



Aviation Frequency Spectrum and the ITU World Radiocommunication Conferences (WRC)

WRC-19
28 Oct – 22 Nov 2019



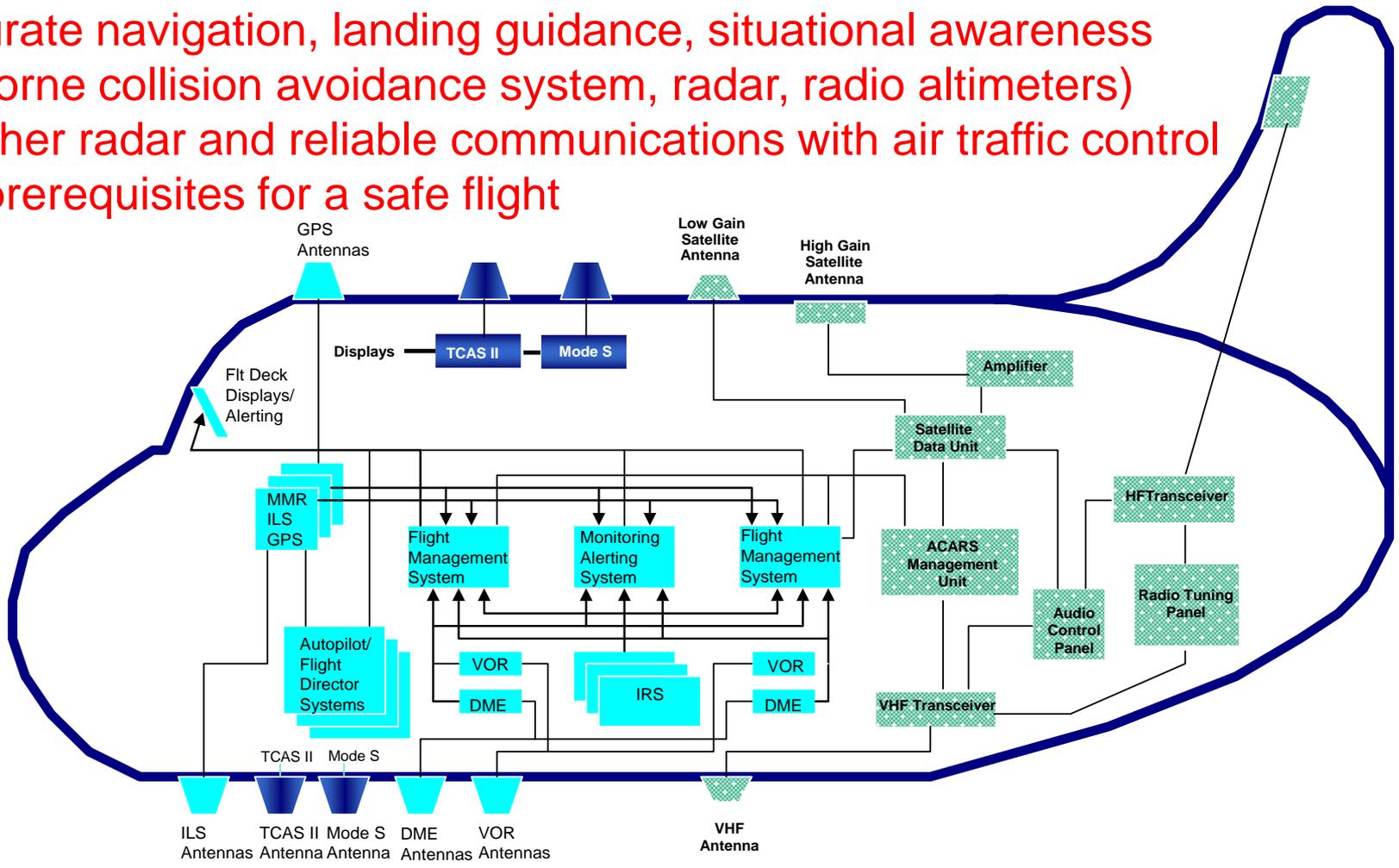
**ICAO Preparatory Workshop for ITU WRC-19,
NACC & SAM Regions**

Mexico City, Mexico, 6 - 7 February 2018

Loftur Jónasson
ICAO

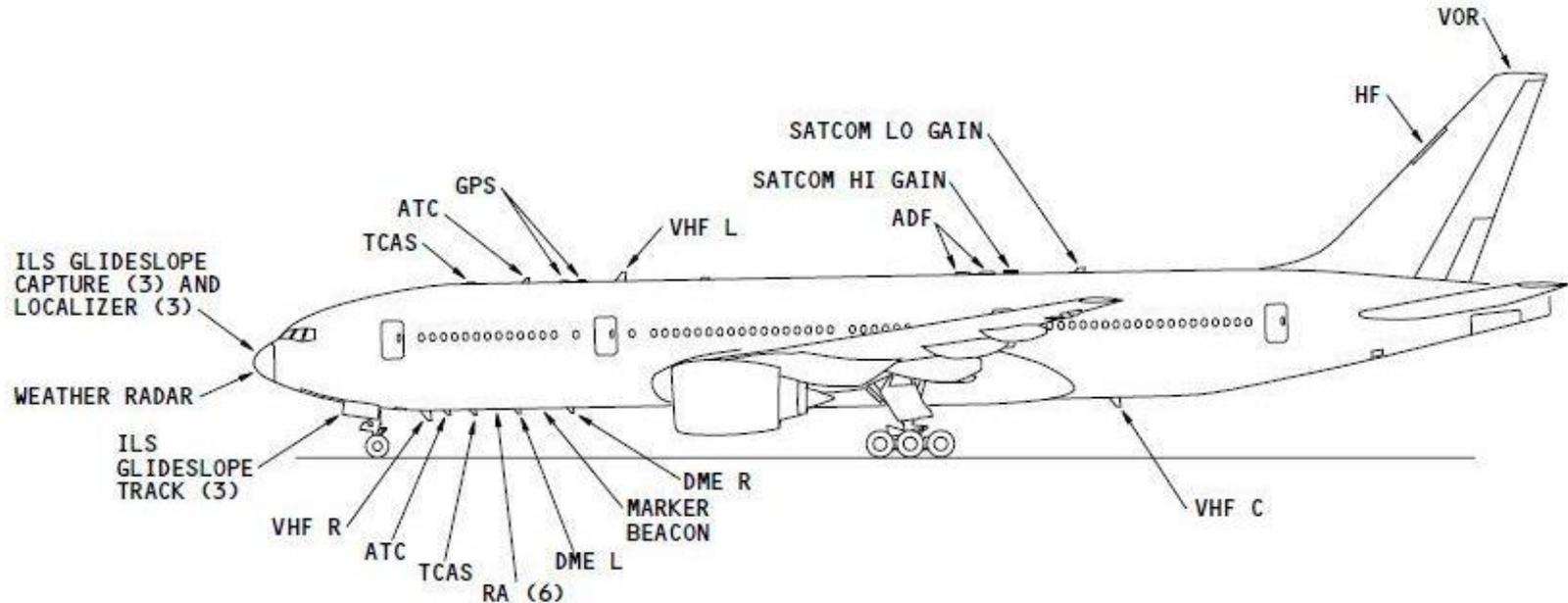
Aeronautical Frequency Spectrum Management

Accurate navigation, landing guidance, situational awareness (airborne collision avoidance system, radar, radio altimeters) weather radar and reliable communications with air traffic control are prerequisites for a safe flight



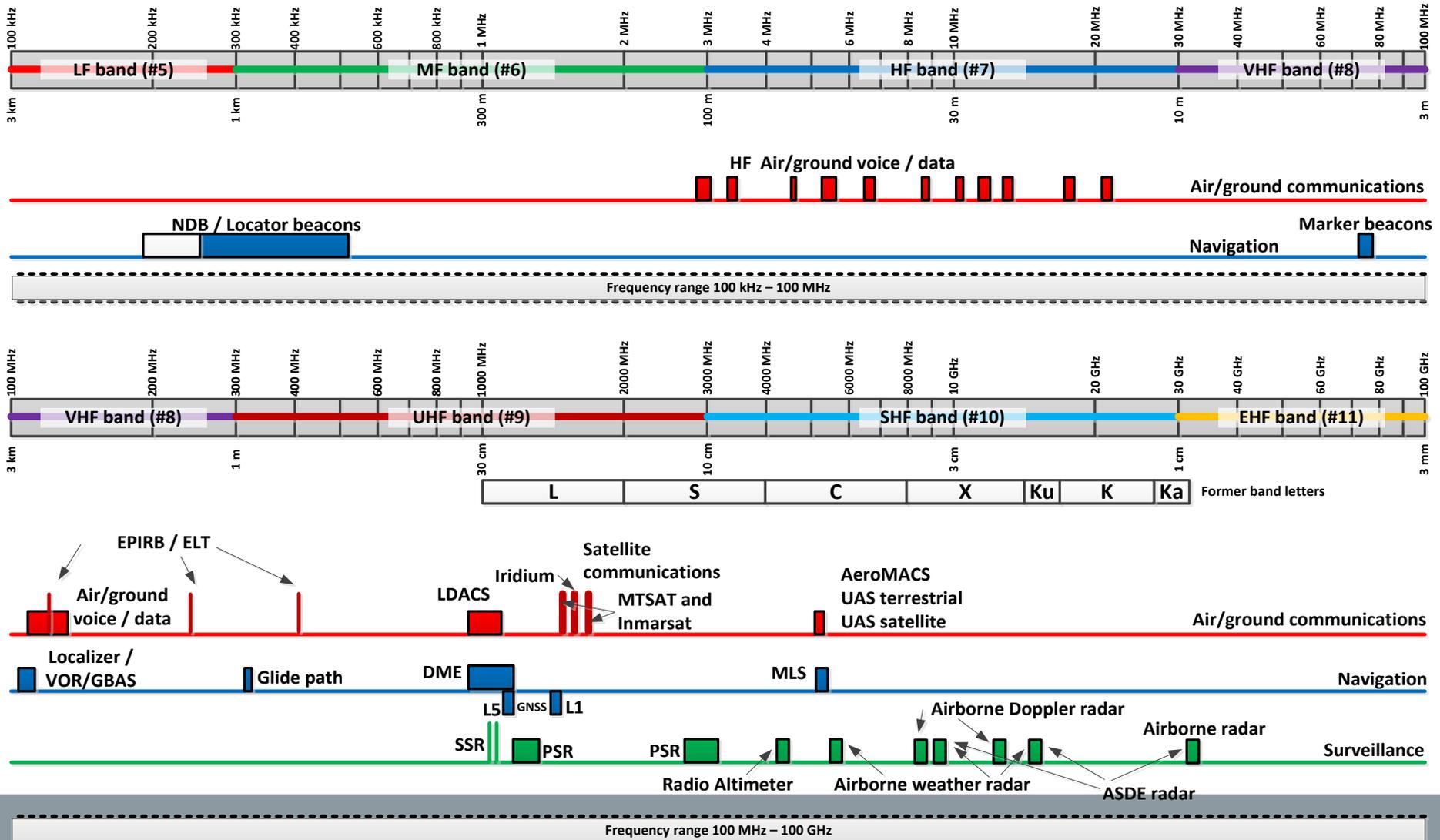
Aeronautical Frequency Spectrum Management

Accurate navigation, landing guidance, situational awareness
 (airborne collision avoidance system, radar, radio altimeters)
 weather radar and reliable communications with air traffic control



777 GENERAL - ANTENNA LOCATIONS

Aeronautical Frequency Spectrum Management



Aeronautical Frequency Spectrum Management

- **Scarce natural resource with finite capacity limits and constantly increasing demands**
- **Congestion imposes the need for efficient frequency spectrum management**
- **Spectrum management:**
 - combination of administrative and technical procedures
 - necessary to ensure interference free and efficient operation of radio services (e.g. Air/Ground Communications and Radionavigation)



Aeronautical Frequency Spectrum Management



Air Transport is a rapidly growing industry:

World wide consistent growth 1970 – 2017

~5% per year, on average.
Doubles every 15 years

In 2017

7.1% over 2016.
37 million aircraft departures
4.1 billion passengers
Doubles every 15 years
Air transport now carries 35% of world trade, by value

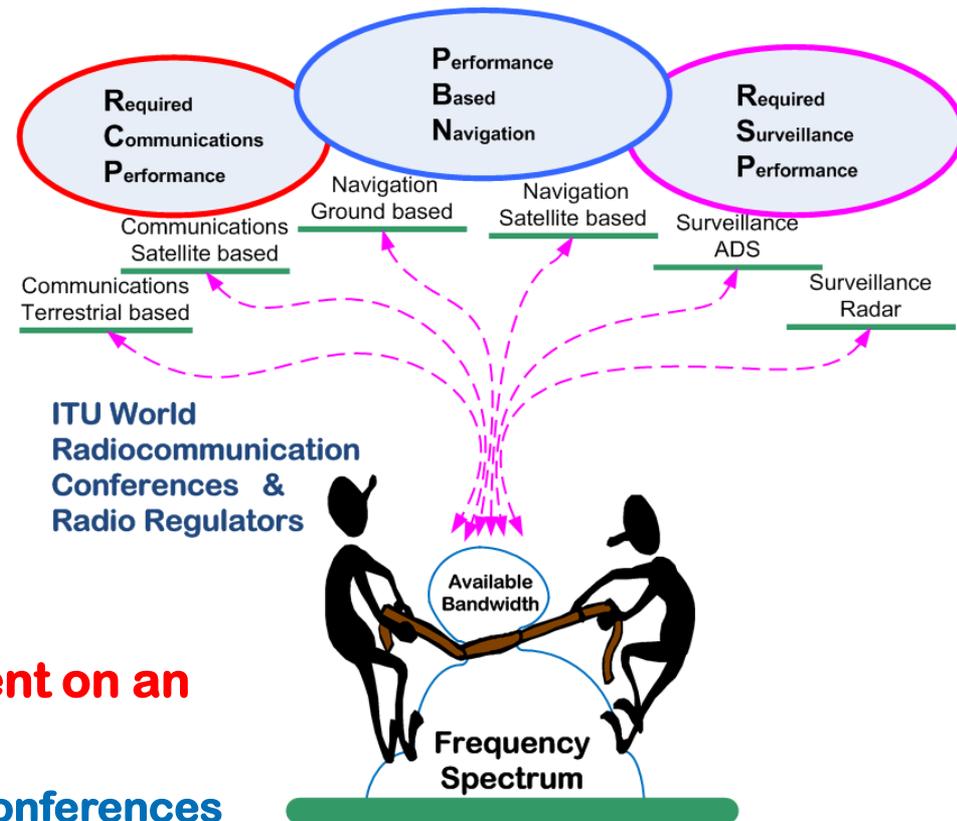
Performance of Air Traffic Management



ICAO Doc 9869 “Performance based Communication and Surveillance Manual”, Fig 1.1

- is directly related to the performance of the **Communication, Navigation and Surveillance systems;**
- which are completely dependent upon availability and access to **frequency spectrum**

Performance of Air Traffic Management



- **is therefore also directly dependent on an outside programme:**
the ITU World Radiocommunication Conferences and the WRC preparatory process in the ITU and the Regional Telecommunication Organizations

Aeronautical Frequency Spectrum Management

The highest level of Spectrum Management takes place at the ITU World Radiocommunication Conferences (WRC), held every four years:

- **Maintenance of the International provisions for Spectrum Management, contained in the ITU Radio Regulations (RR)**
- **This includes maintenance of the Table of Frequency Allocations**
- **A consequence of this is that aviation frequency managers need to develop, and lobby for an aviation position on frequency spectrum use**



Aeronautical Frequency Spectrum Management

Co-ordination of aviation position for ITU World Radiocommunication conferences

- **At the national level:**

 - National position is developed and co-ordinated by the National Frequency Spectrum authority. Aviation is but one of many users that lobby for attention

- **At the regional level:**      

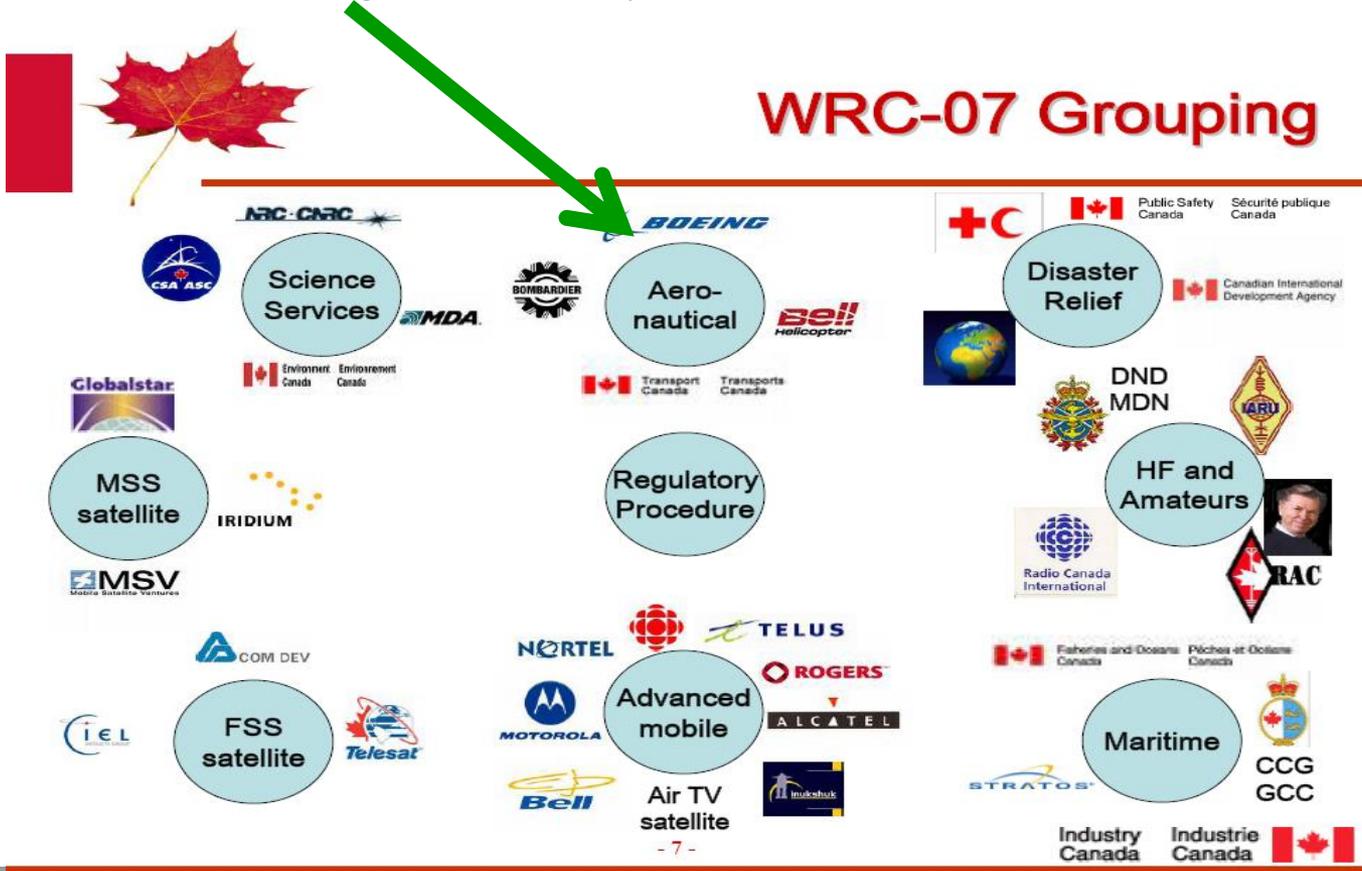
 - National telecommunications authorities co-ordinate their position through regional organizations. Aviation representatives may not be allowed to speak up as the National Frequency Spectrum Authority has only “one official position”. ICAO is allowed to participate

- **At the international level:** 

 - National telecommunications authorities (and Regional) co-ordinate their position through the ITU-R Study Groups. Although aviation may be represented in the national delegations, they may not be allowed to speak up, as the national delegation has only “one official position”. States look to ICAO for guidance on aviation matters

Aeronautical Frequency Spectrum Management

An old slide borrowed from the Canadian Frequency Regulator shows a good example of the many “special interest” groups represented in any national position.



Aeronautical Frequency Spectrum Management

The ITU Radio Regulations update cycle

- A very competitive environment
- Aviation or any other user cannot expect preferential treatment
- Those that do their homework and participate succeed, others lose.

Definition of Radio Frequency Management:
“Radio frequency management is done by experts who meld years of experience with a curious blend of regulation, electronics, politics and not a little bit of larceny. They justify requirements, horsetrade, coerce, bluff and gamble with an intuition that cannot be taught other than by long experience.”

Vice Admiral Jon L. Boyes
U.S. Navy

ITU in brief

UN Specialized agency, established to standardize and regulate international radio and telecommunications.

- **Based in Geneva, Switzerland**
- **Founded on 17 May 1865**
- **193 Member States, 800 Sector members and associates**
- **>700 staff, ~90 nationalities**



ITU in brief

Radio Regulations

■ International treaty:

- Facilitate **equitable access** to and **rational use** of the radio frequency spectrum and the geostationary orbit
- Ensure **availability** and **protection from harmful interference** of frequencies for **distress and safety** purposes
- Assist in prevention and resolution of cases of harmful interference
- Facilitate efficient and effective operation of radiocommunications services
- Provide for, and regulate new applications of telecommunications technology



ITU in brief

Radio Regulations

■ Contents of the Radio Regulations:

A set of regulatory provisions addressing the major topics of:

- **Definitions for services and technical features related to spectrum and frequency planning**
- **Frequency Allocations to services**
- **Procedures for coordination and registration of frequencies**
- **Provisions for distress and safety communications**
- **Provisions for individual radio services (including Aeronautical Services)**
- **Interference – reporting and clearance**
- **Administrative provisions, including licensing**

Together with:

- **Appendices (30) addressing planning, technical parameters and operational procedures**
- **Resolutions and Recommendations**



ITU WRCs

General Overview

- WRCs update the International Radio Regulations
- Held every 4 years
 - Last was in Nov 2015
 - Next in Oct-Nov 2019
- Main purposes:
 - To revise the Radio Regulations (RR); and
 - To address Radiocommunication issues of a worldwide character.
- Radio Regulations: International treaty governing the use of the Radio Frequency Spectrum
- Why participate at World Radiocommunication Conferences:
 - To protect existing services
 - To obtain access to spectrum for new services and enhance spectrum access for existing services
 - To facilitate market access for radio equipment manufacturers; and
 - To provide regulatory certainty to operators.



ITU WRCs

WRC-15 in numbers

- Participation: 3300 delegates
- Budget of ~\$7 million US Dollars
- 4 weeks (5 ½ weeks counting RA-15 and CPM19-1)
 - 162 Administrations
 - 5 regional telecommunication organizations
 - 6 intergovernmental organizations
 - 3 UN specialized agencies (ICAO, IMO, WMO)
 - >115 other international/regional, scientific and industrial agencies or organizations.

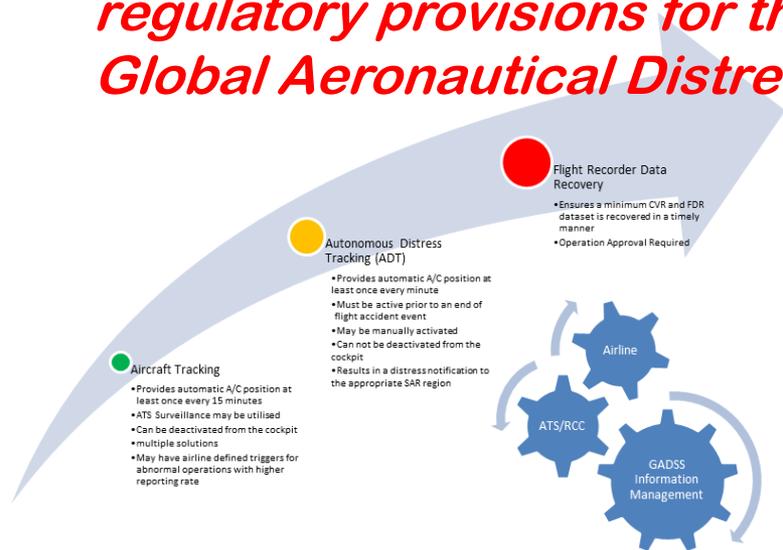
- Over 50 meetings/day, including weekends.
- 6AM – Latest finish to a Plenary session
- 9AM - ...start time the next (same) morning.



WRC-15

Main Results for Civil Aviation (1)

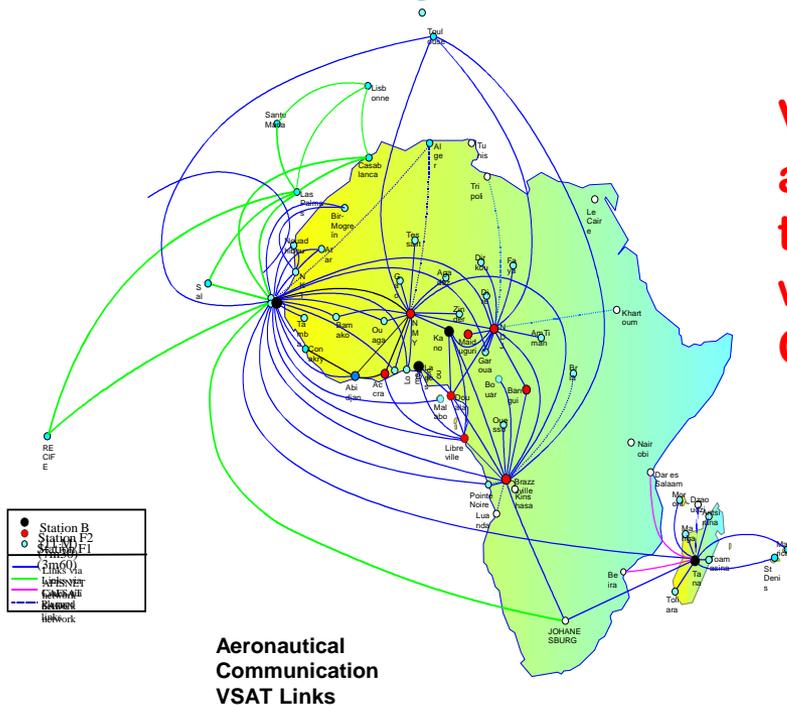
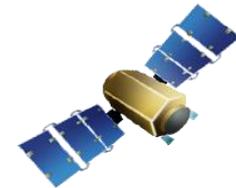
- **Global Flight Tracking and GADSS:**
 - **A new allocation for space based reception of ADS-B, enabling tracking of aircraft globally, including remote and polar regions**
 - **An agenda item for WRC-19, *to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS)***



WRC-15

Main Results for Civil Aviation (2)

- Better regulatory protection of Fixed Satellite Service (FSS) VSAT links used in Africa and Indian Ocean to provide terrestrial aeronautical and meteorological communications networks



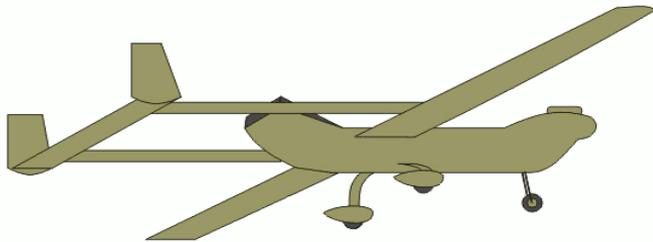
VSAT networks for aeronautical ground-ground telecommunications are in wide use in both Africa and Central/South America



WRC-15

Main Results for Civil Aviation (3)

- New regulatory provisions related to earth stations on-board unmanned aircraft which operate with geostationary satellite networks in the fixed satellite service (FSS)



A delicate compromise achieved by the conference. It provides the ICAO Remotely Piloted Aircraft Systems Panel (RPASP) with a set of conditions to develop SARPs against – or to identify showstoppers, if any. It is expected that WRC-23 will revisit the issue, based on the outcome of the ICAO studies



WRC-15

Main Results for Civil Aviation (4)

- Other positive outcomes achieved:
 - Full protection of primary surveillance radar spectrum and the frequency band used by aeronautical radio altimeters
 - Increased regulatory protection for the COSPAS/SARSAT
 - A new allocation for Wireless Avionics intra-communications, a potential enabler for safer and more fuel efficient aircraft.



WRC-15

Main Results for Civil Aviation (5)

In general, conference results conformed to the ICAO Position. Major factors contributing to this include:

- Early development and dissemination of the draft ICAO Position
- Active participation by national aviation experts and ICAO in the preparatory work of the ITU, including the relevant meetings of the ITU-R
- ICAO participation (from HQ and regional offices) in meetings of the regional telecommunication organizations
- Increased awareness in the Regions through FSMP meetings and ICAO Radio Frequency Workshops in the Regions
- Active Participation of the ICAO Delegation at WRC-15 allowed ICAO to counter and refute proposals which would have adversely impacted aeronautical spectrum



Management and Defense of Aviation Frequency Spectrum

- **ICAO Frequency Spectrum Strategy:**
 - High level vision on existing and future spectrum requirements in support of the evolving CNS systems and infrastructure requirements
- **ICAO Frequency Policy Statements:**
 - Statements of official policy on each and every frequency band used by aeronautical systems for the provision of CNS
- **ICAO Position for WRC:**
 - ICAO Position on the specific agenda items of the upcoming ITU WRC to ensure that aeronautical requirements and safety concerns are met
- Strategy for establishing and promoting the ICAO WRC Position (including Assembly Resolution A38-6)

ICAO Spectrum Strategy

(as per AN-Conf/12 Recommendation 1/12)

- e) develop and implement a comprehensive aviation frequency spectrum strategy to be referenced to the GANP, which includes the following objectives:
- 1) timely availability and appropriate protection of adequate spectrum to create a sustainable environment for growth and technology development to support safety and operational effectiveness for current and future operational systems and allow for the transition between present and next generation technologies
 - 2) demonstrate efficient use of the spectrum allocated through efficient frequency management and use of best practices; and
 - 3) clearly state in the strategy the need for aeronautical systems to operate in spectrum allocated to an appropriate aeronautical safety service;

See ICAO Doc 9718, Vol I (First Edition, 2014), chapter 8.

Updated version now available in Doc 9718, unedited Second Edition, Sep 2017

ICAO Spectrum Policy Statements

- A WRC is limited to certain issues and certain frequency bands. The ICAO position only addresses spectrum usage in context with issues identified in the pre-set WRC agenda.
- The ICAO **Policy Statements** however, indicate **overall ICAO policy for each and every frequency band** used by aviation safety services
- The Policy Statements are “**Official ICAO Policy**”, **approved by Council**. Latest revision of the policy statements was done together with the development of the ICAO Position.
- Included in **Doc 9718, Vol I**, the “*Handbook on Radio Frequency Spectrum Requirements for Civil Aviation*”

ICAO Position and WRC preparations (1)

Approach for establishing and promoting the ICAO Position for future ITU WRCs - ICAO Doc 9718, Vol I, Attachment E

- ICAO Position is established as early as possible after the agenda for that WRC is established
- The Position presents ICAO views on all agenda items of interest to international civil aviation on the agenda of the WRC, with particular regard to the impact on safety, regularity and efficiency of flight
- Focal point on all aspects related to the development of the ICAO Position is the Frequency Spectrum Management Panel.
- Proper co-ordination with ICAO Regional Offices (Bangkok, **Cairo**, Dakar, Lima, Mexico, Nairobi, **Paris**)



ICAO Position and WRC preparations (2)

- **Draft Position is reviewed by the ICAO Air Navigation Commission (ANC), sent to States and relevant International Organizations for comments, and a consolidated ICAO Position is submitted to ANC and Council for approval**
- **Approved Position is sent to States for use in the States' own internal coordination process, when developing national positions**
- **Following development of the Position, consequential amendments to Spectrum Strategy and Policy Statements are developed for approval by the Council**
- **Subsequent developments arising from ICAO and ITU activities in preparation for the WRC are considered by the Council with a view to update the Position as necessary**

ICAO Position and WRC preparations (3)

Guidance for the promotion of the ICAO position

- Assembly Resolution A38-6 shall be fully implemented so as to secure support from States to the ICAO Position and ensure that the resources necessary to support increased participation by ICAO to international and regional spectrum management activities are made available.
- ICAO contributes to the WRC preparatory activities conducted by ITU and Regional Telecommunications Organizations, by submitting additional technical papers supporting the ICAO Position
- ICAO maintains close co-ordination and co-operation with other aviation organizations participating in the Conference, such as IATA
- Regional ICAO co-ordination meetings to present and discuss the ICAO Position should be organized as required. These meetings to be held in conjunction with meetings of FSMP

ICAO Position and WRC preparations (4)

Assembly Resolution A38-6 (part 1)

- *Urges Member States, international organizations and other civil aviation stakeholders to support firmly the ICAO frequency spectrum strategy and the ICAO position at WRCs and in regional and other international activities conducted in preparation for WRCs, including by the following means:*
 - a) working together to deliver efficient aeronautical frequency management and “best practices” to demonstrate the effectiveness and relevance of the aviation industry in spectrum management;
 - b) supporting ICAO activities relating to the aviation frequency spectrum strategy and policy through relevant expert group meetings and regional planning groups;
 - c) undertaking to provide for aviation interests to be fully integrated in the development of their positions presented to regional telecommunications fora involved in the preparation of joint proposals to the WRC;
 - d) including in their proposals to the WRC, to the extent possible, material consistent with the ICAO Position;

ICAO Position and WRC preparations (5)

Assembly Resolution A38-6 (part 2)

- e) supporting the ICAO position and the ICAO policy statements at ITU WRCs as approved by Council and incorporated in the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation* (Doc 9718);
 - f) undertaking to provide civil aviation experts to fully participate in the development of States' and regional positions and development of aviation interests at the ITU; and
 - g) ensuring, to the maximum extent possible, that their delegations to regional conferences, ITU study groups and WRCs include experts from their civil aviation authorities and other civil aviation stakeholders who are fully prepared to represent aviation interests;
- *Requests* the Secretary General to bring to the attention of ITU the importance of adequate radio frequency spectrum allocation and protection for the safety of aviation; and
 - *Instructs* the Council and the Secretary General, as a matter of high priority within the budget adopted by the Assembly, to ensure that the resources necessary to support the development and implementation of a **comprehensive aviation frequency spectrum strategy** as well as increased participation by ICAO in international and regional spectrum management activities are made available.

Current Status of Work

- ICAO Position was developed by FSMP in 2016, reviewed by the Air Navigation Commission and sent to States for comments (1 Dec 2016)
- Position finalized by FSMP WG/4 in March-April 2017, based on feedback from States – subsequent final review by the Air Navigation Commission (9 May 2017)
- Position approved by ICAO Council (19 June 2017) and disseminated to States and International Organizations (14 July 2017)



ICAO

SAFETY



Thank You!