With better communication and more accurate navigation systems, it is possible to optimise routes, creating new itineraries and thus reduce fuel consumption and CO₂ emissions, contributing to noise reduction and optimising flight time by mastering departure and arrival times.

The SESAR initiatives (EASA / Eurocontrol) and NextGen (FAA) related to CNS/ATM (Communications, Navigation, Surveillance / Air Traffic Management) are established in such a way to increase the safety, efficiency and capacity of the airspace while maintaining its integrity and reducing environmental impact.

These initiatives, related to ATM, taken up by the ICAO’s global spectrum strategy, will establish a sustainable future plan for urban environment and anticipate emerging needs associated with society evolution.

The frequency spectrum is increasingly requested for new applications, particularly from the mobile and internet industry (4G / LTE, 5G, Wi-Fi, WLAN, RLAN, Machine Type Communications...).

It is therefore vital for aviation to:
- Avoid congestion of the frequency spectrum currently assigned.
- Sustain the existing allocations for systems called “Safety of Life” awarded to Radio Communication, Navigation and Surveillance systems with the help of the Civil Aviation Authorities and ICAO. A recent typical example is low power audio (Wireless microphones and In-Ear monitors) for Programme Making and Special Event (PMSE) and its possible use in the band 960-1164 MHz which is currently used mainly for safety Aviation services.
- Preserve the benefits obtained for the new systems defined by SESAR and NextGen and communications to command unmanned aircraft systems (UAS / RPAS) in non-segregated airspace, and Telemetry.

Further to the last World Radiocommunications Conference 2015 decisions, it is now possible to:
- Deploy Global Flight Tracking function using the recent Space ADS-B allocation.

The allocation made in the Earth-to-space direction will enable real-time tracking of aircraft and will facilitate reporting the position of aircraft equipped with ADS-B anywhere in the world, including oceanic, polar and other remote areas.
- Use of safety-related wireless systems, called “Wireless Avionics Intra-Communications” or WAIC, to be utilized within an aircraft.

This new Radio-Frequency spectrum allocation will positively impact future aircraft systems design by integrating sensors, actuators and other critical aircraft functions wirelessly thus reducing both the weight and complexity of aircraft wiring.

Aeronautical standards have now been launched to support the development of WAIC systems on board aircraft.

### Spectrum needs

The roadmap established by ICAO aims to improve the efficiency of spectrum allocated to civil aviation, to establish a transition plan with new technologies and functions defined in the CNS/ATM Plan and define the new spectrum requirements to cover the traffic growth over the long term.

The following points in the next World Radiocommunications Conference 2019 agenda, impacting aviation, are representative of the Aerospace industry involvement and challenges:
- **Agenda Item 1.10:** to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS).
- **Agenda Item 1.11:** to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis.
- **Agenda Item 1.14:** to consider, on the basis of ITU-R studies in accordance with Resolution 160, appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations.
- **Agenda Item 1.16:** to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN outdoor), in the frequency bands between 5150 MHz and 5925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution 239.
- **Other spectrum challenges are also identified such as the use of new technologies (Short Range Device, RFID, WiGig, Internet of Things...) to enhance passenger experience and airlines demands on board aircraft.**

### Frequencies for commercial and business aircraft

GIFAS is a Trade Association with over 375 members, from major prime contractors and system suppliers to small specialist companies. They cover the full spectrum of skills from the design, development and production of aerospace systems to marketing, maintenance and operation.

GIFAS members are active in all sectors of the aerospace industry including civil and military aircraft, helicopters, engines, missiles and weapons, satellites and launch systems, UAV, large aerospace, defence and security systems, equipment, subassemblies and associated software applications.

Managed through dedicated entities, GIFAS structures its recommendations in the spectrum domain through the Frequencies Commission.

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Description of the sector

Stakes

Commercial and business aircraft are equipped with Communications, Navigation and Surveillance systems (CNS) which provide essential and critical safety functions related to airworthiness and flight regularity. The aviation sector is characterised by specific aerospace and safety factors, which distinguish it from other users of the spectrum. Indeed, the functions and performances associated with CNS systems are standardised by ICAO (International Civil Aviation Organization) thus, beyond the harmonised regulatory framework, it ensures the worldwide interoperability of all the on-board Radio systems:

- **Radio Communication, voice and data links (VHF, HF, Inmarsat or Iridium Satcom...):**
- **Air Traffic Monitoring (ATC / ADS-B):**
- **Weather (Radar for cloud detection, thunderstorms, ice...):**
- **Navigation:**
  - **Global Navigation Satellite Systems (GNSS):**
  - **Radio aids (ILS, DME and MKR for landing, VOR and DME for positioning, ADF for bearing).**
  - **Radio Altimeters:**
  - **Telemetry.**

In addition, means used by airlines for Operations and Maintenance purposes require significant bandwidth. Cabin needs have also been expressed to offer passengers “Connectivity” related services:

- **Communication Air - Ground (messaging, phone, internet...).**
- **Passenger Entertainment (Live TV).**
- **Air to Ground (ATG):**
- **Satcom Ku or Ka band.**

CNS systems are standardised by ICAO (International Civil Aviation Organization) thus, beyond the harmonised regulatory framework, it ensures the worldwide interoperability of all the on-board Radio systems:

Military and/or government aircraft are subject to specific qualifications and regulations and can operate other specific means which use frequencies allocated to Ministries of Defence and Interior without forgetting the standardisation between NATO states. The spectrum allocated to the aeronautical sector is spread over the entire spectrum, from 100 kHz to 30 GHz, and is spread over the three basic functions: Communication, Navigation and Surveillance.

In addition to wavelength features, the spectrum is very diverse because it is used for air-ground, ground-ground, air-air communications and Satellites. The technologies are both analogue and digital as well as vocal and/or data applications.

CNS lifespan is very long to enable a return on investment for ground infrastructure (stations, networks, and airports), satellite (Constellation stations and networks), and for the development of embedded systems, as well as to ensure very long term sustainability and interoperability.

The frequencies allocated to business and transport aircraft require continuous availability and protection against interference in order to ensure the safety of aircraft, passengers, crews and overflown populations.

Social weight of the sector

The airline industry and business aviation are major contributors to the evolution of society and economic prosperity (Quoted from ATAG – Report May 2016 and IATA publications):

- More than 3.3 billion passengers and 50 million tons of cargo per year
- Air traffic has doubled every 15 years since 1971
- Overall economic impact (for the airline industry):
  - Represents nearly 8% of the world economy
  - 2 700 billion dollars of revenue (direct, indirect, induced & Tourism catalyst)
  - 3.5% of global GDP (would rank 21st in the world if the airline industry was a country)
  - 9.9 million direct jobs
  - 62.7 million jobs globally
- 1 400 Airlines
- 27 800 commercial aircraft in service
- 3 880 commercial airports

Frequencies allocated to commercial and business aviation for CNS require special protection against unwanted interference phenomena from other services. Exclusive or primary allocations must be made to ensure the safety and regularity of flights.

Beyond compliance with international regulations, some countries/authorities impose the carriage of specific systems over their territory or according to the routes followed or flown by the plane (polar, over water, desert areas...).

In addition, to meet the safety objectives and to allow operational availability of aircraft, systems installed on aircraft are redundant which potentially increase the spectral occupancy.

Sector evolution as per industry view

Aviation is a global industry that must take into account the interests of all users of the airspace. The increase in population and the specialisation of air transport induce a continuous increase in traffic estimated at 4.7% per year. In order to absorb this growth with a safety level equivalent to that of today, it is imperative to avoid the impending congestion of the frequency spectrum by increasing the exclusive spectrum for aeronautical systems.

New frequency allocations for new systems related to air traffic management should be defined if the regular traffic growth is to be absorbed.

Aircraft travel ever greater distances, communications beyond the horizon as well as flow rates needs, are increasing. Satellite networks are increasingly used over polar, ocean and desert areas where it is not possible to install infrastructure/terrestrial networks.