



*ATM's new frontier: satellite-based surveillance*

**Conferenza FONDAZIONE 8 OTTOBRE 2001**

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*Milano, 21 ottobre 2014*

# ATM future challenges

## Main drivers for change:

- Significant traffic increase at global level
- Complexity increase
- New technology solutions
- fit for purpose regulation, interoperability and efficiency



Innovation bringing  
opportunities and  
challenges in the field  
of the Air Traffic  
Management

▶ The increase in traffic demand and complexity strongly requests an evolution to ensure:

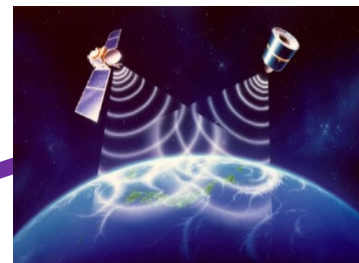
- **highest level of safety**
- **optimised services**
- **Global scale**

▶ The **enablers** for worldwide services are:

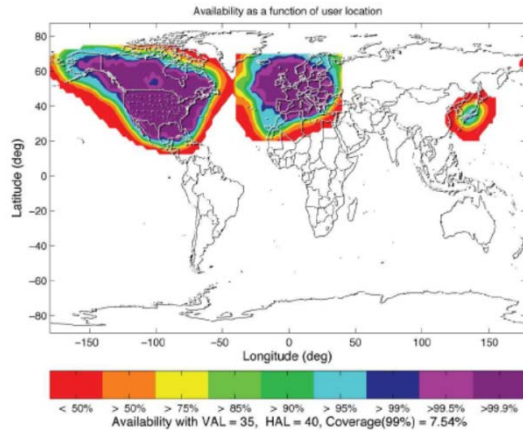
- **automation**
- **Interoperability**
- **new business models**
- **remote control**

**Satellite technology** is one of the most promising technology **to support the worldwide evolving scenario:**

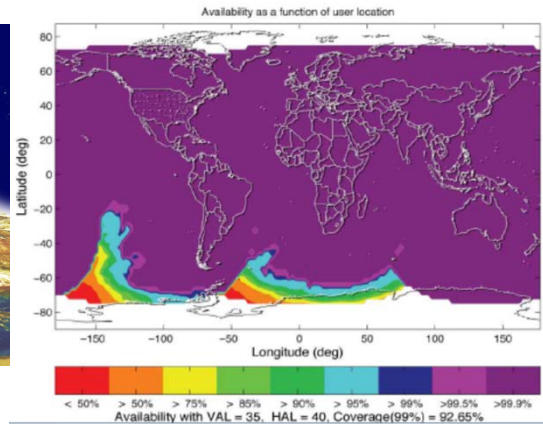
- integrated system for a global service
- joining and harmonising the efforts of multiple stakeholders
- allowing improved performance in safety, operations and costs



▶ The **satellite technology**, key enabler for the entire future CNS (Communication Navigation Surveillance) services, **is already a fact in the Navigation domain** in en-route and approach. Operational constellations like **GPS** and **Glonass** and regional augmentation systems (i.e. **SBAS**) allow a certified use of the satellite technology to support aeronautical application up to Approach with Vertical guidance (APV) with LPV 250 minima – i.e. instrumental approach that **steers, in full safety, the aircraft up to just 250 ft (~76 mt) height above the runway**.




**SBAS (LPV250) coverage today**




**Expected SBAS DFMC (LPV200) coverage**

- ▶ **EGNOS benefits :**
- ▶ **Increased safety** by allowing IFR approaches with vertical guidance in all its (continental scale) service area
  - ▶ **Improved accessibility at airport** by providing lower approach minima at non-ILS-equipped runways
  - ▶ **Improved operational capability** by providing a back-up for ILS approaches
  - ▶ **Reduced costs and environmental impacts** by allowing constant power approaches and curved approaches (time and fuel savings, and lower CO2 emissions)
  - ▶ **Costs savings** by optimisation/decommissioning of conventional nav aids

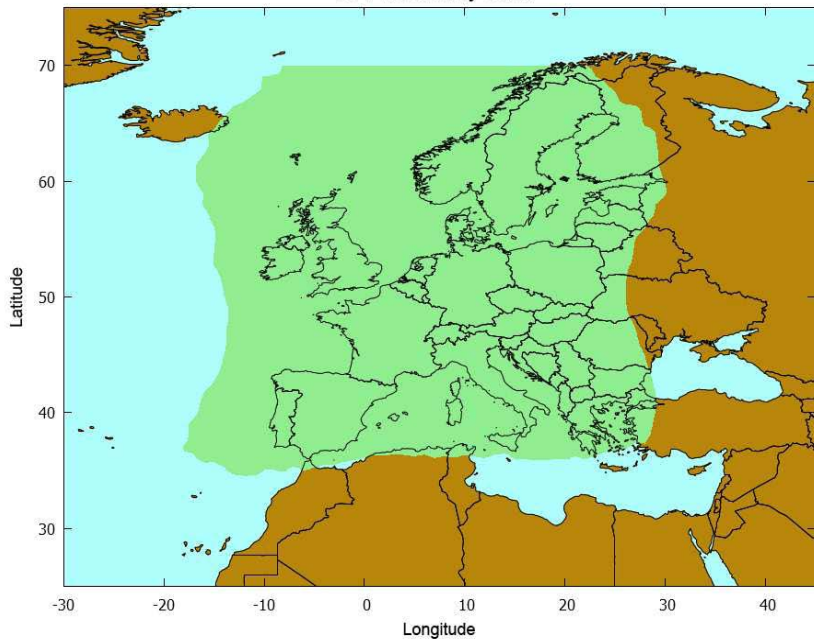


Palermo Airport	VOR (current)	GNSS (new)	Reduction
Approach time	1033 sec.	576 sec.	-44%
Trajectory length	60.2 NM	31.9 NM	-47%
Fuel consumption	208.31 kg	143.56 kg	-31%

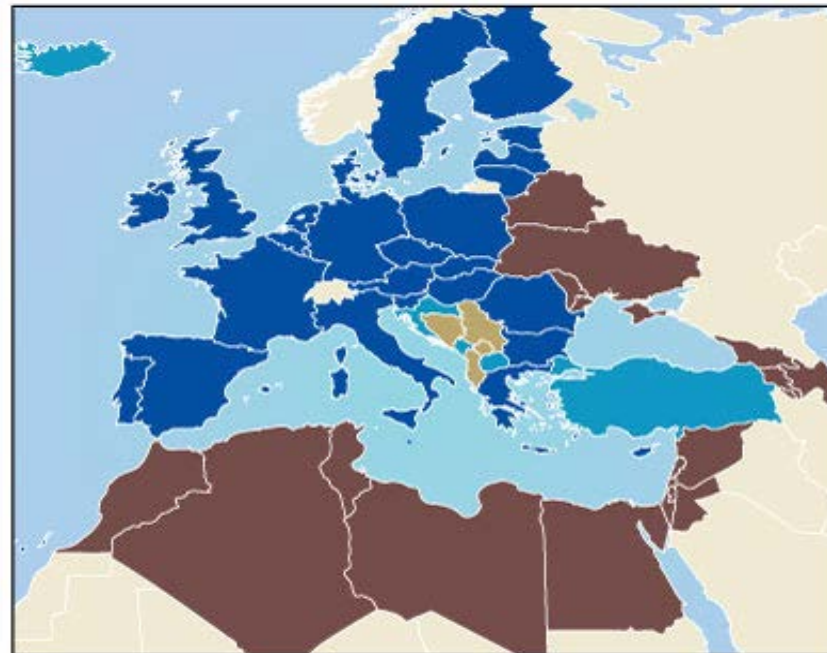


**SENECA**  
satellite navigation services for civil aviation

APV-I Availability at 99%

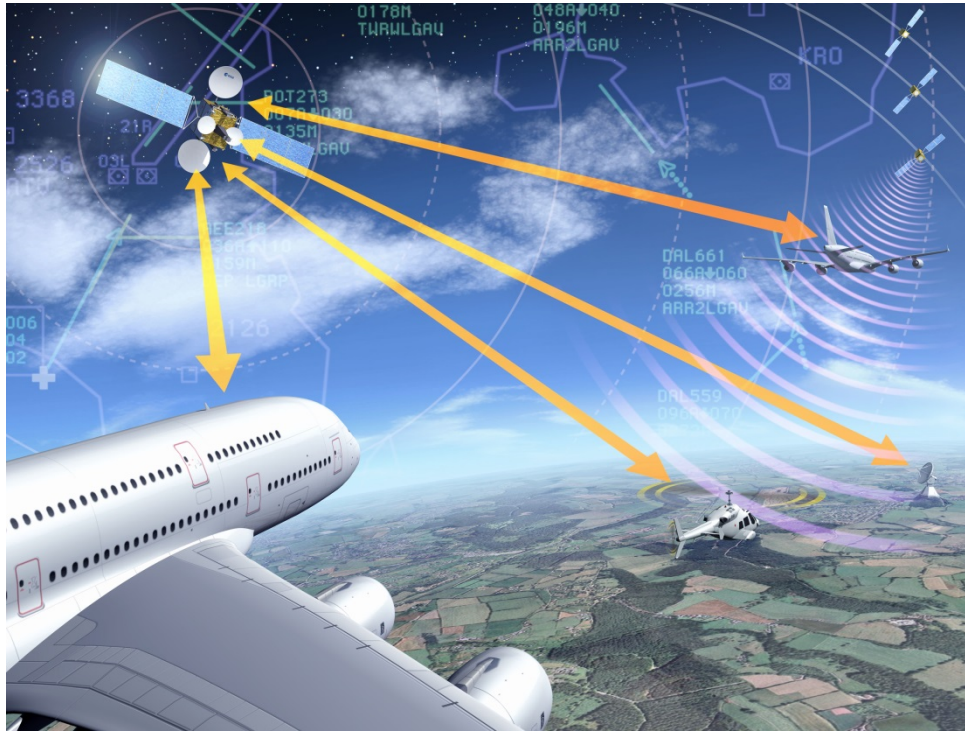


***EGNOS Coverage today***



■ ENP countries

***ENP: Target Service Area Extension***



An **efficient** and **safe** improvement in ATM can not leave aside to pursue in **Communication services targets** like:

- **Uniform high performances with no geographical constraints** – by using satellite as common technological enabler, it will be possible to offer to ANSPs and pilots the same communication means with uniform performances, independently from customer specific location, and in each geographical area (e.g. anymore gaps between technological support in oceanic, remote or polar areas and continental one).
- **Service continuity** – by using redundant satellite systems, the required ATM continuity could be reached on worldwide scale.



▶ **Iris** – Iris is an ESA Programme for the development of a system able to support satellite communication for ATM services. Target of Iris Programme is to develop and validate a new architecture for communication that is able to support a "full 4D trajectory management" both in continental and oceanic areas. Iris possible operations are planned for 2030+ with a precursor version based on **inmarsat** available in 2017.

▶ **Iridium NEXT** – Iridium NEXT with its constellation of 66 operational Low Earth Orbit (780 Km) satellites could offer a communication service characterised by low latency, worldwide coverage (including pole), light and cheap avionic hardware. Specific ATM applications through Iridium NEXT (or following Iridium constellations) are to be investigated taking also benefit from Iridium NEXT starting of operations planned on 2018.

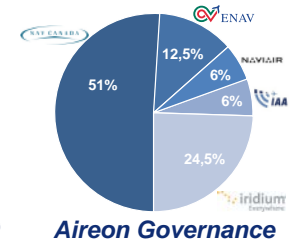
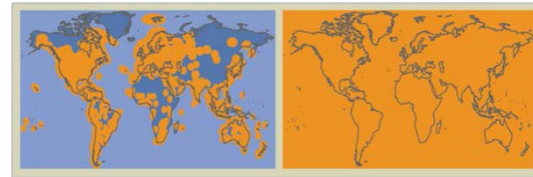
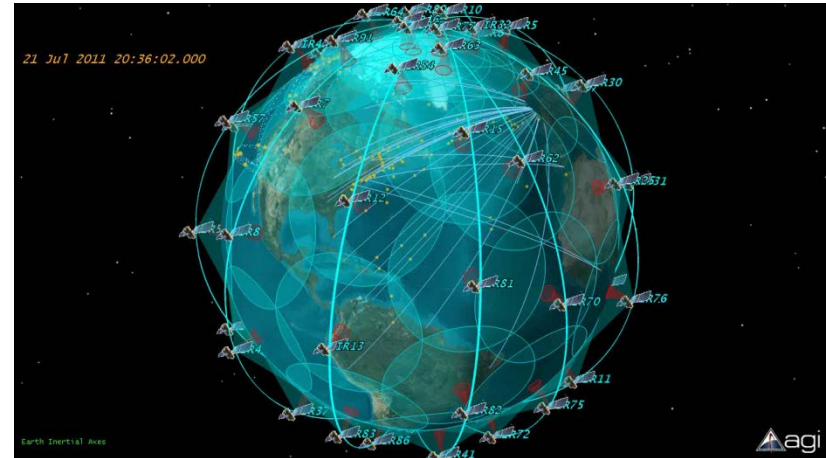


▶ In **2015** Iridium will launch satellites of the new global coverage “**Iridium NEXT**” constellation. Each one of the Iridium NEXT satellite **will have onboard an ADS-B payload** developed and **managed by Aireon Company** (Company **owned 12,5% by ENAV**).

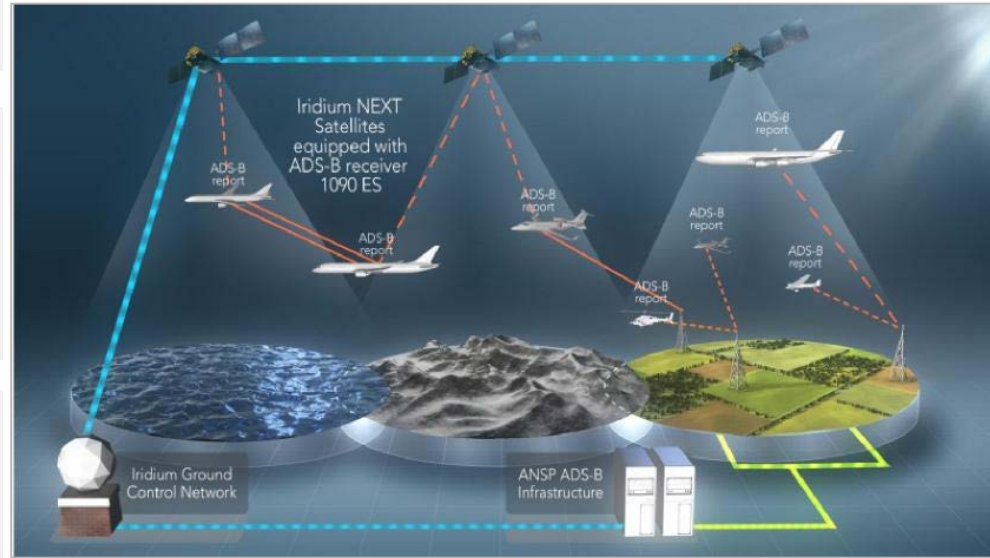
▶ The **ADS-B** payload installed onboard each one of the **66 LEO satellites** of the Iridium constellation (plus onboard 6 in orbit and 9 on ground Iridium spare satellites) **will allow Aireon to support in 2018-2030 a surveillance service on global scale** - including oceanic, polar, desert and remote area not reachable by radar coverage.

▶ **ADS-B technology** taking benefit from the positioning data made available onboard by GNSS (error magnitude of just few meters) and broadcasting the same with ½ hertz frequency **allows an accuracy for surveillance better than the radar one.**

▶ Taking advantage of the satellite interlink capability of the Iridium constellation the **latency of the Aireon ADS-B** transmitted data is in the order of **2 seconds**.



- ▶ The Aireon surveillance service **does not require any additional equipment** by the airlines. Aireon makes use of the hardware currently available compliant to ADS-B and T-CAS mandates.
- ▶ Aireon will “simply” be able to **receive**, thanks to its 66 satellites covering the entire globe, the **ADS-B message** (including accurate positioning information) **transmitted by all equipped commercial airplanes wherever flying over the globe.**
- ▶ Once received the ADS-B message will be transmitted by Aireon to the Air Traffic Control Center (ACC) customer so **allowing in few seconds the ATC to see also aircraft flying in remote airspaces** (even antipodal with respect to the ACC location) **and where the radar does not give coverage.**



## Value for ANSPs

For the first time, ANSPs will be able to take advantage of truly global air transport surveillance without significant new infrastructure investment.

- **Enhanced Safety**
- **Savings in Infrastructure**
- **Return on ADS-B Investment**
- **Service Enhancements**
- **Global Harmonization**
- **Reduced Emissions**
- **Business Opportunity (e.g. remotised services)**



## Value for Airlines

With Aireon enabled space-based global ADS-B, airlines may achieve shorter, optimized flight paths, saving fuel and improving operational efficiencies everywhere in the world.

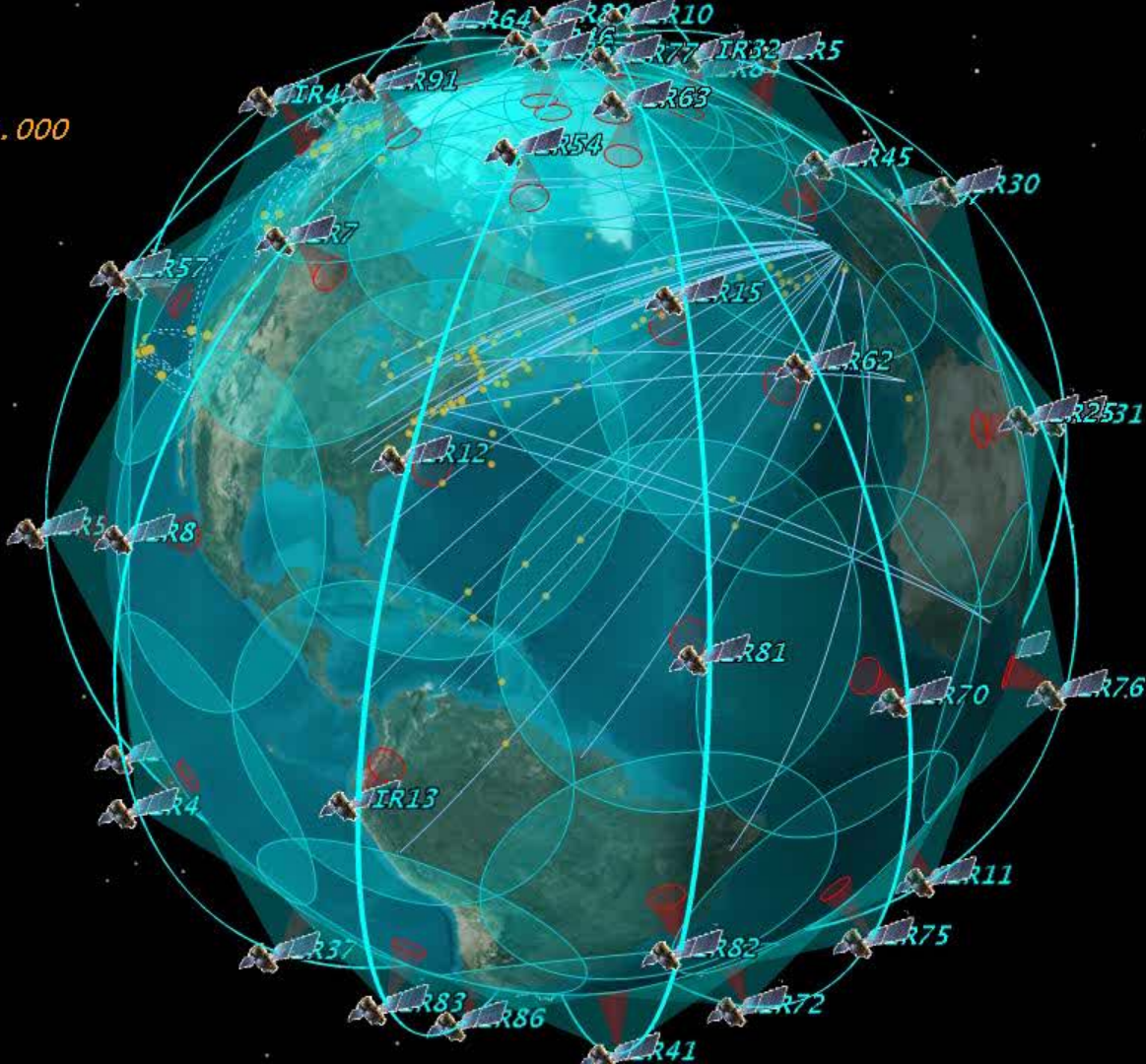
- **Enhanced Safety**
- **Billions in Fuel Savings**
- **Return on ADS-B Investment**
- **Operational Efficiencies**
- **Global Harmonization**
- **Reduced Emissions**

- Growing traffic demand and complexity
- High safety standards and performance
- Industry driven approach
- Timely and streamlined regulatory provisions



Full exploitation of satellite benefits as the “ATM’s Technology new frontier ”

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Earth Inertial Axes

