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# INTERNATIONAL CIVIL AVIATION ORGANIZATION

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# RECONNECTING THE WORLD



## Handbook on Radio Frequency Spectrum Requirements for Civil Aviation

Volume II - Frequency assignment planning criteria for  
aeronautical radio communication and navigation systems (ICAO Doc 9718, Volume II)

Workshop/Training on  
“Frequency Finder 2023” application  
Bangkok, Thailand | 9 – 13 October 2023

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## Doc 9718, Radio Frequency (RF) Handbook

### Volume I → Spectrum Management

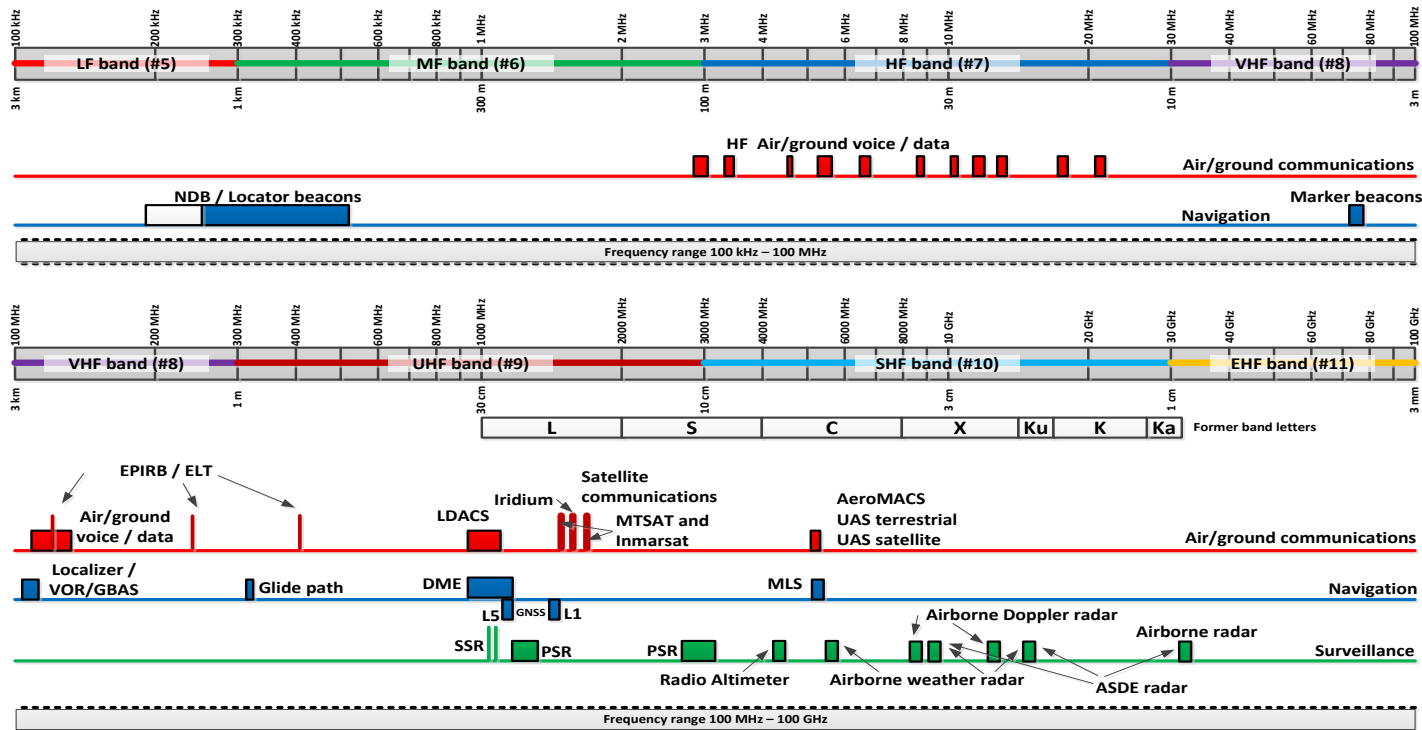
- **ICAO Frequency Spectrum Strategy:**
  - High level vision on existing and future spectrum requirements in support of the evolving CNS systems and infrastructure requirements
- **ICAO Frequency Policy Statements:**
  - Statements of official policy on each and every frequency band used by aeronautical 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

### Volume II → Frequency Management

- **ICAO Frequency Assignment Planning**



## Vol. I – Overview of spectrum for aviation



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 to the Aeronautical Mobile Satellite (R) Service



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## Doc 9718, RF Handbook

## Vol. II – Frequency assignment planning

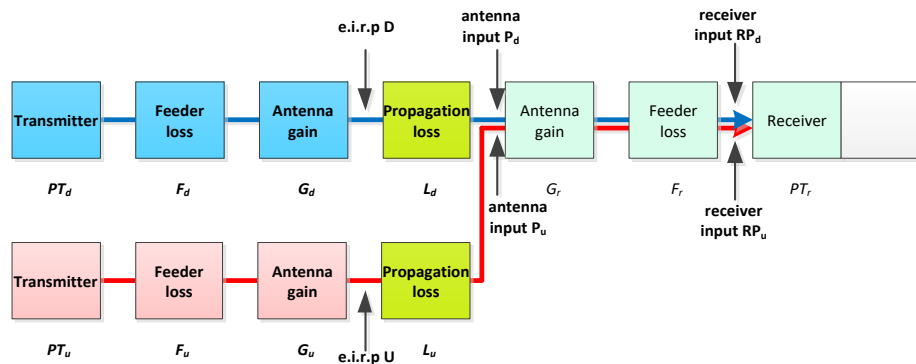
- Provides for globally harmonized frequency assignment planning criteria and guidance material to support the application of SARPs in Annex 10, Vol. V
- Developed in conjunction with the revisions to Annex 10, Vol. V
- Developed by the Frequency Spectrum Management Panel (FMSP)
- New chapters on NAV Aids developed with the help of the Navigation Systems Panel (NSP)
- **Implementation has been agreed through the relevant Regional eANP**
- Support the development of a frequency assignment plan which encompasses the Regional COM lists



## Vol. II – Frequency assignment planning

### Chapter 1 – General methodology (1)

- General methodology for compatibility analysis
  - General model for compatibility assessment
  - Based on:
    - Protection of desired signal at receiver input
    - Not to exceed maximum permissible distortion of receiver output signal

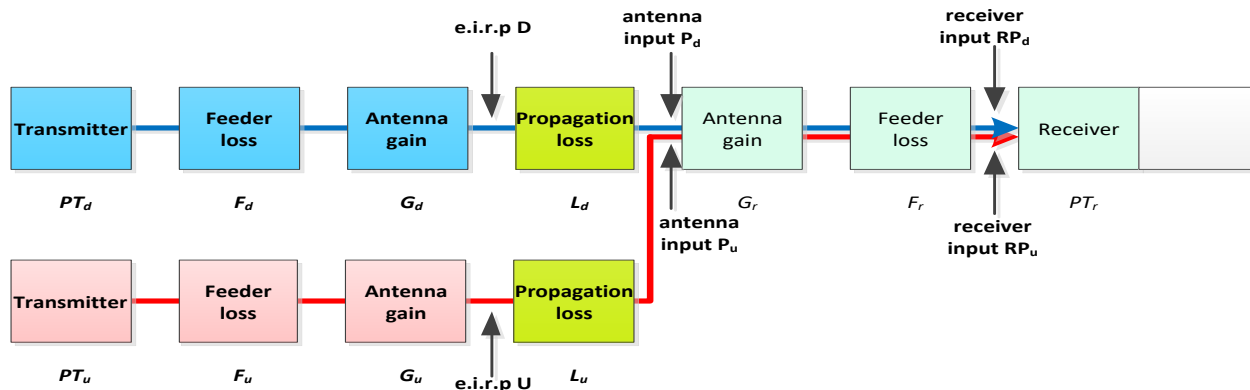






## Vol. II – Frequency assignment planning

### Chapter 1 – General methodology (2)



Determine the desired signal level at receiver input

Determine the undesired signal level at receiver input

Determine the D/U ratio

If  $P_D$  and  $P_U$  are the same, D/U is  $L_D - L_U$



## **Vol. II – Frequency assignment planning Radio wave Propagation model**

- Propagation model
  - Based on free space propagation  
(Re. Recommendation ITU-R P.525)
- Propagation model does not accommodate certain phenomena which are difficult to predict such as
  - Changes in the refractive index of the atmosphere
  - Ducting
- ITU has developed propagation curves for aeronautical communication and navigation systems  
(Recommendation ITU-R P.528)





## **Vol. II – Frequency assignment planning**

### **Compatibility criteria for frequency coordination (1)**

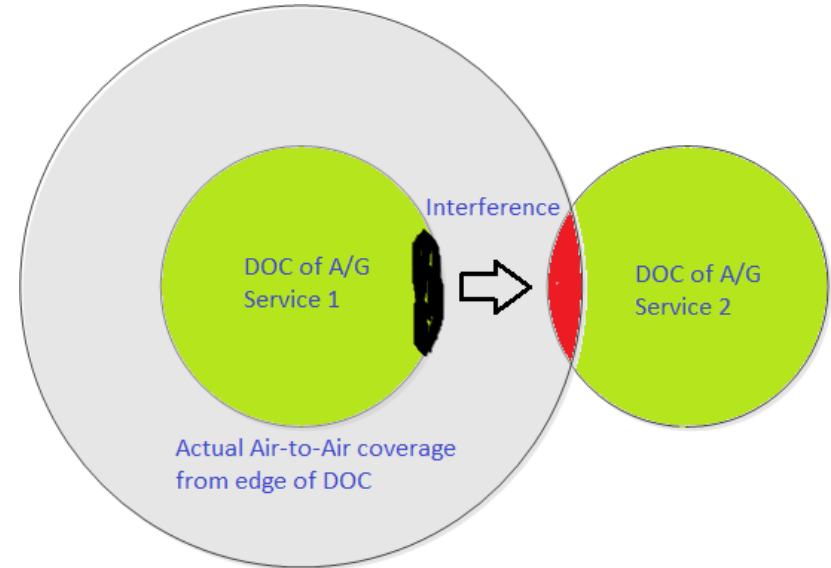
- Frequency assignment planning criteria are to be considered as a generic technical measure to support frequency coordination.
- Planning criteria provide for a rather conservative method to assign frequencies without causing harmful interference.
- In most cases, a detailed technical analysis would result in reduced geographical separation being required.
- Consideration of actual operational use



## Vol. II – Frequency assignment planning

### Compatibility criteria for frequency coordination (2)

- Frequency assignment plans
- may include frequency assignments which do not meet the planning criteria as agreed by ICAO
- In many of such cases these frequency assignments may be considered **operationally** compatible

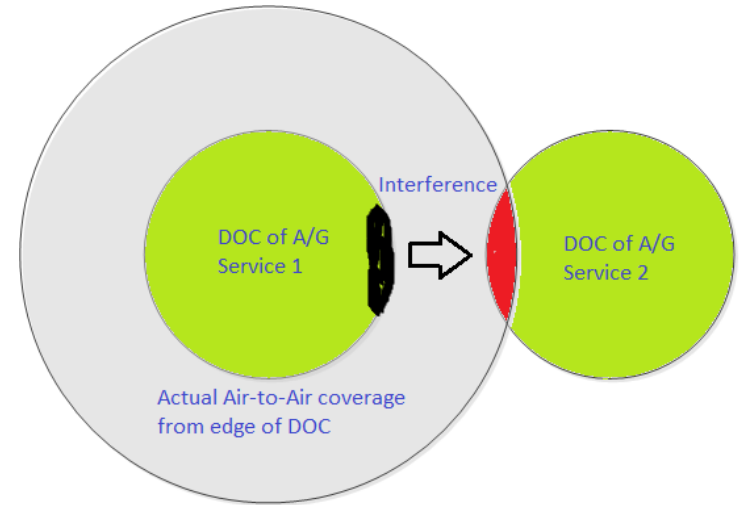




## Vol. II – Frequency assignment planning

### Compatibility criteria for frequency coordination (3)

- consideration of the operational use
  - absence of interference reports
  - consideration of the effect of the terrain.
  - as result of a detailed analysis of the technical characteristics of both the desired and undesired stations
- Non-compatible identification in Frequency Finder  
does not necessarily imply operational incompatibility

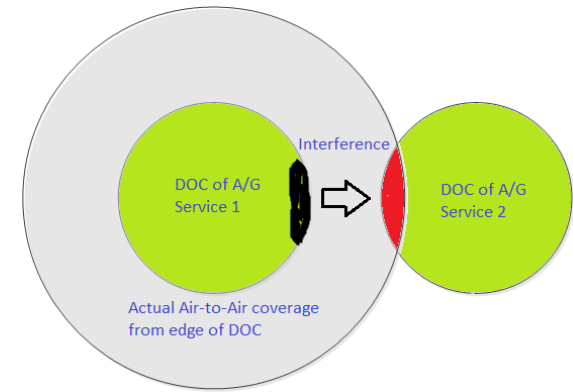




## Vol. II – Frequency assignment planning

### Compatibility criteria for frequency coordination (4)

- A station that is considered “Not Compatible” because it does not meet the ICAO frequency assignment planning criteria is not, by default, also operationally “Not Compatible”
- Frequency Finder displays geographical areas where interference is *predicted* to support a more detailed analysis.





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***QUESTIONS?***



Thank You!