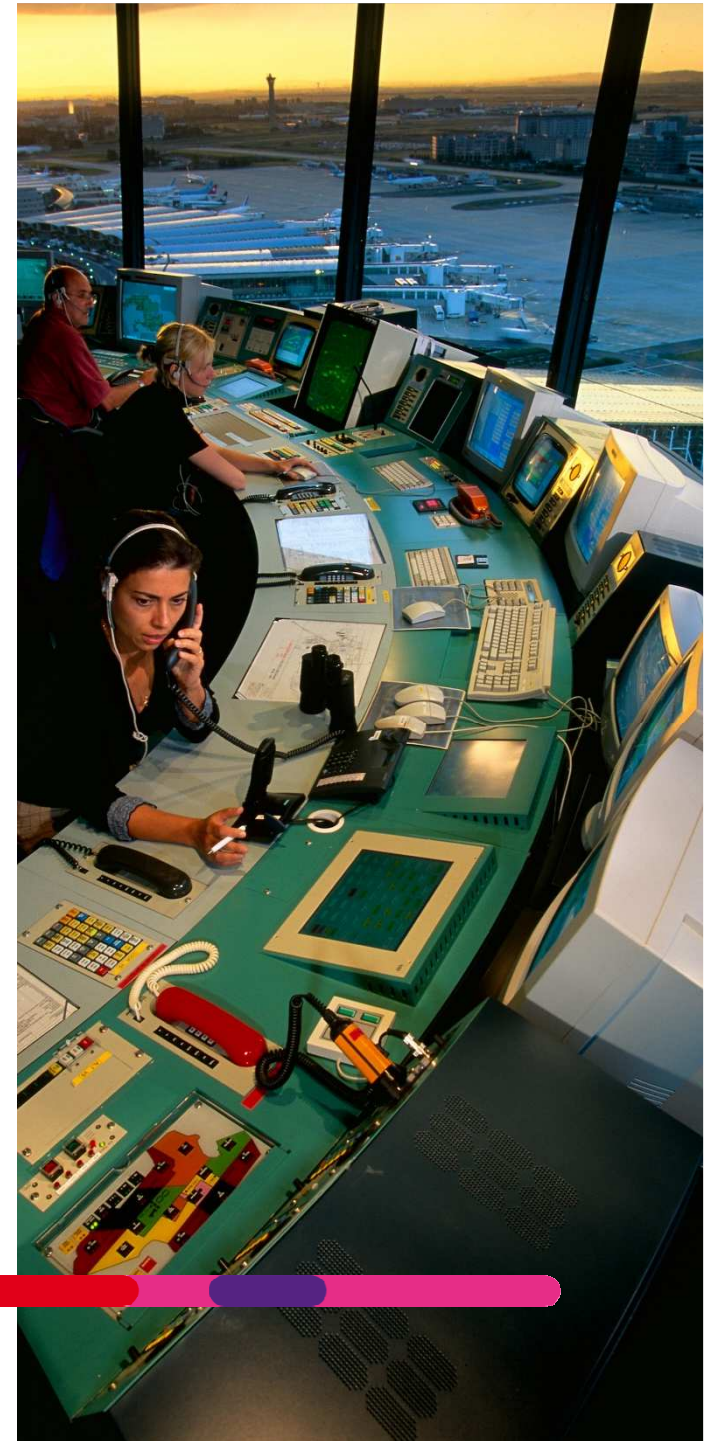
ENGIE Ineo : 40 years of experience in the aeronautical fields

- Our systems are operating in airports & control centers of more than 70 countries
- Turnkey solution integrator for :
 - Runway/airfield infrastructures,
 - Aeronautical telecommunications and networks,
 - ATC/ATM Tower and Enroute systems
- ATC product designers : VCS, Recorders, Tower integrated systems
- Experts in ATC, telecoms, software engineering
- Services : from deployment to maintenance
- ISO 9001 and ISO 14001 Certifications



02

ENGIE Ineo : Integrator of
Aeronautics Products



ENGIE Ineo is also a turnkey solution integrator

- **Airport Infrastructure** : production and backup power plants, solar power systems, secured electrical distribution, runway lighting, navigational aids (VOR, ILS, DME, NDB, DF), weather stations, equipment monitoring & maintenance...
- **Telecommunications & networks** : HF/VHF, UHF, MW, VSAT, LAN/WAN networks, remote VHF stations, secured optical fiber networks (data collection around the runway)
- **Air Traffic Control** : digital and analog voice communication systems (VCS), voice recording systems (VRS), ITWP, integrated towers, mobile towers, AFTN/AMHS switch, AIS, time synchronization, ATIS, D-ATIS, 3D simulators...



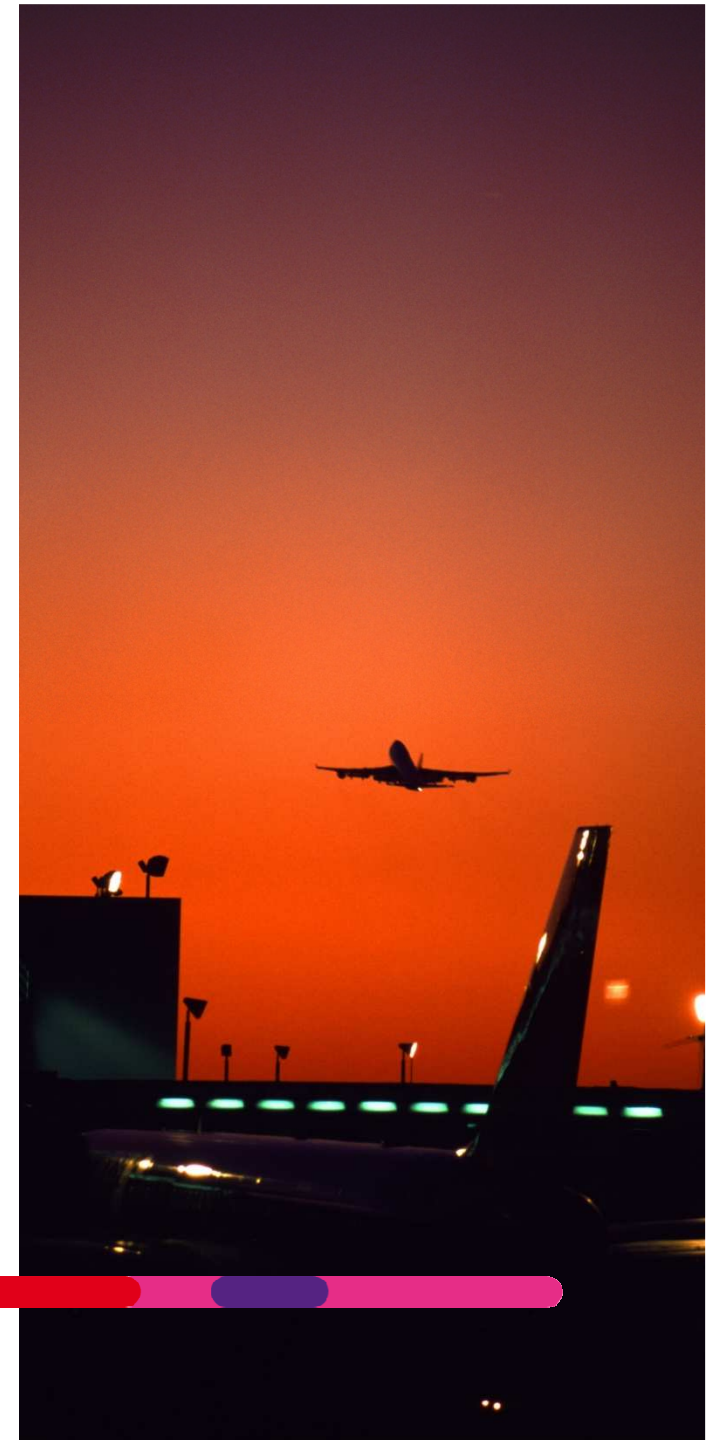
ENGIE Ineo offers a comprehensive range of services

- Project management
- Studies and engineering
- Prime contracting
- Procurement / Transport
- Integration
- Installation and Commissioning
- Training
- Operational Maintenance
- Technical Assistance



03

ENGIE Ineo : Manufacturer of
ATC & Airport solutions



ENGIE Ineo : ATC Product Designer



- ENGIE Ineo designs, develops and commercializes :

— A range of products for ATC/ATM commercialized under the brand name: **be-safe.com**

airvoice

Full-IP VCS



airtouch

Smart Tower Suite



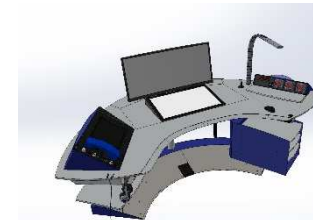
airrecord

Full-IP recorder

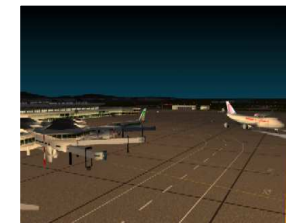


airview

Integrated Tower Working Position



— Simulation and Training products and tools for ATC



AIRvoice : VCS over IP



- Voice Communication Switch over IP
- A native full-IP software solution
- A solution optimized for VSAT networks
- A flexible HMI developed and customized for ATC Controllers
- Designed for ATC Towers and ACCs
- Compliant to ICAO and EUROCAE standards



Key figures

+100

Operator stations installed
In 2013

11

Equipped countries

1st

World manufacturer of
VCS over IP

AIRrecord : ATC voice recorder



- Voice recorder of air traffic control
- Additional VCS solution to AIRvoice full VoIP
- Continuous recordings and secure voice communications “ground / ground” and “air / ground”
- Integrates all analog radio and telephone - digital and IP interfaces and gateways
- Responds to ATM interoperability requirements
- COTS hardware without obsolescence, high availability architecture



Key figures

Up to
256
Recording channels

30
Simultaneous playbacks

35
Days' short term recording

AIRtouch : Airport Integrated System



- An evolutive software suite designed to simplify working positions of controller, supervisors and maintenance operators
- Reduces the number of interfaces in front of the controllers
- Monitors & controls equipment and systems : airfield lighting, power plant, NAVaids equipment, weather sensors and stations, newtorks, radios, radars, ADS B ...
- Provides tools for simple and efficient air traffic management : e.stripping, ATIS, support to decision making, support to billing, documentation
- Control of the blinds, lights, access, video-monitoring...for Tower and Cab



Key figures

5000

standard # of elementary pieces of real-time information that can be incorportaed

11

Years of experience in the field of airports

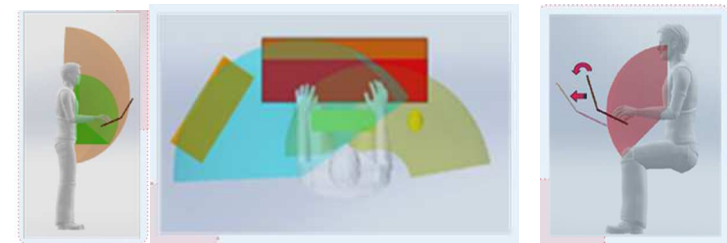
100

% of airside pieces of equipment

AIRview : an ergonomic console



- ATC-dedicated ergonomic workstation
- Optimized footprint within the control tower
- “no paper” principle
- Built-in peripheral devices with no apparent cabling (monitor, keyboard, mouse, mic-earphones, loudspeakers)
- Numerous ergonomic adjustment : screen distance, height and tilt, sitting low and sitting high positions...
- 2 stretch LCD touchscreen monitors, hinged and redundant



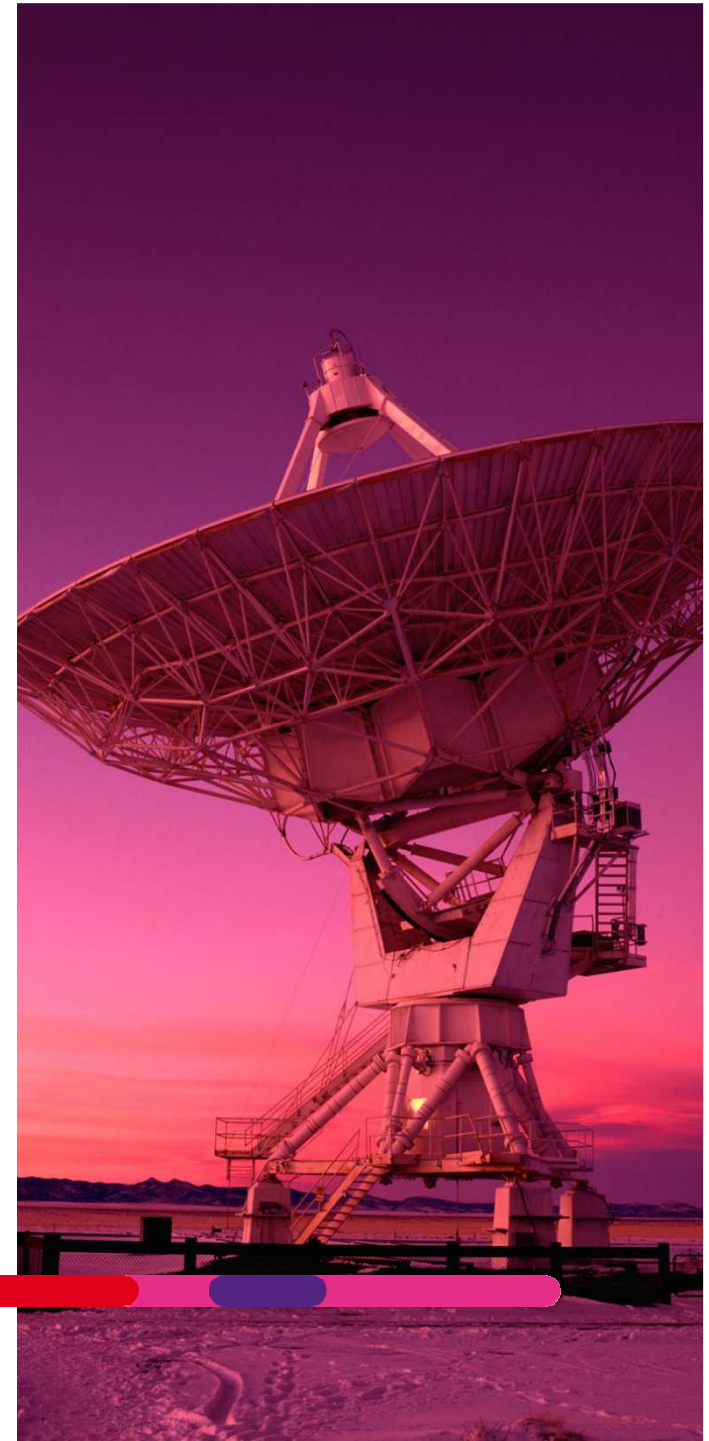
Training and simulation tools

- Software simulation solutions for the training of air traffic controllers
- 2D and 3D ATC (radar and non-radar) intuitive and modular simulators from aerodrome to En-route, up to ADS/CPDLC
- 3D control tower simulator (Simulavia JV)
- 3D simulators operational in Saudi Arabia, Qatar, Egypt, Ethiopia, Lao
- Voice communication system simulator :
Voice@net



04

References



Reference : Mauritania – Ministry of Transports – Nouakchott new Airport

Date : 2015-2017

Challenge

- Delivery and deployment of the lighting for both runways (3400m et 2400m) of the new Nouakchott airport

Scope of supply

- AIRtouch integrated system to control and monitor lighting on both runways from four operator working positions
- 1 Tower cab controller working position
- 1 Operational supervision working position in the Power station
- 1 working position in the Crisis Room
- 1 backup / last resort working position on a relocatable lap top
- Architecture redundancy of the PLCs ensures runway lighting high system availability even under contingency



Reference : Congo – DGGT – Ouesso airport

Date : 2014 - today

Customer challenge

- Bringing the airport up to international standards for AIRBUS A340-300.
- Supply of all the ATC related equipment on the airport

Scope of supply

- 3000m runway airfield lighting, taxiway and 420m approach
- Production power station (2 x 450 kVA)
- UPS (2 x 250kVA), 24V redundant power
- Power Networks (LV, HV and ULV)
- Optical fiber network
- Centralized monitoring and control (AIRtouch)
- 3 Air Traffic Controller working positions
- Radio and telephone equipment : HF, VHF, VCSS (AIRvoice - 4WP and 3 Frequencies)
- Time distribution, Voice recorders
- Meteorological equipment
- Nav aids (ILS and D-VOR)
- ITWP (AIRview), VSAT and AFTN



Reference : France – DSNA – CNS Equipment installation

Date : 50 years of experience

Customer challenge

- State of the Art installation of Communication, Navigation, and Surveillance means

Services

- Design of installation
- Integration with existing equipment: mechanical, electric and protocol interfaces
- Provision of infrastructure such as pylons and management of Civil works

Installed equipment

- Communication: VHF stations and pylons, VOIP network (Digivoi)
- Navigation: ILS Cat I and III, GBAS station, VOR/DME, VDF
- Surveillance : Mode S radar



Reference : Multistates – ASECNA/ICAO – MSSR Project

Date : 2013 - today

Customer challenge

- Improve air traffic surveillance across ASECNA airspace (1.5 times the size of Europe)
- Pave the way for ASECNA to switch from procedural control to radar control, thus drastically improving both separation and traffic safety

Supply & services

- Supply and installation of 11 Monopulse Secondary Surveillance Radars (MSSR) and 11 ATC systems, deployed across 12 different African countries :
- Consoles with two positions
- Power back up and UPS
- Power distribution
- Recorders
- Time distribution
- VCS IP (AIRvoice)
- Optical fiber network



Reference : Multistates – ASECNA – AIRvoice Full-IP VCS

Date : 2012 - 2014

Challenge

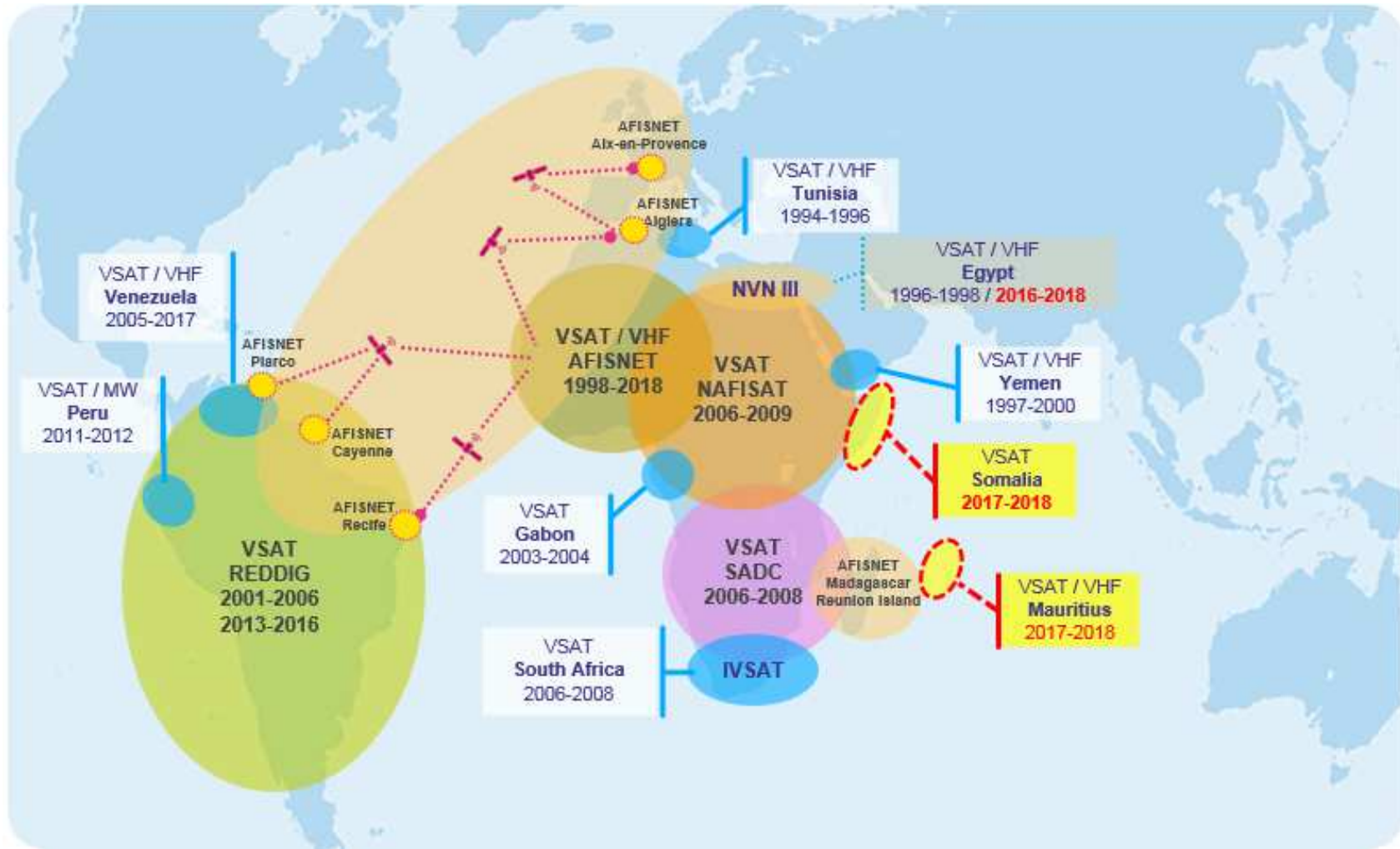
- Replacement of the full-IP AIRvoice VCS on 14 sites in 9 countries and in the Asecna Training ATC Academy (EAMAC) to integrate new standards and technologies

Scope of supply

- Deployment of the 14 AIRvoice VCS fully compliant with ED137 interoperability requirements for VoIP ATM
- 100 control working positions with touchscreen terminals
- Delivery, deployment and commissioning of AIRvoice VCS, AIRrecord UPS and Time distribution
- Full Logistics package included.



ENGIE Ineo : A World Leader in VSAT networks - ANSP



Reference : Africa – ASECNA – VHF coverage

Date : 2008-2017

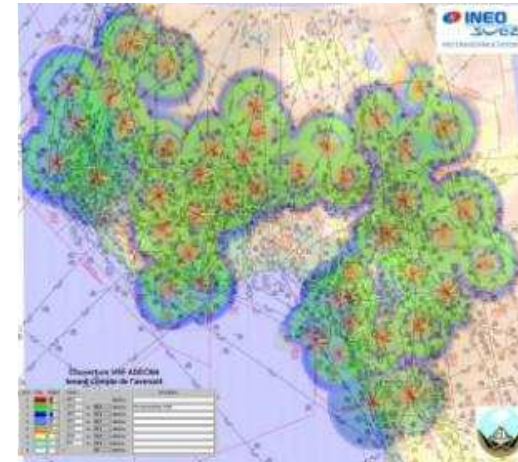
Customer challenge

- VHF coverage of the ASECNA airspace
- 17 hubs, 31 new stations, upgrade of 12 existing stations spread out in 17 countries

Services

- VHF coverage studies
- Turnkey solution including civil work, solar panels, VSAT stations and VHF systems
- Innovating monitoring and control solution (information gathered locally to optimize space segment)

ENGIE Ineo is ASECNA remote VHF provider since 1996



Reference : South-America– REDDIG I & II Aeronautical VSAT network - ICAO

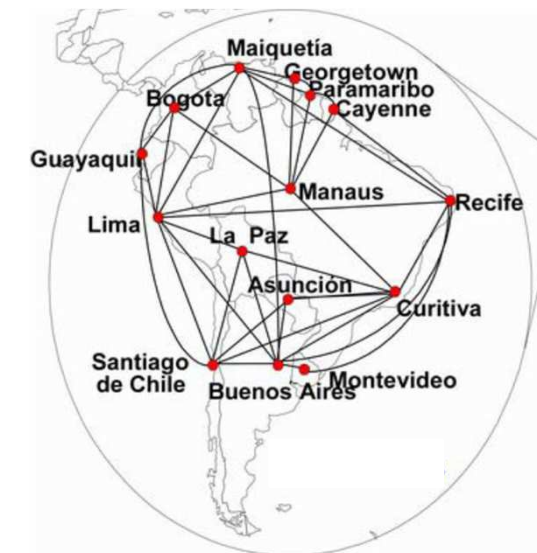
Date : 2002-2004 & 2013-2017

Challenge

- Build and set-up a private digital network with high level of services over the South-American countries dedicated to Aeronautical Telecommunications

Périmètre du Projet

- Provision, deploy and put into service the complete network of 16 VSAT stations for CAAs of : Argentina, Bolivia, Brazil, Chile, Colombia, Equateur, French Guyana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela and Trinidad &Tobago.
- Perform routing of the following information : ATS/DS, AMHS/ RSFTA, Hotline, RADAR, video-conferences
- NOC : Implement a monitoring and network management system (NOC) from two redundant and remote hubs (contingency)
- **Phase I** : set-up a meshed Frame Relay switched network for voice and data with an open-architecture
- **Phase II** including : network upgrading with the IP features; set-up a MPLS ground network for backup of the main network. Big-bang switching to the new architecture of the 16 stations without service interruption



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