COMBATING THE CAPACITY CRUNCH

As aircraft return to the skies during a period of post-pandemic recovery the aviation industry needs to tackle congestion and work to reduce CO_2 emissions

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Today aviation contributes around 2% of global CO_2 emissions annually, some of which is entirely avoidable. European airspace is fragmented and congested, leading to less optimized routings, air traffic bottlenecks and capacity constraints. Airspace constraints also contribute to inefficient flight profiles, routes and holding stacks, causing delays, frustrating passengers, wasting fuel and

generating excess CO_2, issues that will undoubtedly be exacerbated with the anticipated doubling of passenger numbers within 20 years.

Aviation is a difficult sector to decarbonize due to the limited choice of suitable substitutes for fossil jet fuel. Sustainable aviation fuel, hydrogen, and batteries are promising solutions for achieving big emissions reductions in the long term, but

they won't arrive at scale for "immediate" reductions. Therefore, the industry has only two practical options: fly less, and / or make current flight operations more efficient.
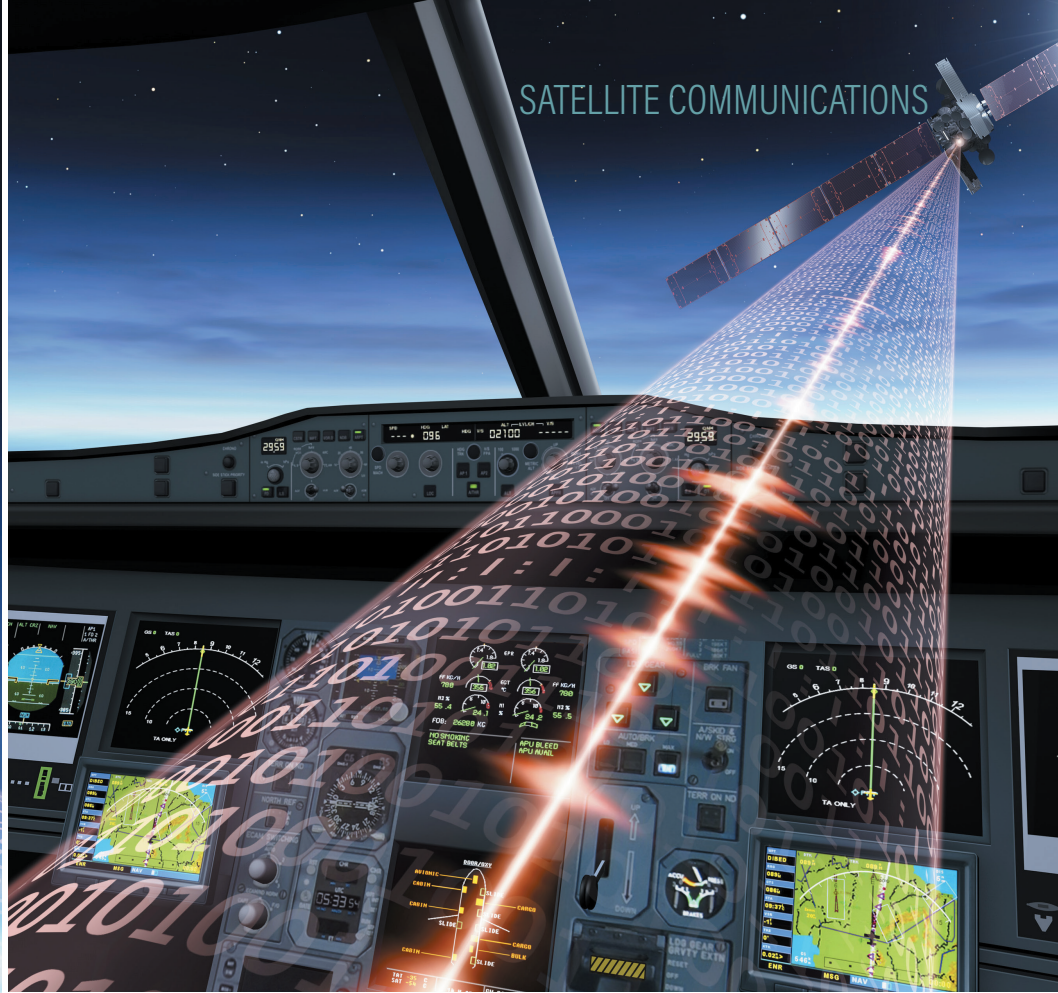
Technology constraints

Today's operational communication is reliant on outdated voice and data link technology for ATM, based on Very High Frequency (VHF), that can no longer keep up with the

needs of modern aviation. The technical constraints of VHF generate unacceptable inefficiencies in ATM, causing delays, generating unnecessary CO_2 emissions, and impacting airline profitability.

Improved ATM relies on the transition to a modernized Internet Protocol (IP) based infrastructure, with appropriate performances and security to enable machine to machine dialogue between aircraft and air traffic control systems, as planned in the Single European Sky ATM Research (SESAR) program. More automation and data link capacity will achieve a step change in efficiency.

An available future proof solution

Is there a ready-made solution to transition to an IP-based modern and CO_2 efficient ATM? Absolutely, Iris is a pan-European, satellite-based data link service developed in partnership between the European Space Agency (ESA) and Inmarsat. Iris is a key enabler of the European aviation industry's response to congested VHF and airspace, relieving the burden on VHF and paving the way for air traffic modernization: alleviating congestion in the busiest airspace; enhancing safety; improving flight efficiency, contributing to a reduction in delays, cutting excess fuel consumption and reducing CO_2 emissions in line with the European Green Deal.

ATM modernization is a quick win towards achieving a greener, more sustainable future for aviation, whilst the industry transitions towards net zero aviation. According to ESA, average CO_2 savings per year from Iris in Europe are estimated at 1.5 to 3 million tonnes, rising to 6.5 million tonnes by 2040, with a cumulative savings total of 27 to 55 million tonnes. That is comparable to the annual emissions of major European cities like Seville and Florence.

Iris is designed to complement the current VHF Data Link – Mode 2 (VDL-M2) network and become a building block of the future multilink communications infrastructure. Importantly, it is the only current solution that can manage capacity hotspots, which is where VDL-M2 falls short today. Iris uses secure satellite-based IP connectivity to relieve pressure on congested ground-based VHF links, enabling next-generation air traffic management to take place, where numerous actors can interact digitally and seamlessly in a highly automated system, removing many of the restrictions placed on ATM today.

Iris in particular will enable trajectory-based operations (so called ATS B2 services) allowing airlines to fly optimal routings and ANSPs to better manage the scarce airspace resource, especially around airports where continuous climb and descent operations are expected to significantly reduce delays and fuel burn and contribute towards the forecasted CO_2 savings.

easyJet adopts Iris

The role of Iris in Europe is now set to reach its next milestone, with one of Europe's leading airlines confirmed to play a key role in the program's continued expansion. Set to begin flying late 2022, easyJet will adopt Iris'

Following a commitment by Inmarsat and the ESA to globalize the Iris service, regions far beyond Europe are provided with an option for the evolution of digital air traffic management that will undoubtedly transform air navigation services and passenger flight experience. The benefit of Iris not needing extensive ground infrastructure ensures regions facing economic and ground infrastructure challenges can look to modernize without unachievable investment.

To realize Iris' benefits airlines must act now

Iris will be operational across Europe by 2023, supporting trajectory based operations introduction in time with the European mandate by end of 2027. Any European airline purchasing a new aircraft should line fit SB-S equipment during their fleet renewal process to enjoy the full ATM benefits and IP channel for operational apps as soon as possible to avoid the costs of retrofit.

Within these efforts, Iris and Inmarsat SB-S will provide the much-needed, yet mature and proven, broadband pipe required to enable automation and artificial intelligence within air traffic management, with the support of key operational and industry players. Alongside providing the vital bandwidth necessary to reduce air traffic delays, improve efficiency and open up the skies to more and more passengers. Most importantly, Iris will aid in reducing aviation's carbon footprint – creating a better world for us all. ❖

Left: Light Cockpit Satcom, Cobham AVIATOR 200s will be installed on easyJet's new A320neos **(below)**, and use Inmarsat's SB-S service

transformative capabilities on up to 11 Airbus A320neos, with the support of leading ANSPs.

With more than 30 partners steering the program's development, Iris will support easyJet's commitment to achieving net zero carbon emissions by 2050 as part of the UN-backed 'Race to Zero' campaign, with an interim target of a 35% reduction in carbon emissions by 2035.

EasyJet's Airbus A320neo aircraft will be line fitted with the Cobham Light Cockpit Satcom (LCS), powered by the Inmarsat SB-S service. The LCS terminal will interface with the Flight Operations & Maintenance Exchanger (FOMAX) and the Air Traffic Services Unit (ATSU) to deliver the transformational benefits. All data link services will be via one single small, lightweight terminal with global oceanic and continental coverage: Aeronautical Telecommunication Network Open Systems Interconnection (ATN / OSI), ATN Internet Protocol Suite coming (ATN / IPS), legacy Aircraft Communications Addressing and Reporting System (ACARS), Voice and Future Air Navigation System (FANS), plus an IP pipe for connected Electronic Flight Bag (EFB) and sensor / monitoring apps.

Inmarsat's vice president of Air Traffic Services Ghislain Nicolle said, "Inmarsat brings the capability, bandwidth and data speeds to allow secure and efficient data exchanges between pilots and controllers, as well as between the aircraft and ground systems, unlocking increased automation and flight optimization. This is only possible with a very high quality, totally secure communications link like Inmarsat SB-S. On top of this we provide the link capacity to power transformational cockpit applications."

Iris will be operational across Europe by 2023 and will be the first communication service to benefit from a Pan-European certification from the European Aviation Safety Agency (EASA), with no requirement for ground infrastructure. Once it has fully entered commercial and operational service in Europe, the deployment of Iris will support the SESAR masterplan.

Going global

The issues that European airspace is experiencing are not unique and can be seen across the world. Many regions face the challenge of using outdated communication infrastructure that can often be found to impact flight efficiency.