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SATELLITE-BASED VHF VOICE AND DATA COMMUNICATIONS

SEVENTH NORTH AMERICAN, CENTRAL
AMERICAN AND CARIBBEAN WORKING
GROUP MEETING (NACC/WG/7)

ICAO NACC Regional Office,
29 Aug - 1 Sept 2022

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STARTICAL: A JOINT VENTURE OF ENAIRE & INDRA

A SATELLITE CONSTELLATION SPECIFICALLY DESIGNED FOR ATM

ENAIRe 

Enaire is the 4th largest national air navigation service provider in Europe and within the 10 largest worldwide.

In 2019, it managed 2.1 million flights transporting 320 million passengers.

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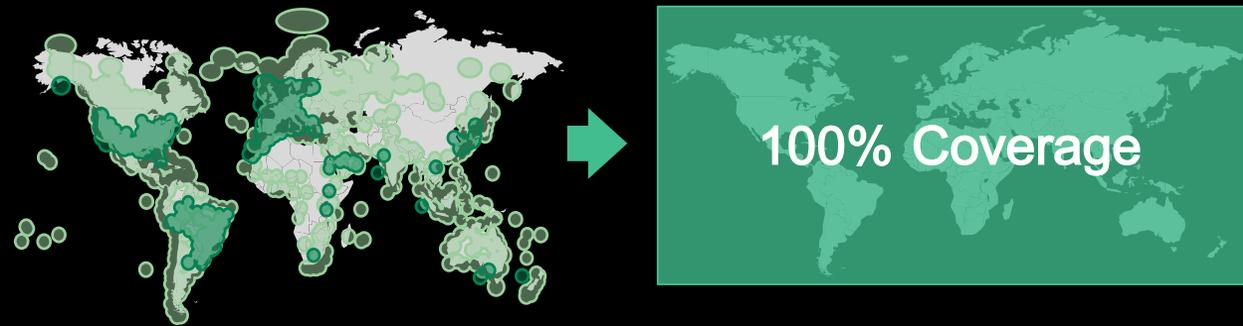
Indra is a leading company in the development of Air Traffic Management systems.

Indra's technology is present in 176 countries and intervenes in 85% of worldwide flights at some point of the flight.

WHAT'S THE PROBLEM?

OCEANIC AND REMOTE AREAS HAVE LIMITED CNS INFRASTRUCTURE, WHICH CONDITIONS SEPARATION STANDARDS

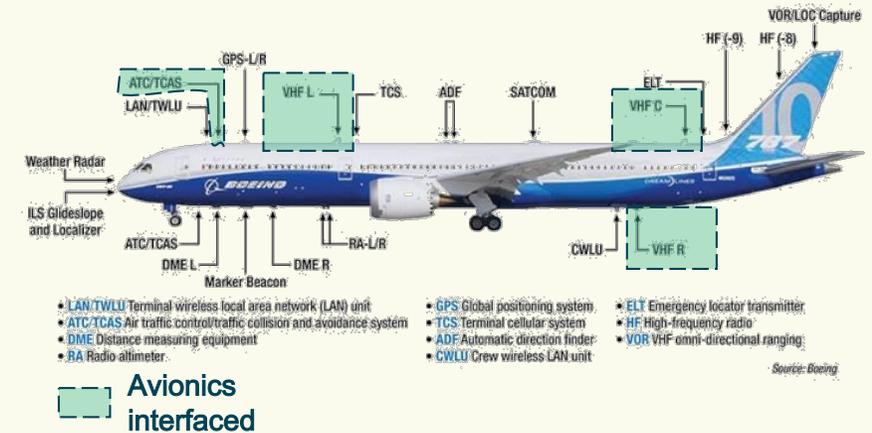
To provide the same services all over the world without performance gaps, CNS services in oceanic & remote areas need to be the same as in continental areas



VHF COMMUNICATIONS FROM SPACE CAN PROVIDE GLOBAL COVERAGE OF VHF AMS(R) SERVICES INCLUDING OCEANIC AND REMOTE AREAS

AIRCRAFTS DON'T NEED ANY ADDITIONAL AVIONICS EQUIPMENT OR RETROFIT

VHF communications is an existing technology, a standard present in every aircraft independent from any manufacturer or service provider.



There are many initiatives ongoing to provide VHF communications from space but to achieve this goal the first step is the regulatory processes in ITU.

The aeronautical community support is needed.

SPACE-BASED VHF COMMUNICATIONS

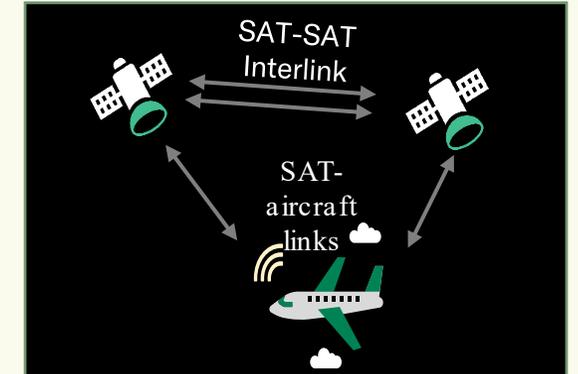
SB VHF COMMS AND ADS

- B WILL ALLOW TO PROVIDE RADAR

- LIKE SEPARATION

Space-based VHF communication is a concept in which aircraft provide communications between the aircraft to air traffic control (ATC) via satellite-based VHF.

This concept, when implemented, is expected to support air traffic management and flight operations in oceanic and remote airspace and will complement current aviation use of satellite-based navigation and surveillance technologies (e.g. ADS-B, ADS-C).



- To apply radar-like separation for civil aircraft, surveillance must be complemented with effective communications.
- Space-based ADS-B has to be complemented with Direct Controller-Pilot Communications (DCPC).

SB COMMUNICATIONS
+
SB SURVEILLANCE

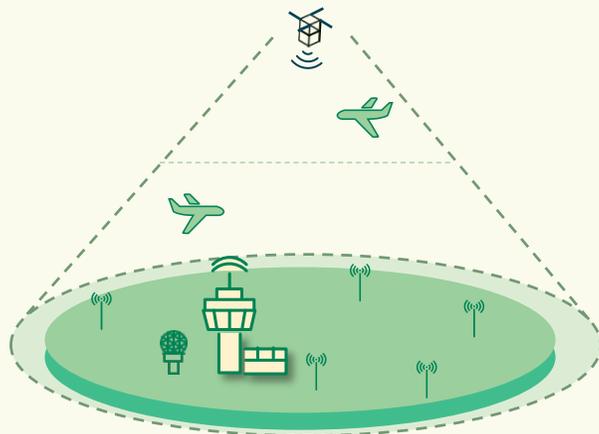
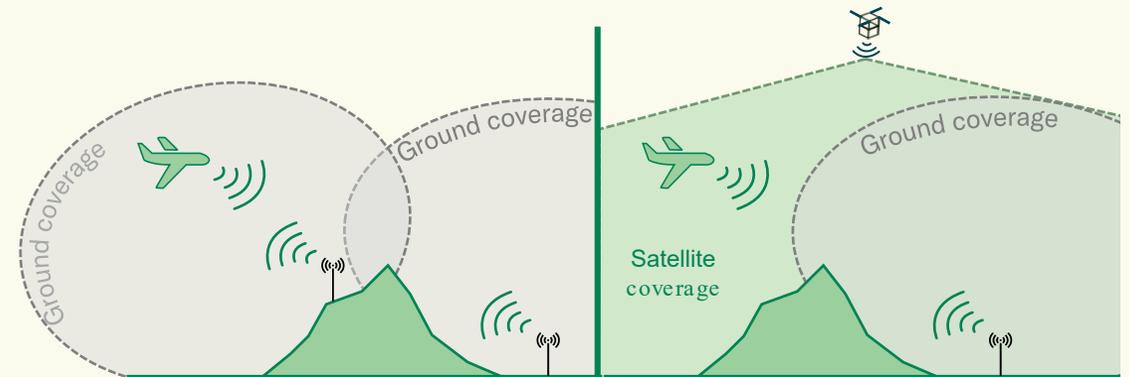


RADAR-LIKE
SEPARATION
IN OCEANIC

SATELLITE TECHNOLOGIES CAN PROVIDE FULL COVERAGE FROM SPACE TO GROUND LEVEL

OPTIMIZE THE GROUND INFRASTRUCTURE

Satellite-based technologies can reduce the amount of ground infrastructure required, especially if the ANSP has defined duplicity plans (i.e. double-triple coverage) or duplicities caused by terrain orography.



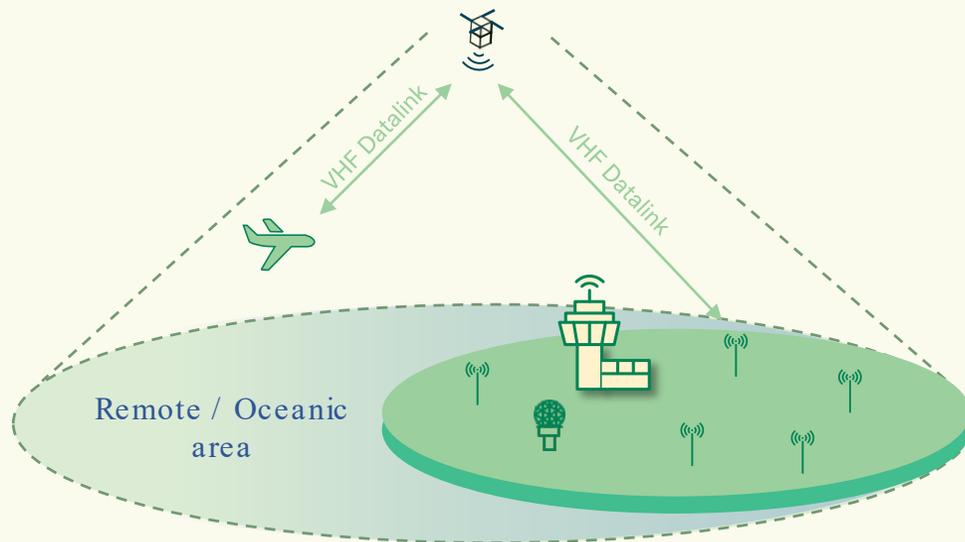
INCREASE RESILIENCE

Adding a new layer of infrastructure allow to utilise satellite infrastructure as a contingency measure in case of high demand or technical difficulties, increasing the resilience of the ANSP network.

DATA LINK AVAILABLE TO ALL AIRCRAFT CAN OPTIMIZE THE WORKLOAD OF AIR TRAFFIC CONTROLLERS

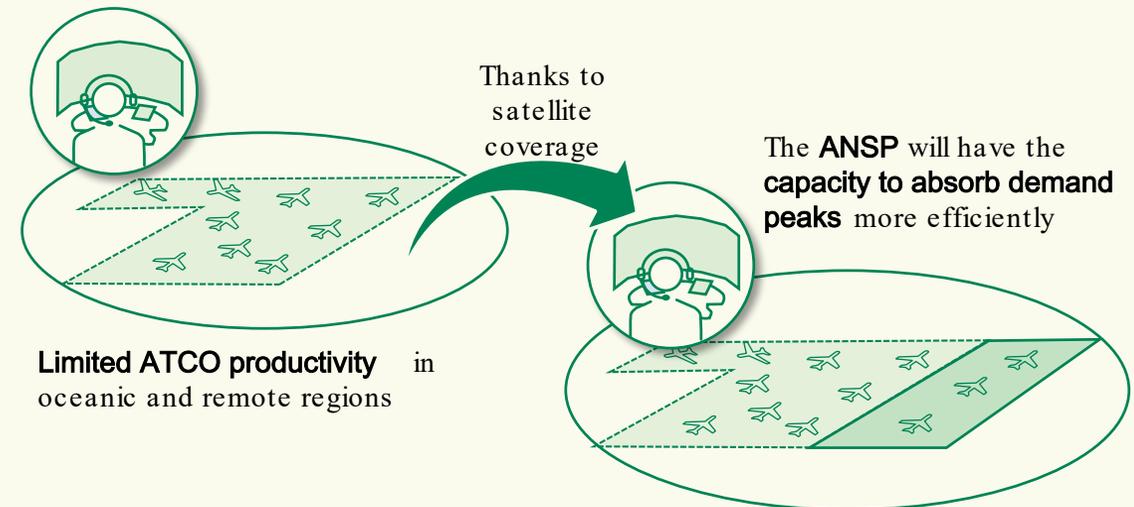
FORGET THE GAP BETWEEN CONTINENTAL AND OCEANIC REGIONS

SB-VHF Data Communications will **increase the availability of CPDLC** usage for all aircraft, reducing the amount of voice communications (which represents 30-50% of ATCO workload), therefore **reducing ATCO workload**.



INCREASE ANSP FLEXIBILITY TO MANAGE DEMAND PEAKS

The reduction of the ATCO workload will entail an **increment on the ATCO productivity**, which will allow the ANSP enhance the capacity to manage demand peaks



VOICE AND DATA COMMUNICATIONS COULD ENABLE OPTIMAL ROUTES FOR AIRSPACE USERS

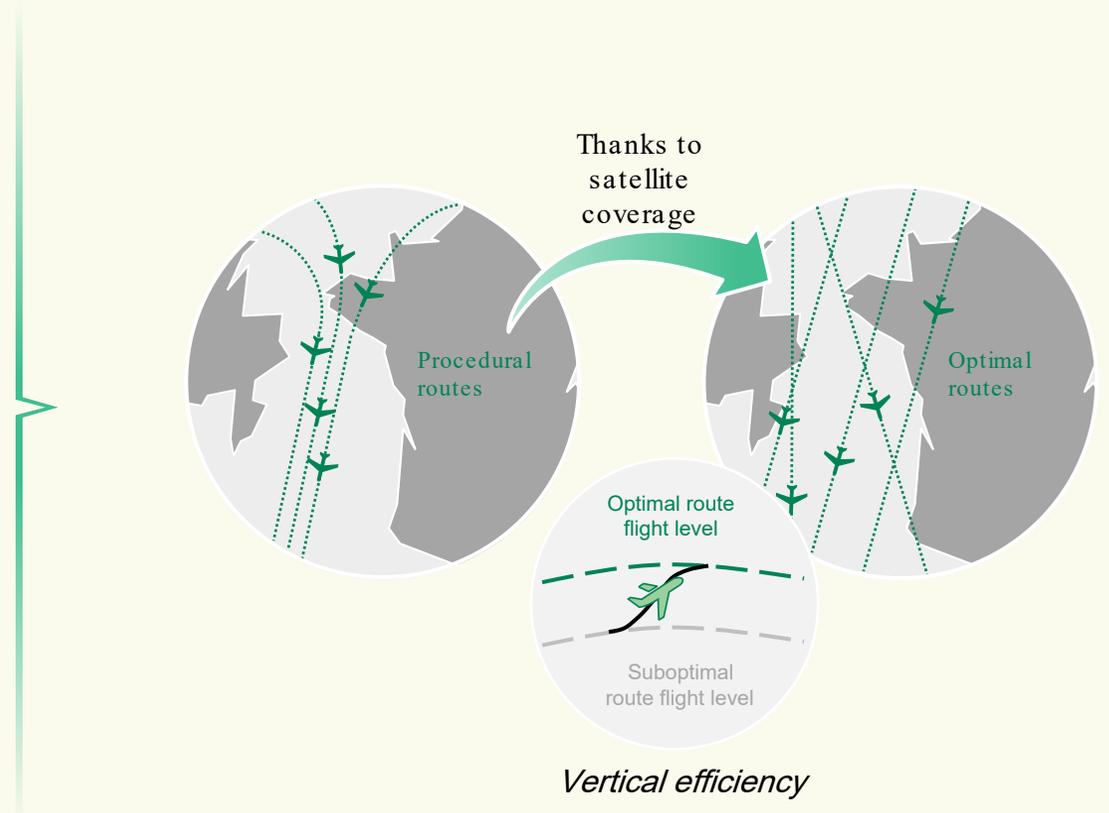
PROCEDURAL OPERATIONS COULD BE REPLACED BY USER PREFERRED ROUTES

User Preferred Routes (UPR) or free route airspace

Wind optimal routes

Seamless operations in Oceanic and Continental

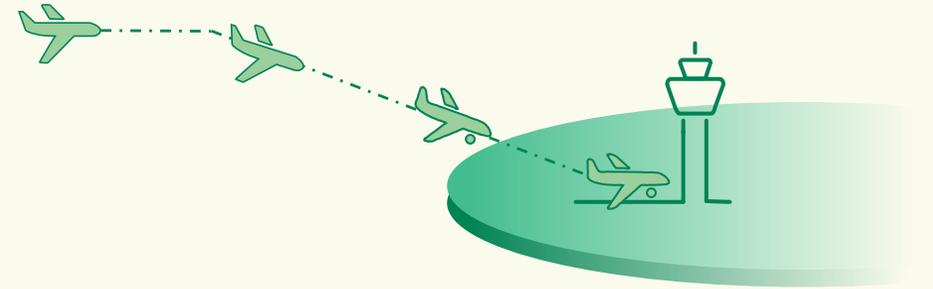
Tactical control, instead of procedural control



SB VHF CAN IMPROVE PREDICTABILITY AND REDUCE DELAYS

ENHANCED ATC SERVICES BASED IN SPACE WILL INCREASE PREDICTABILITY LEVELS

ATCOs will be able to track aircrafts with more **frequency** and **precision**, therefore reducing **uncertainty** in the flight duration and **variability** between predicted and actual times. This will allow **airports** to optimize the management of arrivals and increase airport throughput.



DELAYS WILL ALSO BE REDUCED THANKS TO A SATELLITE BASED SERVICE

68% of en-route ATFM delays are caused by ATC capacity and ATC staffing. Satellite-based technologies can directly contribute to reducing these delays by allowing more flexible routes (hence, **increasing capacity**) and reducing **ATCO workload** (therefore increasing ATCO productivity).

SATELLITE BASED TECHNOLOGIES FOR ANSPs

SOLUTIONS AND ADVANTAGES FOR ANSPs

1



DEPLOY/RENEW GROUND INFRASTRUCTURE

SB services would directly reduce the costs related to the deployment/renewal of ground **COM and SUR infrastructure**

2



ENHANCE ATC SERVICE QUALITY

SB services would reduce **ATCOs workload**, therefore increasing their productivity and overall ATS service performance

3



ENABLE BETTER OPERATIONAL PROCEDURES

SB services would allow the implementation of **new optimal procedures** allowing airlines to fly more flexible routes

4



EXPAND IN OCEANIC/REMOTE REGIONS

SB services would increase the **capacity** of uncovered areas by enhancing ATS services, hence reducing separation minima

PERFORMANCE-BASED COMMUNICATIONS AND SURVEILLANCE

SATELLITE - BASED VHF CONCEPT AS A FACILITATOR FOR PBCS

The ICAO Performance Based Communications and Surveillance (PBCS) Manual (Doc 9869) defines a performance framework to quantify the datalink system performance needed to meet operational requirements. It introduces two concepts:

- Required Communication Performance (RCP) applicable to two-way Controller-Pilot Data Link Communication (CPDLC) dialogues, and
- Required Surveillance Performance (RSP) applicable to one way transfer of surveillance data by contract based Automatic Dependent Surveillance (ADS-C).

Satellite-based VHF concept (both voice and data) appears as a clear facilitator for implementing this PBCS concept. Supporting voice but not data in satellite-based VHF systems would not allow the implementation of the full PBCS concept.

ITU WRC-23

AGENDA ITEM 1.7

ITU is addressing the compatibility studies following the WRC-23 AI 1.7 “*to consider a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation in accordance with Resolution 428 (WRC-19) for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the frequency band 117975-137MHz, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands*”.

ICAO has created two main working groups to collect and discuss the contributions related to this agenda item and to study the necessary review of the current ICAO SARPS

- **FVSG (Future VHF Sub Group)** reporting to ICAO-PT-T and collecting all the activities and studies to review the SARPS
- **CG-SV (Coordination Group – Satellite VHF)** reporting to ICAO-FSMP and collecting all the Questions and Answers related to the Space-Based VHF and related to the future AMS(R)S operating in the VHF frequency band.

ITU WRC - 23

ICAO SUPPORT

- Satellite-based VHF will bring immediate advantages to global air traffic, specially in countries or areas with **limited ground infrastructures** .
- ICAO should continue its internal studies and considerations related to AMS(R)S by **developing the SARPs** in the whole VHF aeronautical frequency band 117.975-137 MHz with the aim to make them available after the WRC-23.
- ICAO should continue supporting the efforts of the ITU-R WP 5B to identify the potential for **new allocation in the band 117.975-137 MHz**.

It is highly recommended to support the Agenda Item 1.7 of the WRC-23 to ensure a new allocation to AMS(R)S in the whole band 117.975-137 MHz.

ITU WRC-23

ICAO NACC SUPPORT

ICAO to start or continue its internal studies and considerations related to AMS(R)S by developing the relevant Standards and Recommended Practices (SARPs) **in the whole VHF aeronautical frequency band 117.975-137 MHz** with the aim to make them available after the WRC-23.

ICAO has created two main working groups: the FVSG reporting to ICAO-PT-T and the CG-SV reporting to ICAO-FSMP.

It is requested to ICAO-PT-T and ICAO-FSMP to inform and report on the progress of these working groups to ICAO NACC Regional Office and understanding the importance and great interest of the region in the satellite-based VHF communications to include the region in those tests or exercises of relevance.

SATELLITE BASED VHF SERVICES

SUMMARY

- Satellite-based services will provide VHF Voice and Datacommunications as well as ADS-B surveillance services from space for oceanic and remote continental areas.
- Satellite-based VHF **doesn't require any relevant investment** from ANSPs and almost **eliminates the start-up time** because VHF Communications is a technology already in place and well known by pilots and ATCOs.
- Regulatory processes both in ITU and ICAO are necessary. **The aeronautical community support will help to achieve this goal** .

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