



| ICAO

# INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY



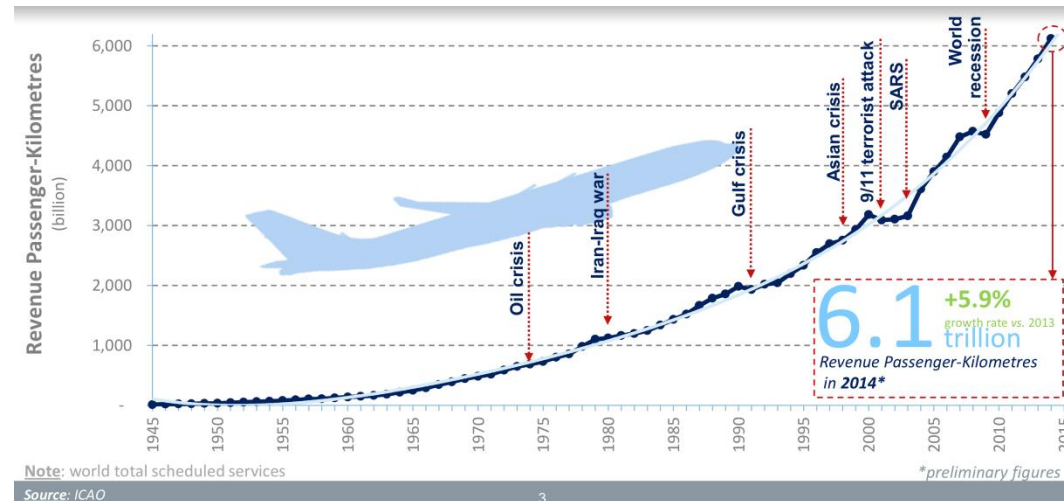
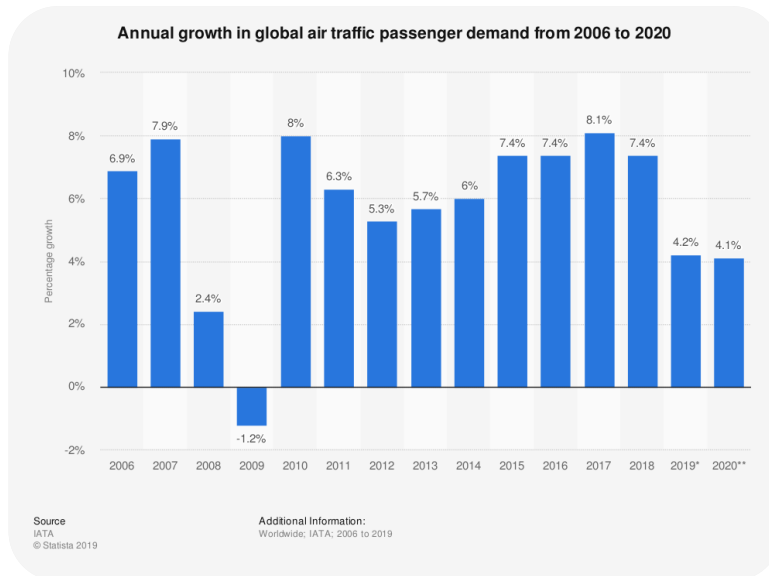
# Overview of Aeronautical Spectrum Usage

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BY Isaiah Kofi Tefutor (CNS Technical Officer ICAO)

For the PRIDA Workshop  
19-21 March in Abidjan, Côte d'Ivoire

# Aeronautical Frequency Spectrum Management



## World wide consistent growth of air traffic Doubles every 15 years

- ➔ In 2019 over 4.5 billion scheduled passengers
- ➔ Air transport now carries 35% of world trade, by value
- ➔ Between 2019 and 2038, 4.6 % expected growth of no. of airline passengers (pre-Covid-19 numbers)

# Aeronautical Frequency Spectrum Management

## *(Aviation: One of users of Radio Frequency Spectrum)*

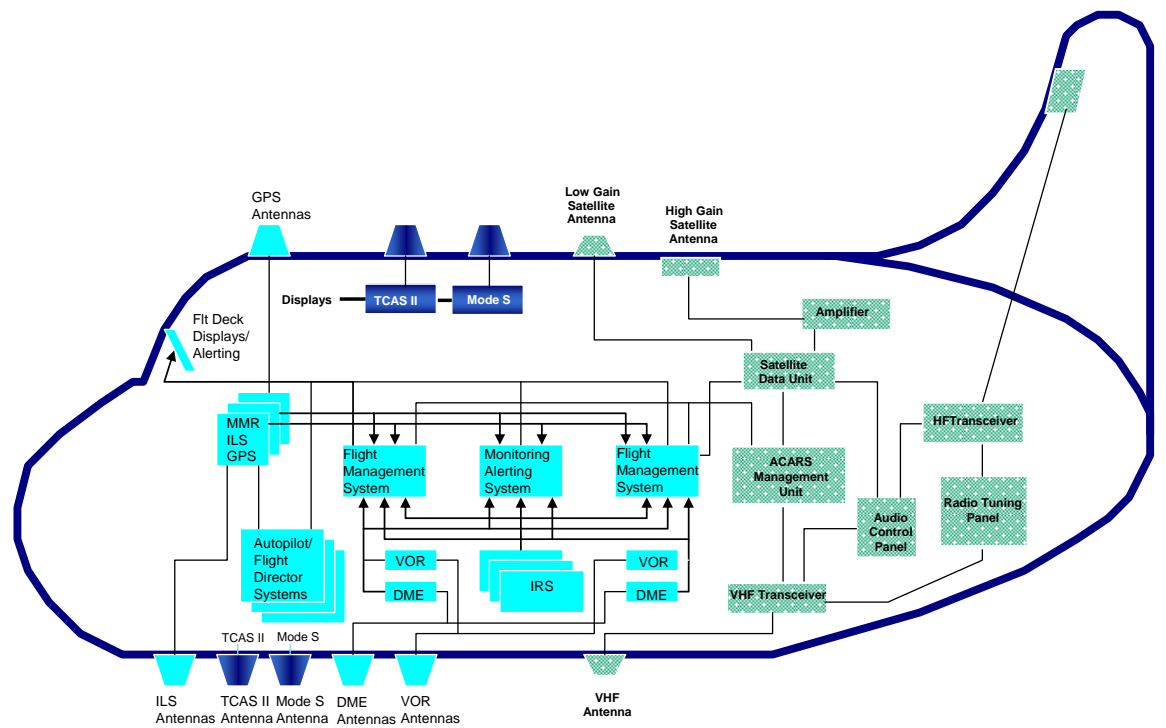
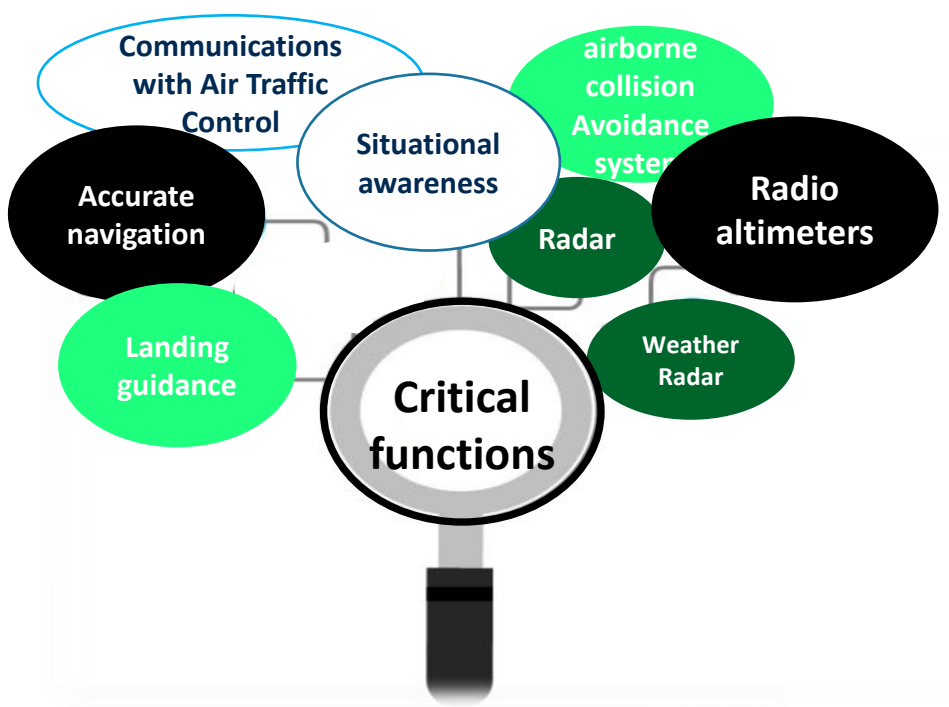
- ❑ About 100 000 flights take off to the sky and land every day without any incidents.
- ❑ **Safe aircraft operation on such a scale is highly dependent upon the availability of sufficient, suitably protected Radio Frequency Spectrum that can support the high integrity and availability requirement associated with aeronautical safety systems.**



# Communications, Navigation and Surveillance Systems – Prerequisite for aircraft operation



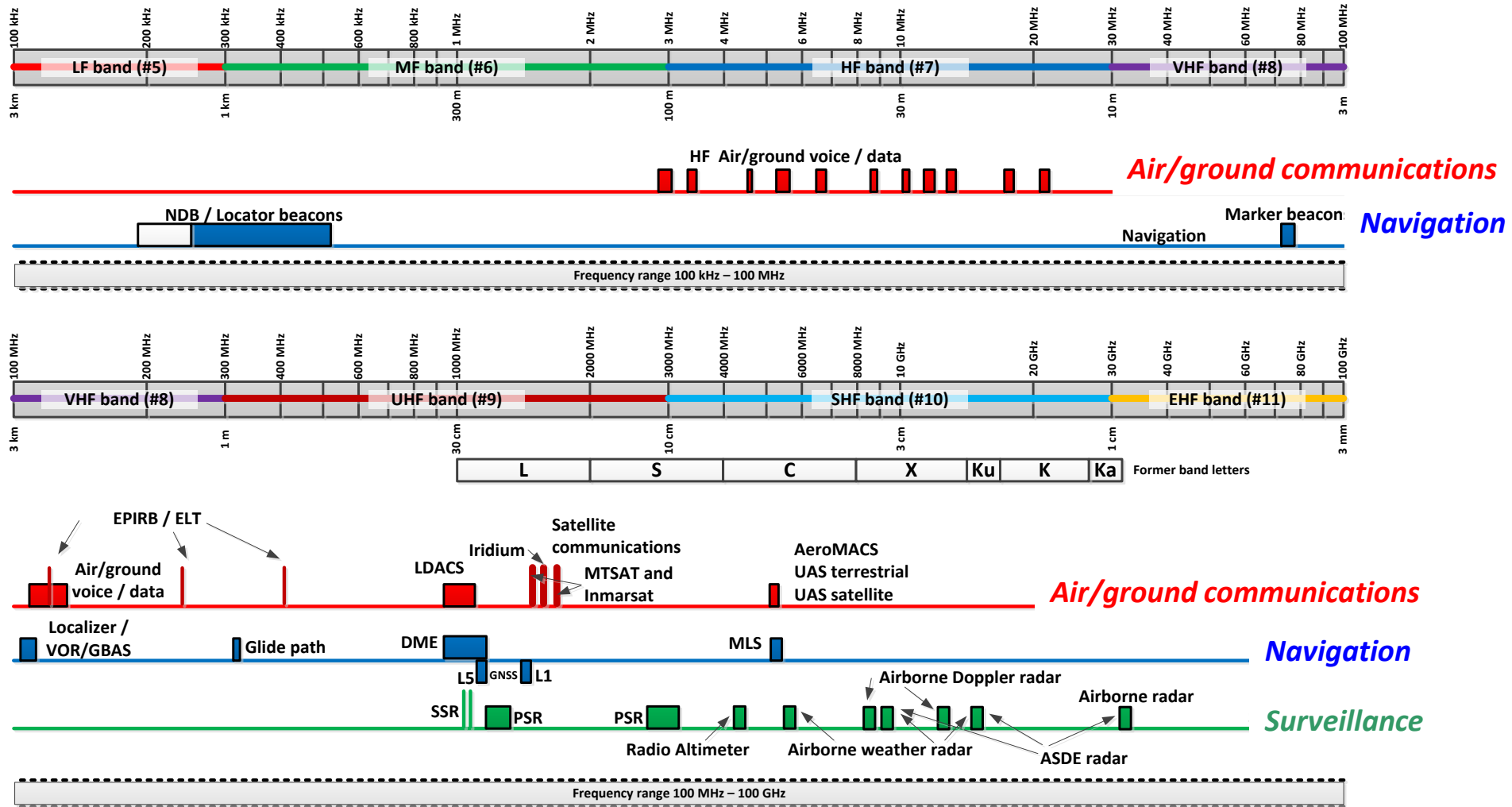
- ❑ An average size commercial aircraft is fitted with **over 30 antennas**.
- ❑ A large number of Communications, Navigations and Surveillance systems, which uses those antennas, are necessary to **provide functions critical to the safe flight of aircraft**.





# Aeronautical Frequency Spectrum Management

Over 1 GHz of frequency spectrum in global allocations to aeronautical safety services



Notes:  
 Drawing not to scale  
 Not all Regional or sub-Regional allocations are shown  
 Band identification (e.g. VHF) and band # per Radio Regulations  
 The satellite communication bands used by MTSAT and Inmarsat are not allocated the the Aeronautical Mobile Satellite (R) Service



# Frequency bands

## Frequency bands for aeronautical radio services

Band	Service	Aviation Use
90 – 110 kHz	RNS	Long range navigation
190 - 535 kHz	ARNS	NDB
1 800 - 2 000 kHz	RNS	Short range navigation
2 850 - 22 000 kHz	AM(R)S	Air/ground communications
3 023 and 5 680 kHz	AM(R)S	Search and rescue
74.8 - 75.2 MHz	ARNS	ILS marker
108 - 117.975 MHz	ARNS	VOR/ILS
117.975 - 137 MHz	AM(R)S	Air/ground communications
121.5, 123.1, 243 MHz	AM(R)S	Emergency frequencies
328.6 - 335.4 MHz	ARNS	ILS glide path
406 - 406.1 MHz	MSS	Search and rescue
960 - 1 215 MHz	ARNS	DME
1 030 and 1 090 MHz	ARNS	SSR/ACAS
1 215 — 1 260 MHz	RLS/RNSS	GNSS
1 215 - 1 400 MHz	ARNS/RNS	Surveillance radar

Band	Service	Aviation Use
1 545 - 1 559 MHz	AMS(R)S	Satellite communications
1 646.5 - 1 660.5 MHz		
1 544 - 1 545 MHz	MSS	Search and rescue
1 645.5 - 1 646.5 MHz		
1 559 - 1 610 MHz	RNSS	GNSS
1 610 - 1 626.5 MHz	ARNS	GNSS
2 700 - 3 100 MHz	ARNS/RNS	Surveillance radar
4 200 - 4 400 MHz	ARNS	Radio altimeter
5 000 - 5 250 MHz	ARNS	MLS
5 350 - 5 470 MHz	ARNS	Airborne weather radar
8 750 - 8 850 MHz	ARNS/RLS	Precision approach radar
9 000 - 9 500 MHz	ARNS/RLS	Precision approach radar
13.25 - 13.4 GHz	ARNS	Airborne doppler radar
15.4 - 16.6 GHz	ARNS	ASDE/other systems
24.25 - 24.65 GHz	RNS	ASDE
31.8 - 35.2 GHz	RNS/RLS	ASDE

- **Aeronautical Mobile (R) Service:** An aeronautical mobile service reserved for communications relating to safety of flight ,primarily along national or international civil air routes.



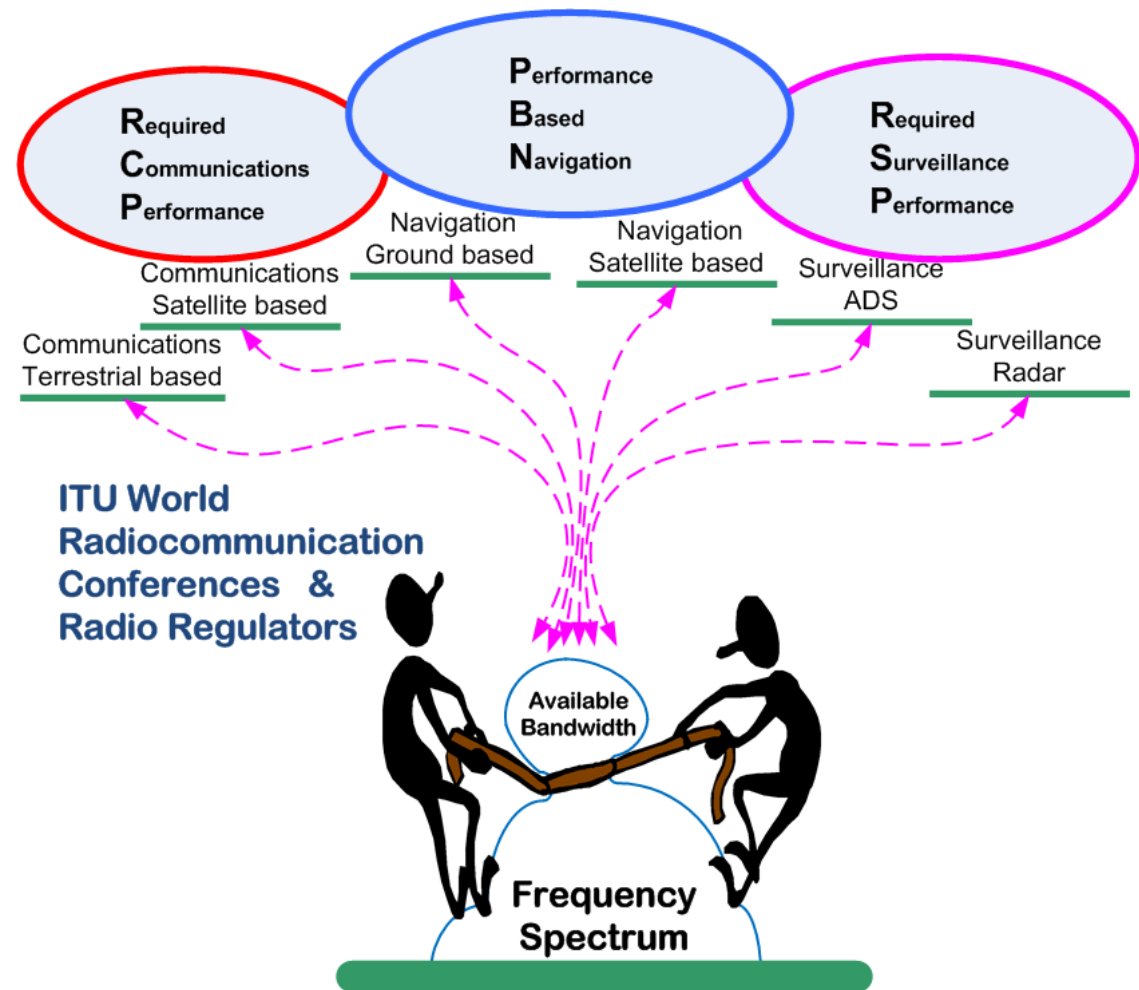
- **Aeronautical mobile (OR)Service :** An aeronautical mobile service intended for communication, including those relating to flight coordination ,primarily outside national or international civil air route (ITU)

# Performance of Air Traffic Management



**Availability and access to frequency spectrum is completely dependent on an outside program:**

The ITU World Radiocommunication Conferences; and the WRC preparatory process in the ITU and the Regional Telecommunication Organizations





# 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



## SPECTRUM MANAGEMENT

necessary to ensure interference free and efficient operation of radio services (e.g. Air/Ground Communications and Radionavigation)

# Aeronautical Frequency Spectrum Management



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



- 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



- National telecommunications authorities co-ordinate their position through the ITU-R Study Groups
- National delegation has only “one official position”
- States look to ICAO for guidance on aviation matters

National level

Regional Level

International level

# ICAO Position and WRC preparations



ICAO position established after WRC agenda established



FSMP is the focal point on all aspects related to development of ICAO's position

Reviewed by ANC, State Letter process, Approved by Council

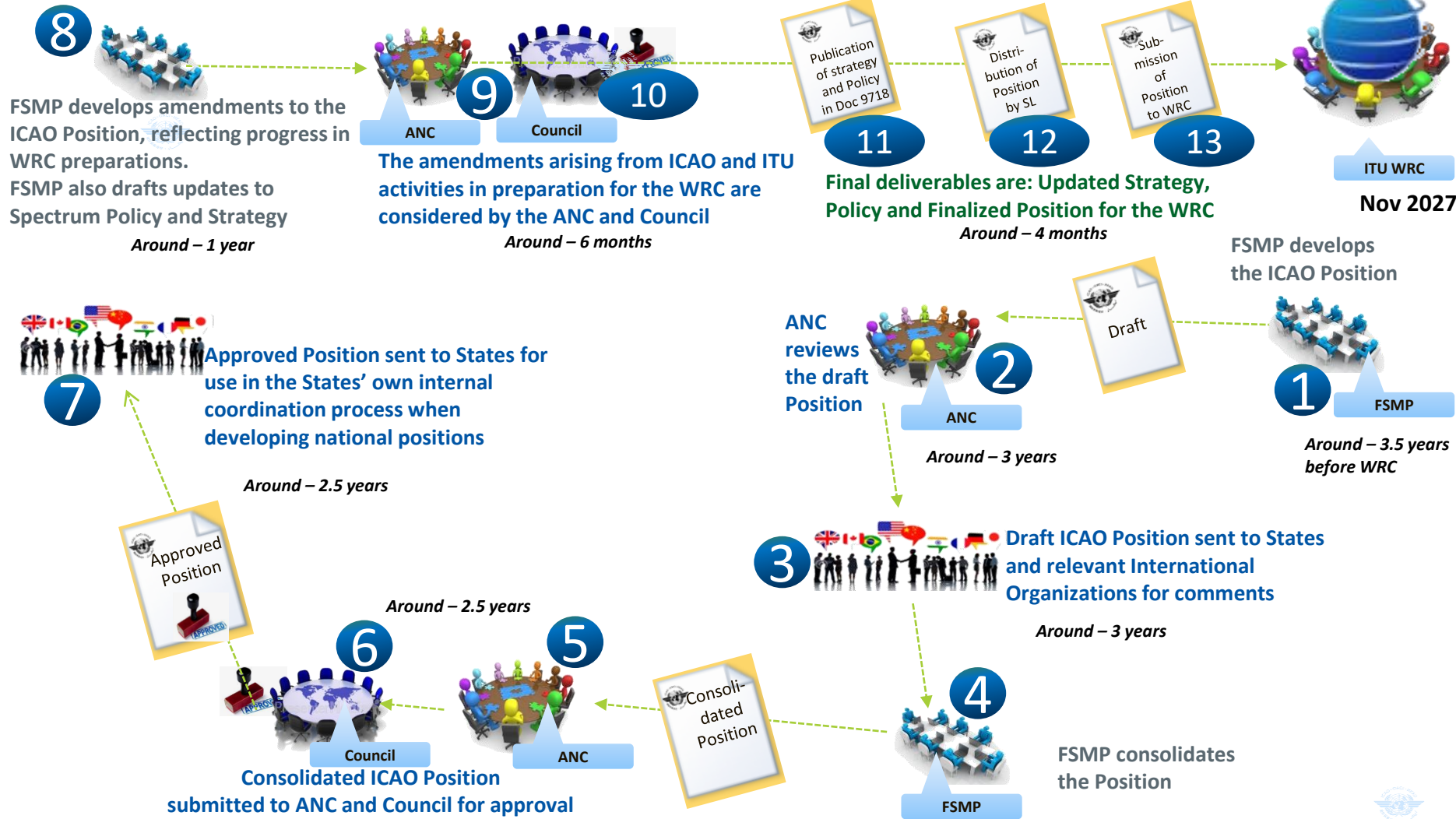
The Position presents ICAO views on all WRC agenda items of interest to international civil aviation, with particular regard to safety and regularity of flight

ITU WRC Agenda established



Proper co-ordination with the 7 ICAO Regional Offices

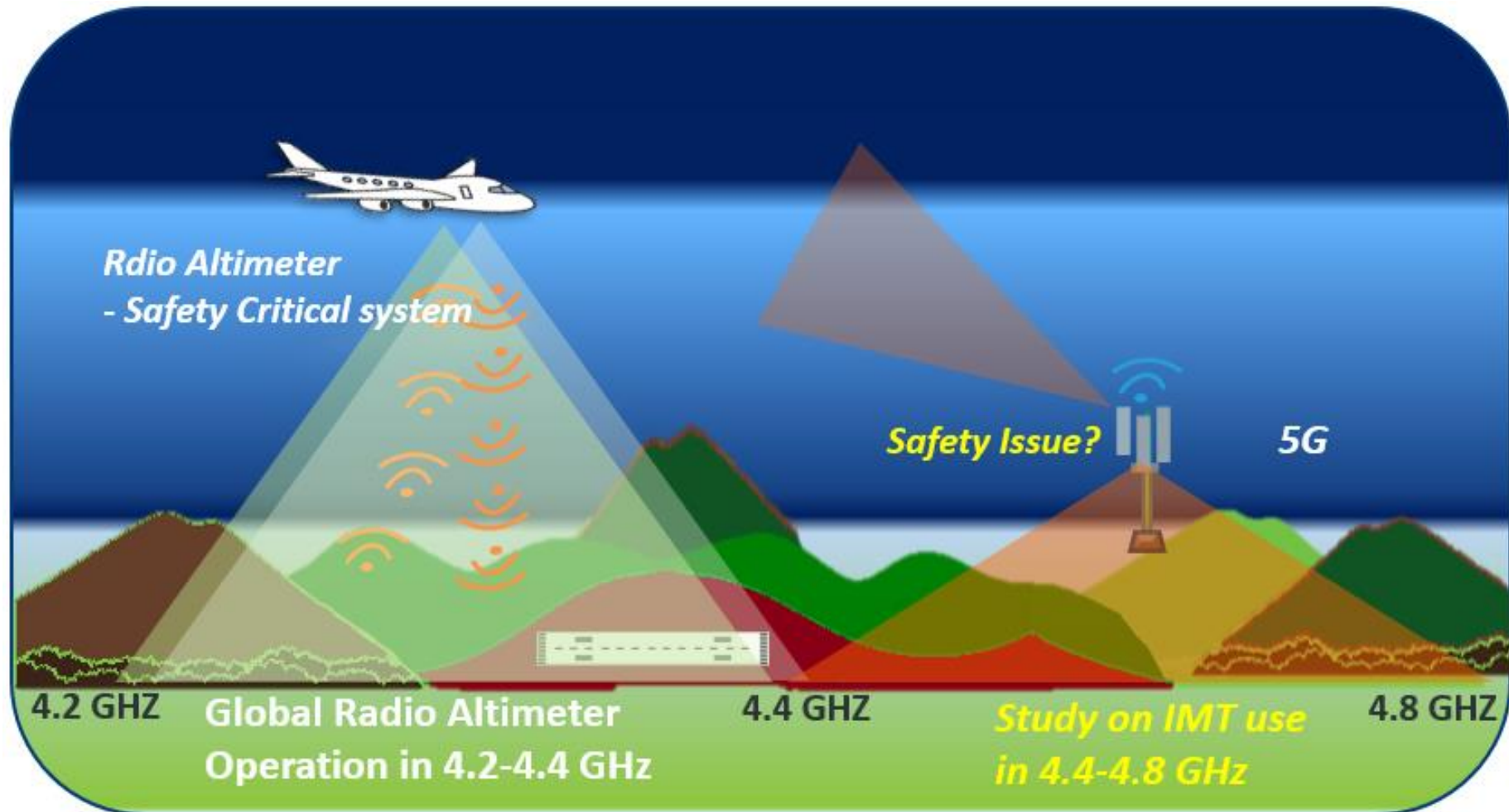
# ICAO Position and WRC preparations



WRC-27

## WRC-27 Agenda Item 1.7:

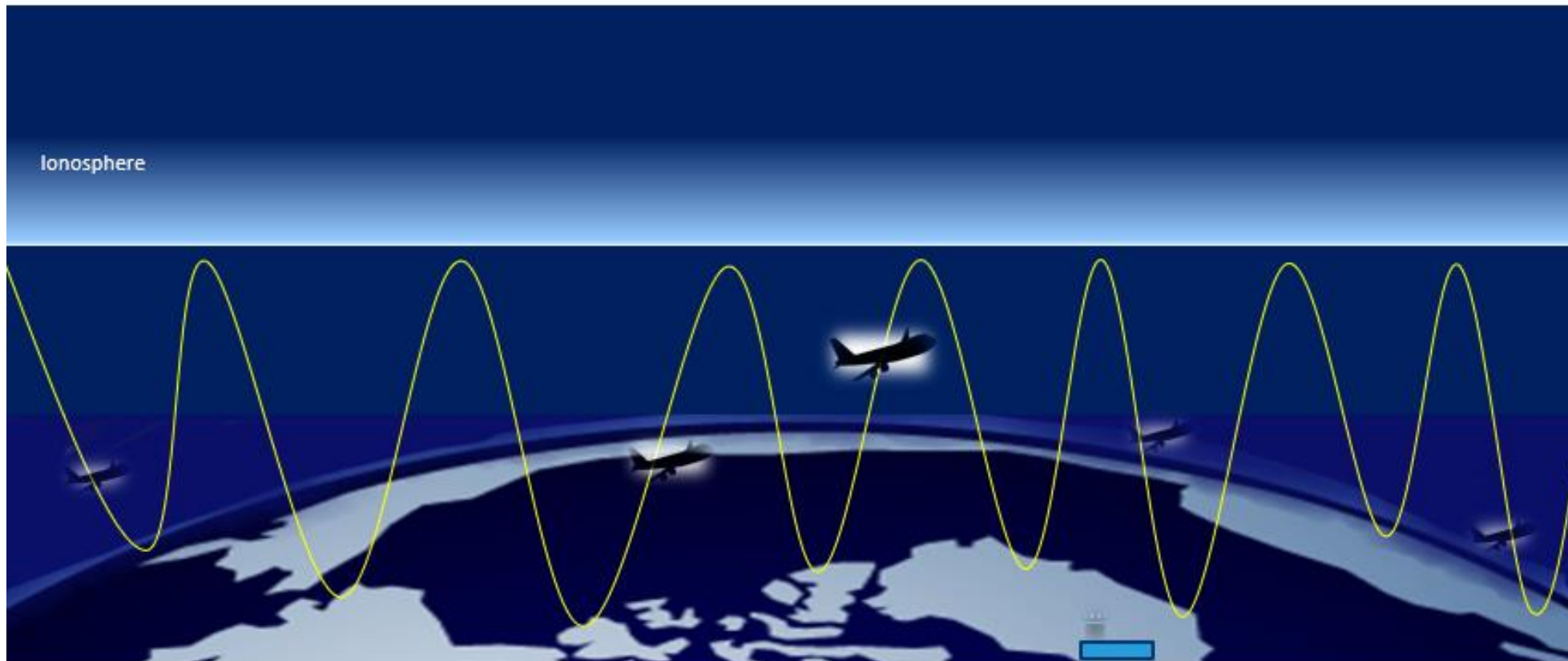
### Study on IMT Use in the frequency bands 4400-4800 MHz





**WRC-27**

## **WRC-27 Agenda Item 1.9: Update Appendix 26 in support of aeronautical mobile (OR) high frequency modernization**

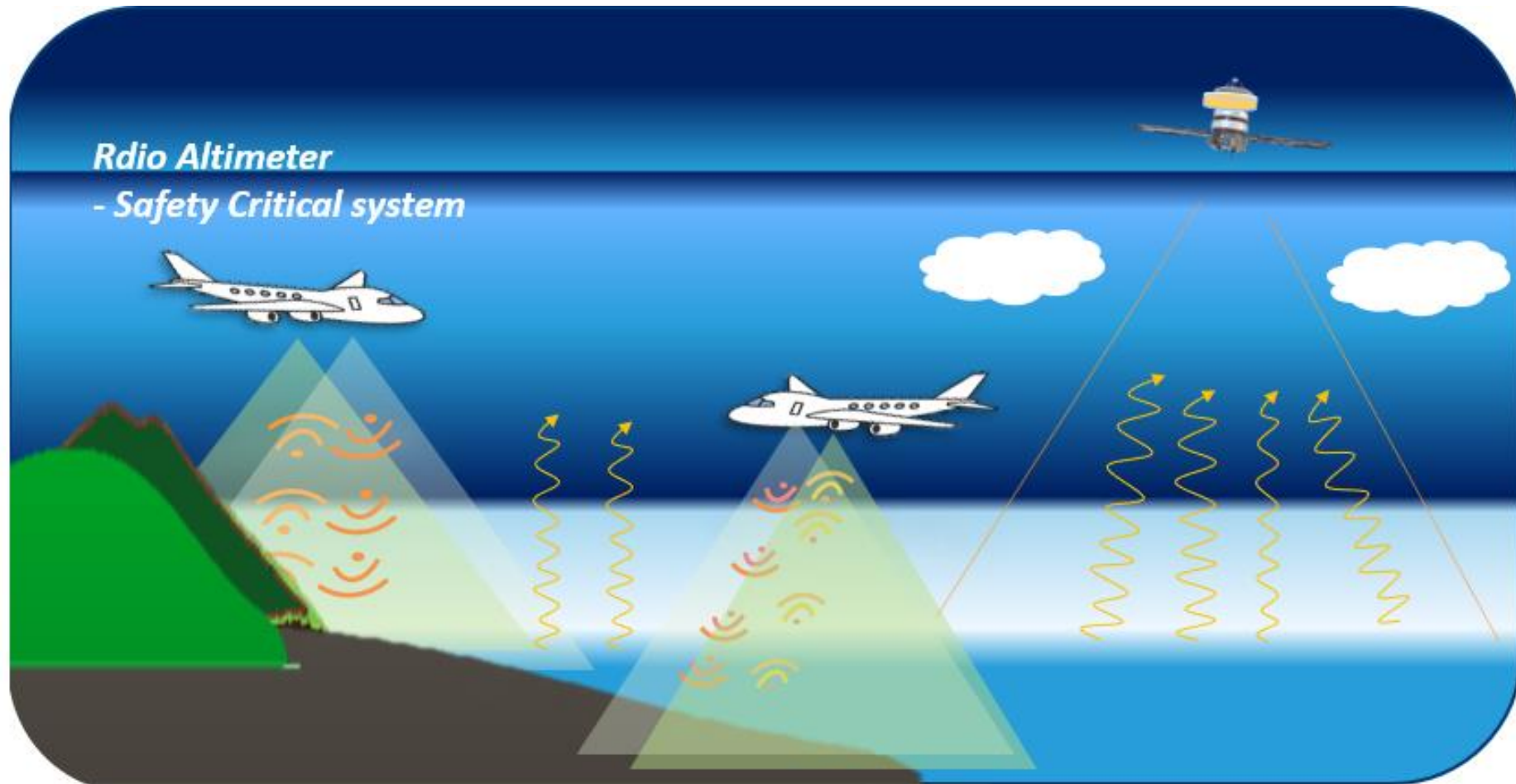


WRC-27

# WRC-27 Agenda Item 1.17: Space Weather Sensors



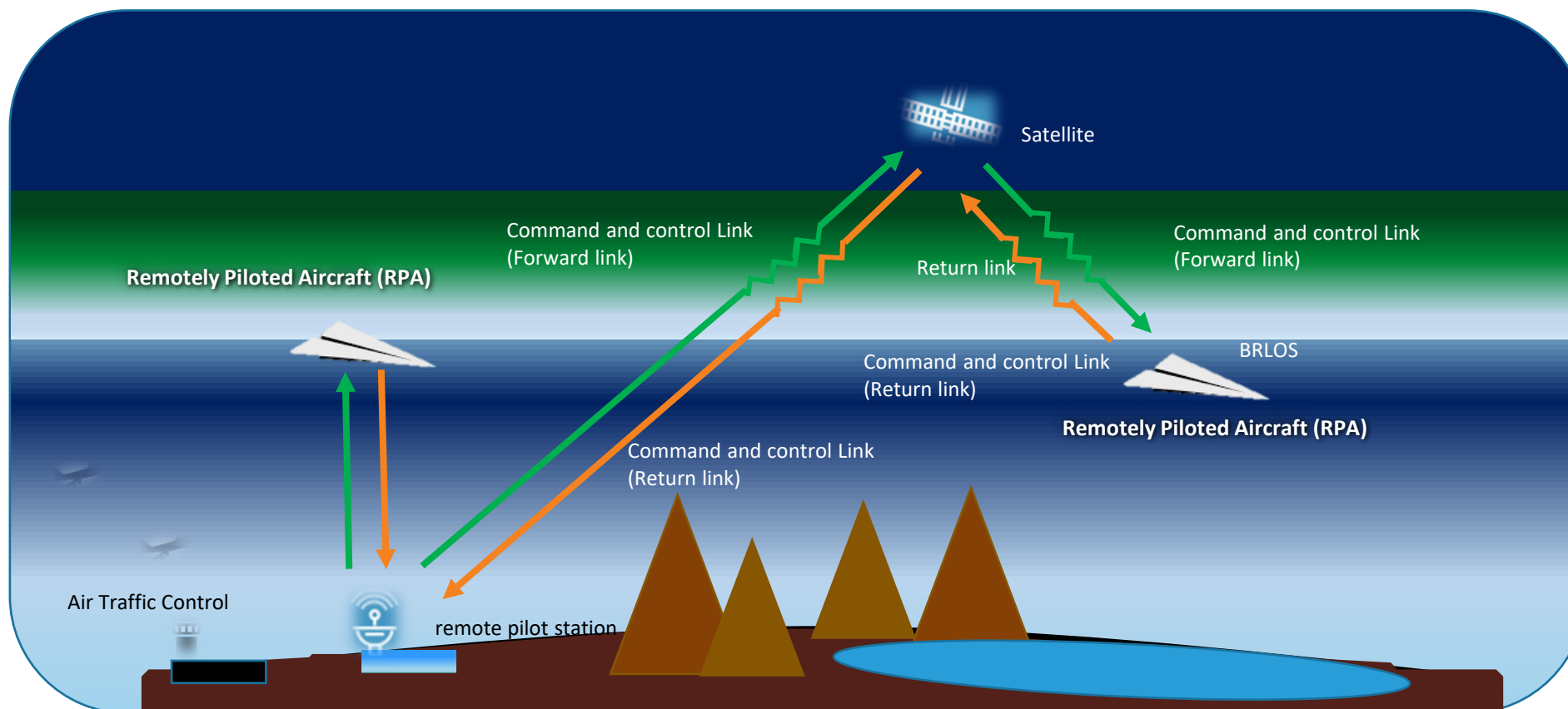
## WRC-27 Agenda Item 1.19: Primary allocations to the EESS passive in the bands 4200-4400



WRC-27

## WRC-27 Agenda Item 6:

Urgent action by Study groups in prep for the next WRC  
beyond-line-of-sight C2-link for RPAS





Thank You!

More information: Frequency Spectrum Management Panel (FSMP)

<https://www.icao.int/safety/FSMP>