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INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY

Coordination of Aeronautical Frequencies

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STATUS OF ITU RADIO REGULATIONS AND ICAO SARPS

Radio Regulations

Mandatory clauses used in
- Articles,
- Appendices and
- ITU WRC Resolutions

Obligatory

in Volume 3 of RR and referenced in Volume 1 and 2 of RR

ITU Recommendations

Part of RR but no obligatory

ITU Standards

published in ITU-R or ITU –T specification documents

Except for the very few instances where an ITU-R Recommendation is incorporated in the Radio Regulations, included in Volume 4 of the Radio Regulations and compliance is mandatory.

ICAO Annex 10

Standards and Recommended Practices (SARPs) for Aeronautical Telecommunications

Article 38 of the ICAO Convention *imposes an obligation to Contracting States, requiring them to notify the Organization of any differences between their national regulations and practices and the International Standards contained in the Annex*

RELATIONSHIP BETWEEN ITU RADIO REGULATIONS AND OTHER MATERIAL AND ICAO SARPS

The Radio Regulations	ICAO SARPs - Annex 10

• ensure interference-free operations of radiocommunication systems and provide ITU Member States with equitable access to the radio spectrum.
• supplement the ITU Constitution and Convention and form the core of the international framework for:
  ○ management of the radio frequency spectrum,
  ○ protection of existing radio services, and
  ○ enabling the introduction of new and enhanced services
	• ensure the safety and regularity of air navigation.
	• specify interface and performance standards for internationally agreed aeronautical systems.
	• contain procedures for regular and emergency communications that are specifically developed for aviation purposes, taking account of the operational conditions.
	- These procedures supplement the basic requirements of the Radio Regulations for procedures in aeronautical communications.

- The Radio Regulations and ICAO SARPs together, form a complementary set of regulatory provisions without any overlap.
- The Radio Regulations must evolve within the general telecommunications environment with its many and diverse users of the radio frequency spectrum, while the ICAO SARPs respond to the operational safety aspects of air navigation and are developed and agreed by aviation within the ICAO organizational framework.

FREQUENCY COORDINATION AND REGISTRATION

ITU framework

The coordination/registration of frequency assignments	• Is performed in accordance with procedures in the RR • Provide international protection of the assignment • Take place through the radio regulator authorities in each country
Frequency registration	in the Master International Frequency Register (MIFR)

ICAO framework

The coordination of frequency assignments **ICAO Doc 9718 Vol II**	• **Is undertaken by ICAO through ICAO regional offices** To support this coordination, ICAO has developed **- frequency assignment planning criteria** **- A global frequency assignment plan** • Take place in most cases with the national civil aviation and/or radio regulatory authorities
Frequency registration	Many of aeronautical frequency assignment tend to be recorded only in national registers or in the ICAO regional air navigation plans.

FREQUENCY COORDINATION AND REGISTRATION (continued)
Reference material from an aeronautical perspective

	Allocations	Allotment	Assignment
Distribution to	Services	Areas or States	Stations
Reference documents/ tools relevant to aviation community	ITU Radio Regulations National regulations	• National regulations • Regional agreements	• National regulations
		• Regional frequency allotment tables in ICAO Doc 9718 Volume II • Regional Air Navigation Plans	• Frequency Finder frequency assignment coordination software used by ICAO Regional Offices for coordination of COM and NAV frequencies

Note. - the table is not comprehensive, other references may also apply, depending on your State

ICAO Doc 9718
Handbook on Radio Frequency Spectrum Requirements for Civil Aviation

Vol. I - ICAO Spectrum Strategy and Policies
Vol. II - Frequency Assignment Planning

Doc 9718 and other relevant material can be downloaded, free of charge, from the FSMP website (Documents section) at:

http://www.icao.int/safety/fsmp

- The latest Edition of Doc 9718 Volume I, second edition + recent updates,
  - is now available on FSMP website…
- Volume II has also recently been updated, second edition 2022

Doc 9718 Volume I
Spectrum Strategy and Policies

Overall ICAO Spectrum Policy (approved by Council)

- **ICAO Spectrum Strategy**
  - Long term spectrum use of current and future radio systems
- **ICAO Spectrum Policy Statements**
  - Specific actions to assist in meeting the Strategic Objectives
- **ICAO Position for future WRC's**
  - Medium and long term availability of spectrum for aviation

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Doc 9718 Volume II
Frequency assignment planning criteria for aeronautical radio communication and navigation systems

Published for the first time in 2013, and Updated in 2017 and 2022

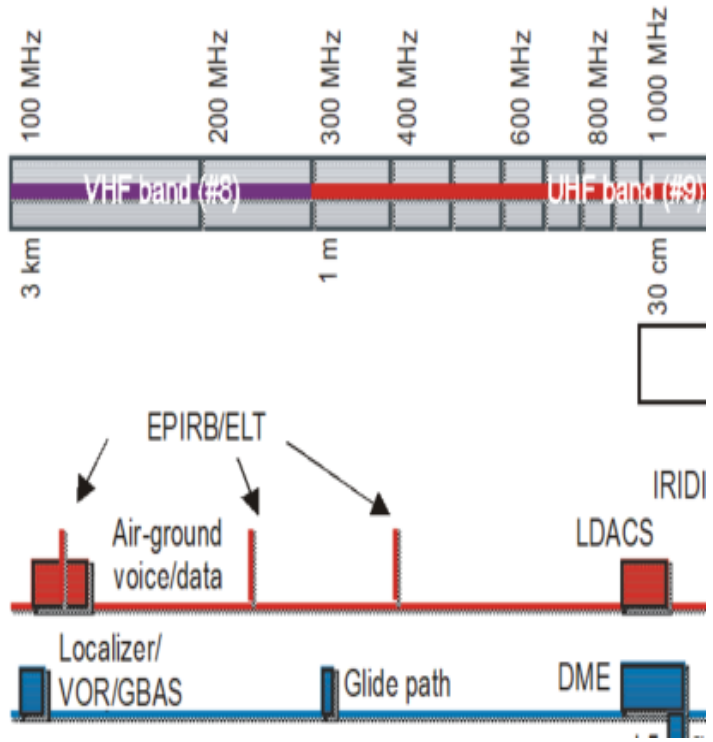
Provides globally harmonized frequency assignment planning criteria and guidance material to support the application of SARPs in Annex 10, Vol. V

- Developed in conjunction with the revisions to Annex 10, Vol. V
- Developed by FSMP (previously ACP Working Group F) and NSP
- **Implementation through Regional Air Navigation Agreement by PIRG**
- Frequency Assignment Planning criteria is used by the ICAO Frequency Assignment Planning software: **Frequency Finder (FF)**

Doc 9718 Volume II

Frequency assignment planning criteria for aeronautical radio communication and navigation systems

Frequency assignment planning criteria		Aeronautical Service
Chapter 1.	General methodology for compatibility analysis	
Chapter 2.	Aeronautical VHF air-ground radio communication systems operating in the band 117.975–137 MHz	Communications
Chapter 3.	Instrument landing system (ILS)	Navigation
Chapter 4.	VHF omnidirectional range (VOR)	
Chapter 5.	Distance measuring equipment (DME)	
Chapter 6.	Ground-based augmentation system (GBAS)	



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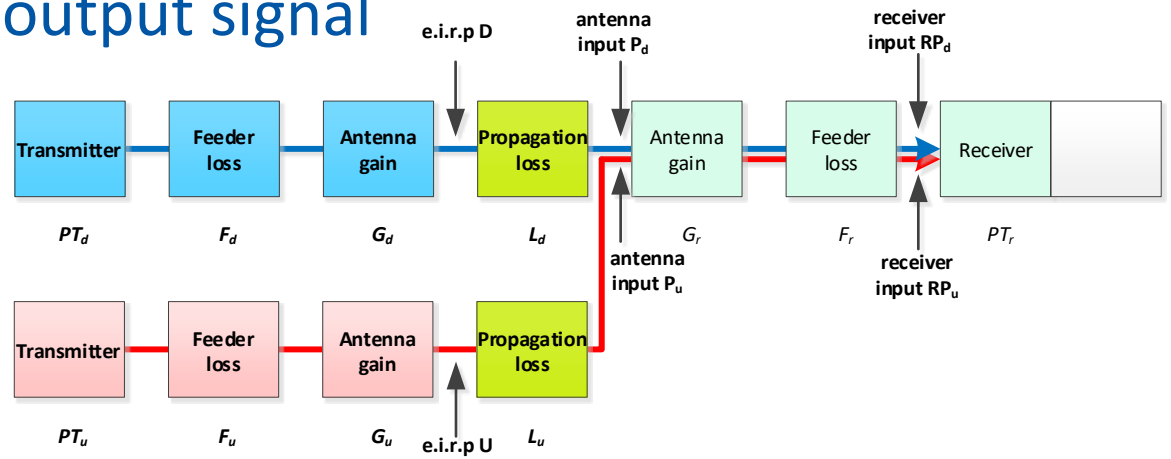
Chapter 1 (1) General methodology

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



Chapter 2 (1)

Frequency assignment planning criteria for VHF air-ground communication systems

❑ General flow of Aircraft Operations

Pre departure		Departure	En route	Arrival	Post arrival	
Aerodrome Control Service		Approach Control Service	Area Control Service	Approach Control Service	Aerodrome Control Service	
AS	TWR	APP	ACC	APP	TWR	AS
Ground/ Aerodrome surface  Aerodrome A	Aerodrome control tower / aerodrome control 	Approach Control Service (departure) 	En-route 	Approach Control Service (arrival) 	Aerodrome control tower / aerodrome control 	Ground/ Aerodrome surface (AS)  Aerodrome B

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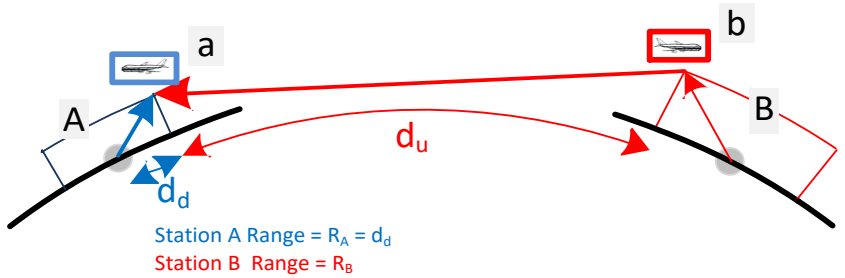
Chapter 2 (2)

Frequency assignment planning criteria for VHF air-ground communication systems

Interference model (co-frequency separation)

- Conforms to the general methodology in Chapter 1
- Model for establishing separation distances to prevent air-to-air interference:



- Minimum separation between stations A and B:

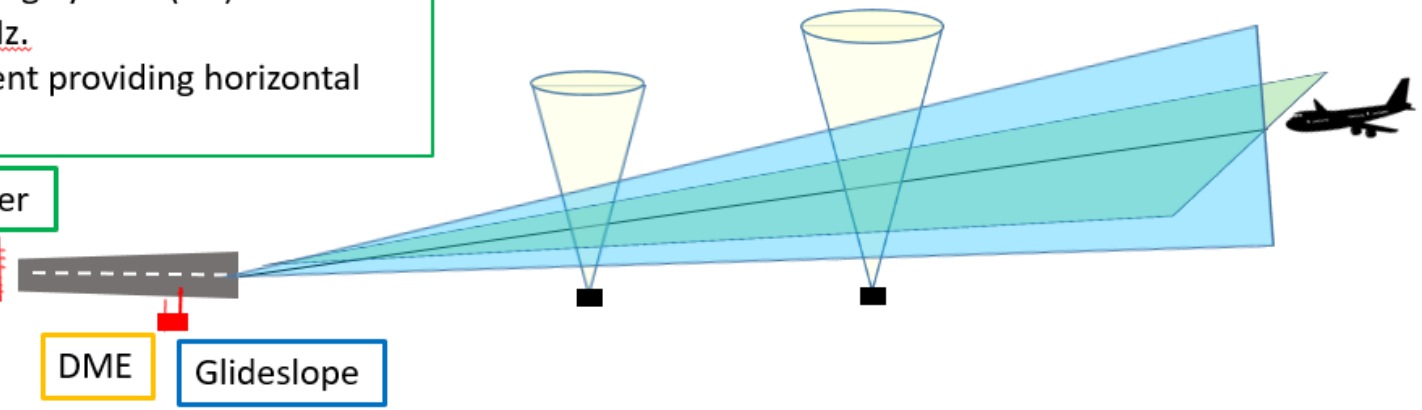
Range A + Radio horizon A + Radio Horizon B +Range B

Chapter 3 (1) - Instrument Landing System (ILS)

- Instrument Landing System (ILS) Marker beacon
- 74.8 -75.2 MHz
- VHF marker beacon providing range information

Marker beacon

- Instrument Landing System (ILS) Localizer
- 108–111.975 MHz.
- VHF ILS component providing horizontal guidance



Most marker beacons have been replaced with Distance measuring equipment (DME: 960-1215 MHz). As long as marker beacons are in operation, the band needs to be available."

- Instrument Landing System (ILS) – Glideslope
- 328.6–335.4 MHz
- UHF ILS component providing vertical guidance

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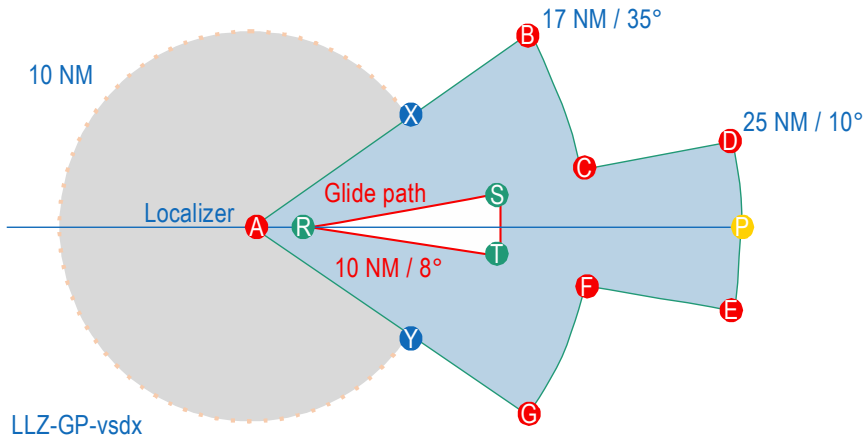
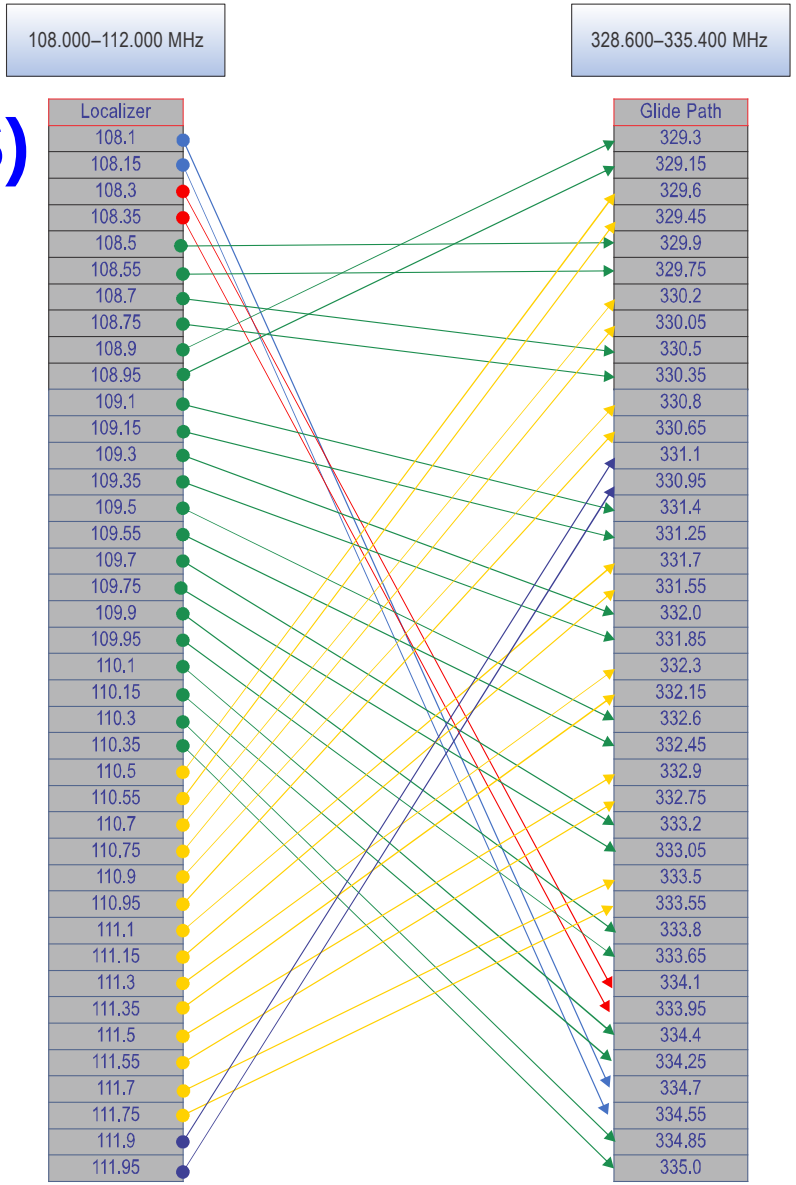
Frequency assignment planning

Chapter 3(2) - Instrument Landing System (ILS)

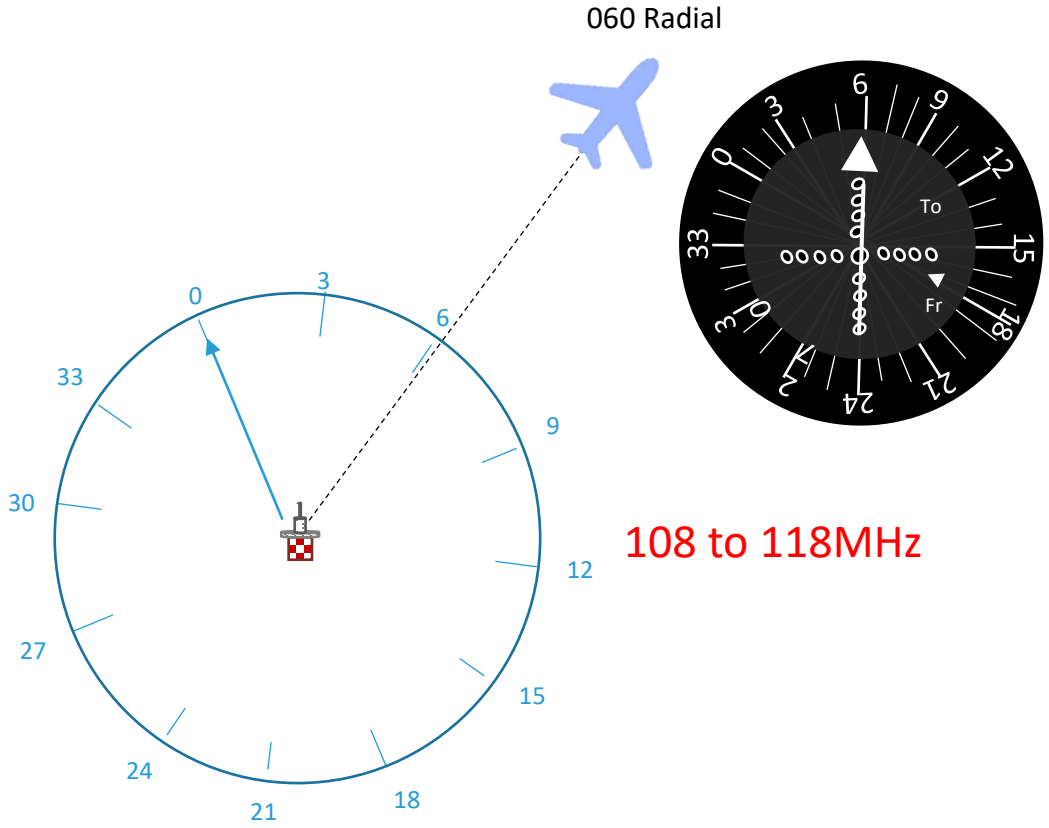
Methodology and examples for calculation of separation distances for:

- Localisers (108-112 MHz)
- Glidepath (328.6-335.4 MHz)
- Localisers versus VOR and GBAS VDB

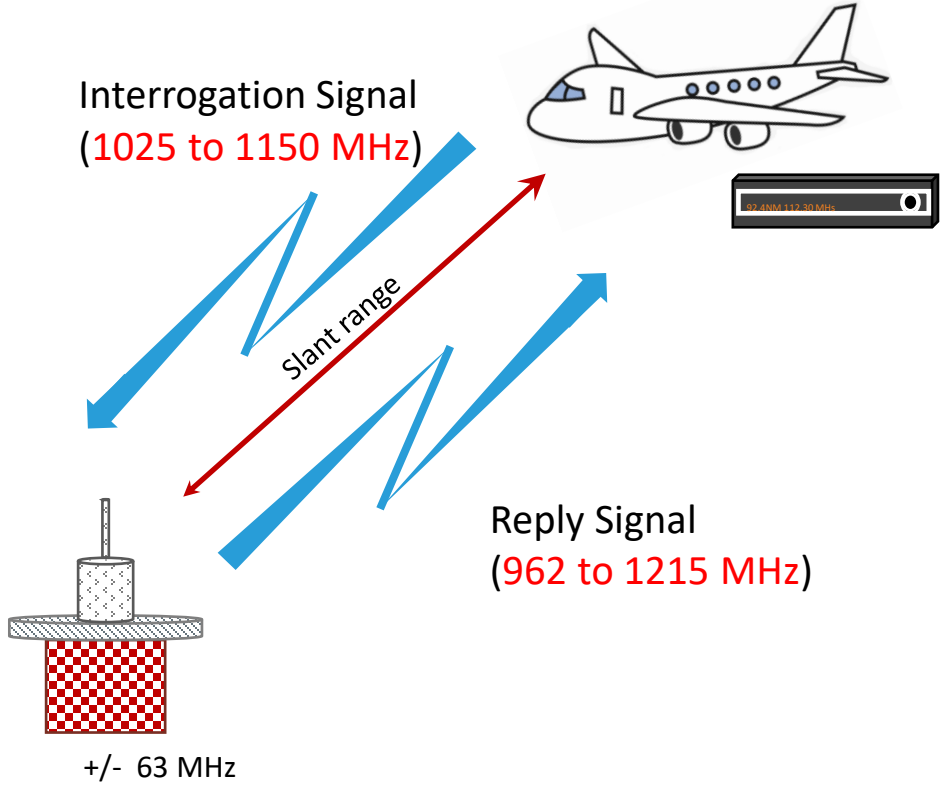




Chapter 4 (1) - VHF Omnidirectional Range (VOR)/ Chapter 5 (2) - Distance measuring Equipment (DME)



VHF Omnidirectional Range (VOR)



Distance Measuring Equipment (DME)

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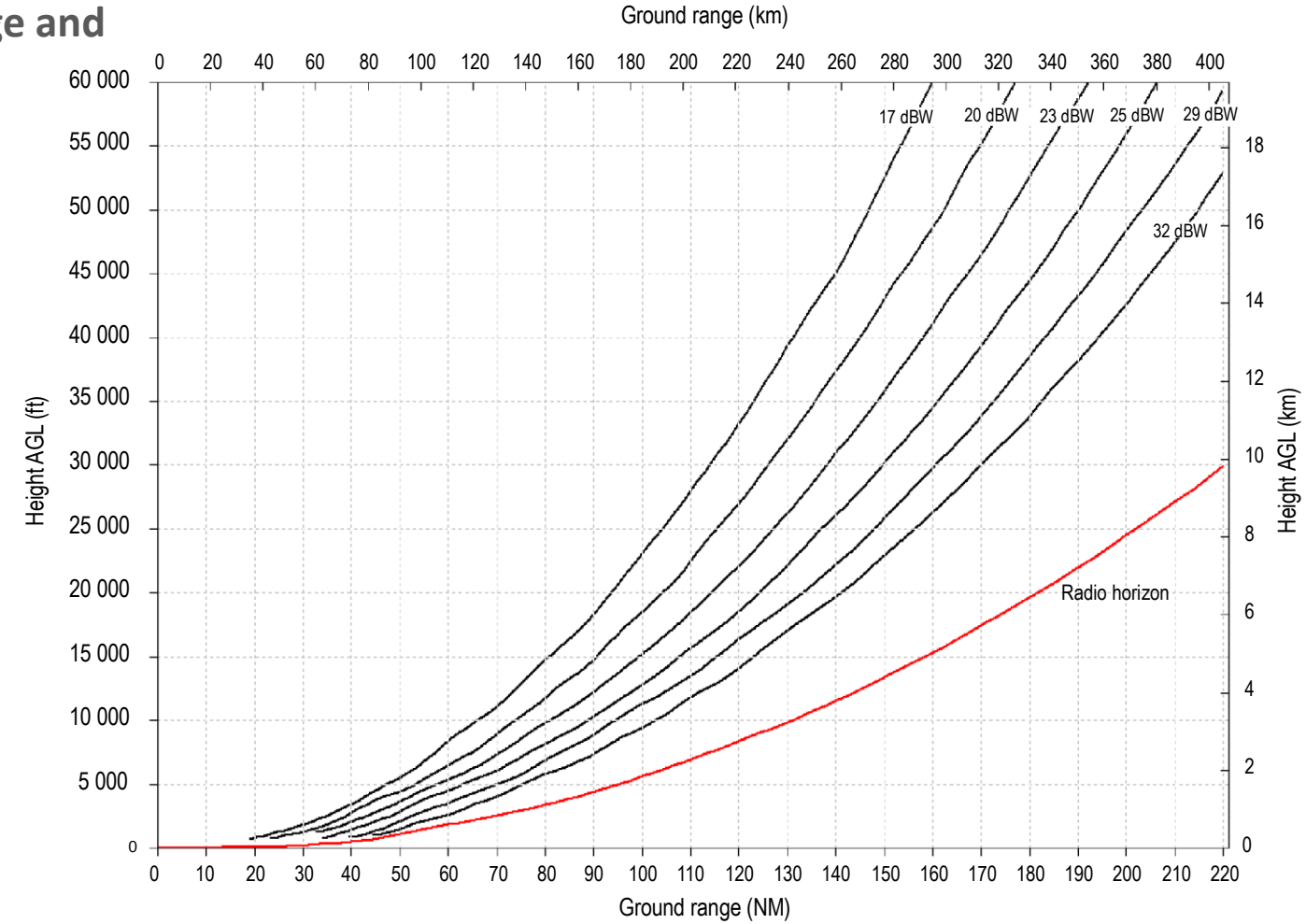
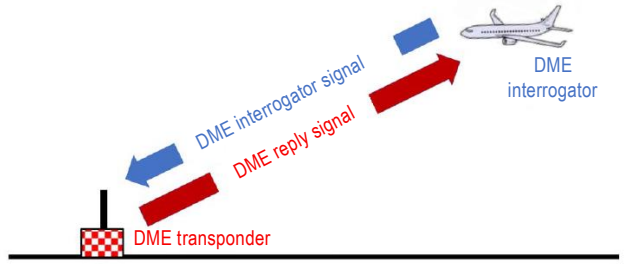
Frequency assignment planning

Chapter 4 (2) – VHF Omnidirectional Range (VOR)

Methodology and examples for calculation of range and separation distances for:

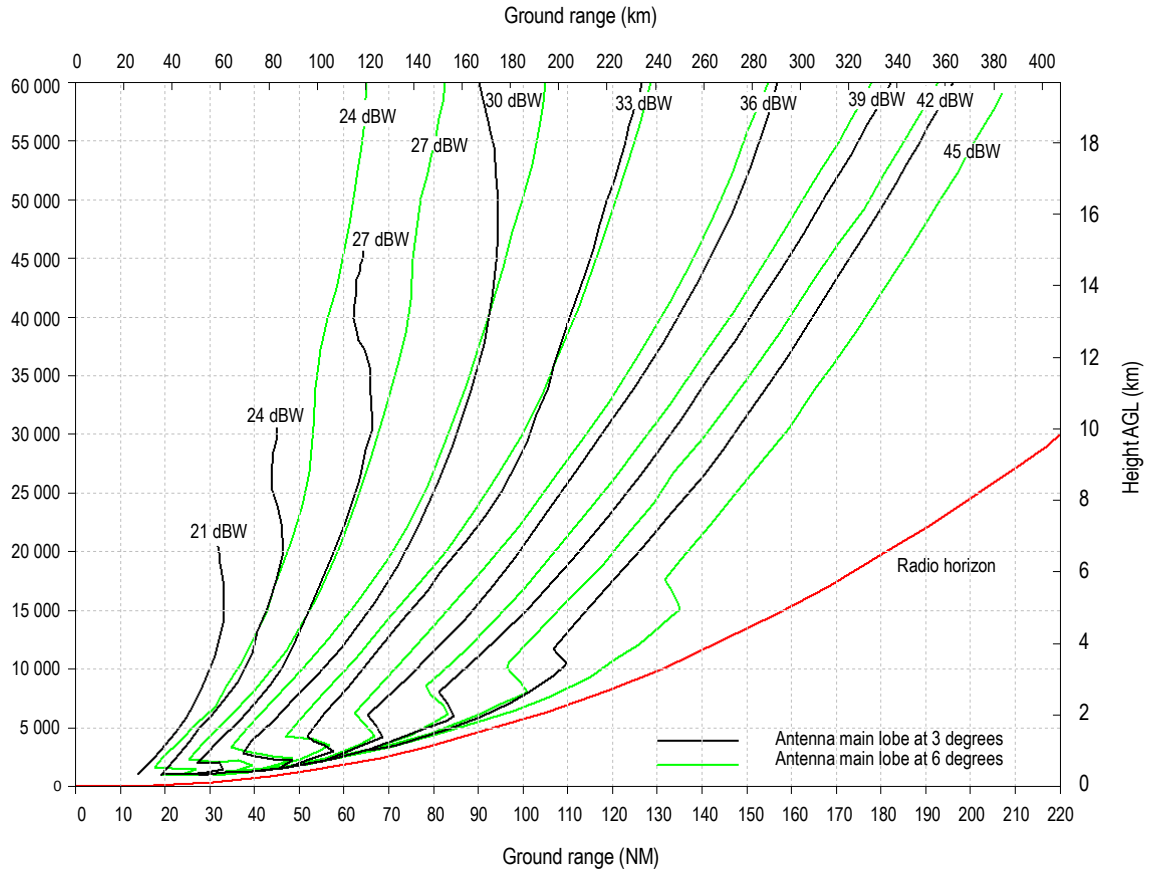
- VOR (108-117.975 MHz)
  - ✓ Associated with DME
  - ✓ Operating in the band 108 – 112 MHz
- VOR versus Localizers
- VOR versus GBAS

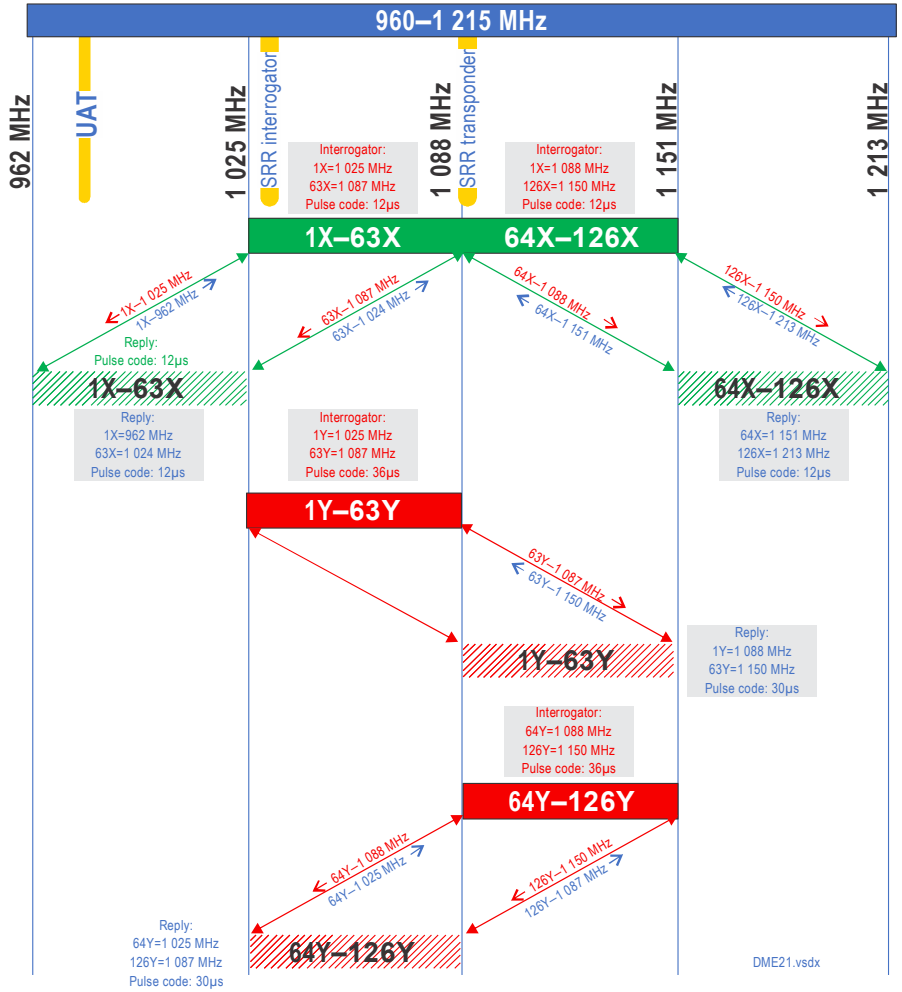




Chapter 5 (2)– Distance Measuring Equipment (DME), 960 – 1215 MHz

Methodology and examples for calculation of operational coverage and separation distances





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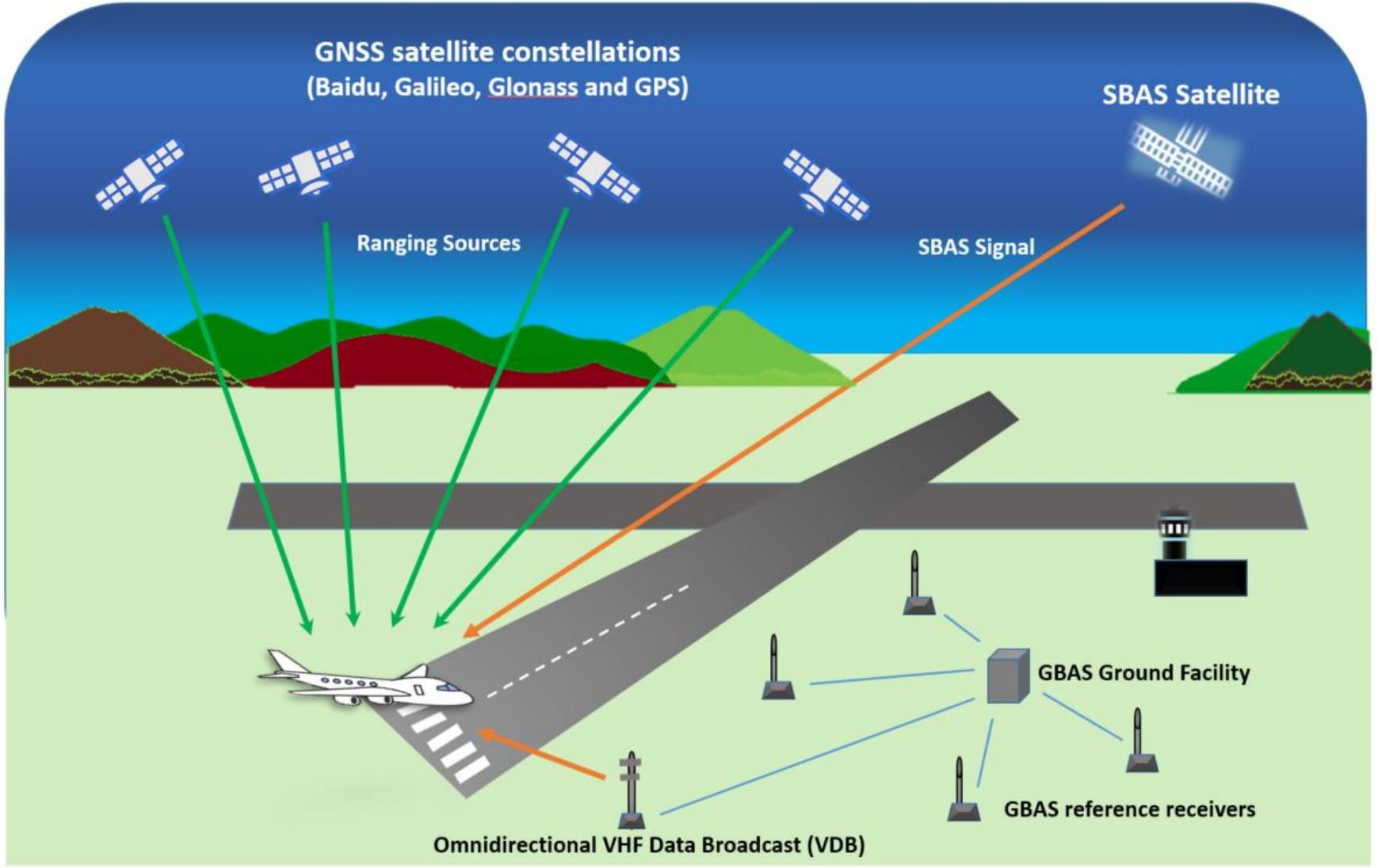
Chapter 6 (1) – Ground Based Augmentation System (GBAS), 108 – 117.975 MHz



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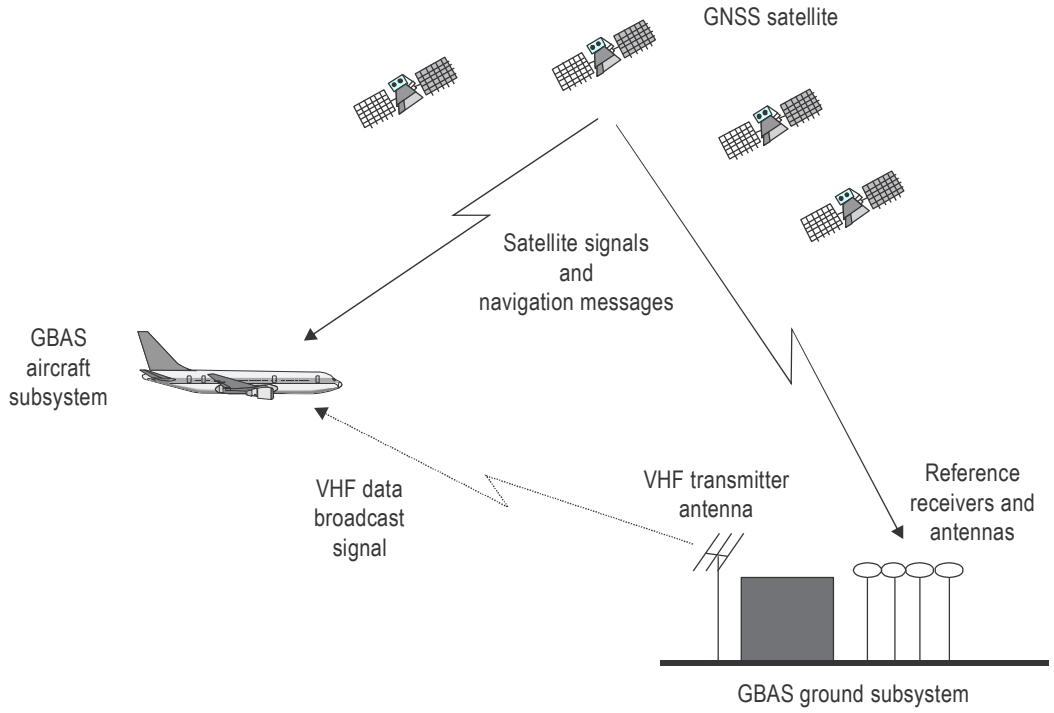
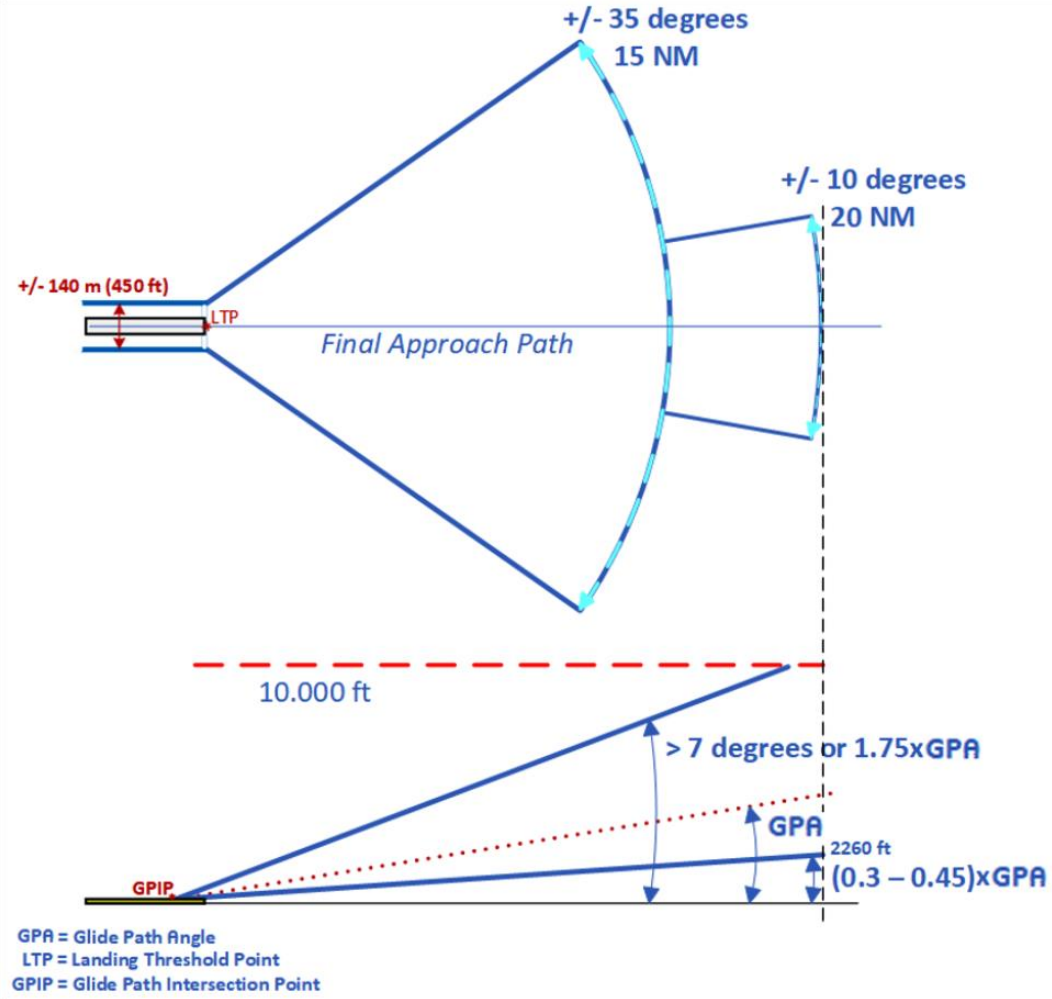
Frequency assignment planning

Chapter 6 (2) – Ground Based Augmentation System (GBAS), 108 – 117.975 MHz

Methodology and examples for calculation of operational coverage and separation distances





ICAO Coordination and Assignment procedures for VHF aeronautical mobile (route) services (AM(R)S) (117.975-137 MHz)

Aeronautical Service	Frequency	Systems
Navigation	108–117.975 MHz	ILS localizer, VOR, GBAS
Communications	117.975–137 MHz	Air-ground and air-air communications (VHF voice and data)

ICAO Coordination and Assignment procedures for VHF aeronautical mobile (route) services (AM(R)S) (117.975-137 MHz)

- ICAO Regional Offices continue to maintain its frequency selection and coordination role (especially inter-regional coordination role), which includes the maintenance and promulgation of Frequency List No. 3 (Aeronautical Communication facilities in the VHF Frequency Bands from 117.975 to 137 MHz).

- The latest information is available for States (DGCAs, CAAs and ANSPs) on each Regional office's website or the website through Frequency Finder (frequency management tool developed and managed by ICAO)

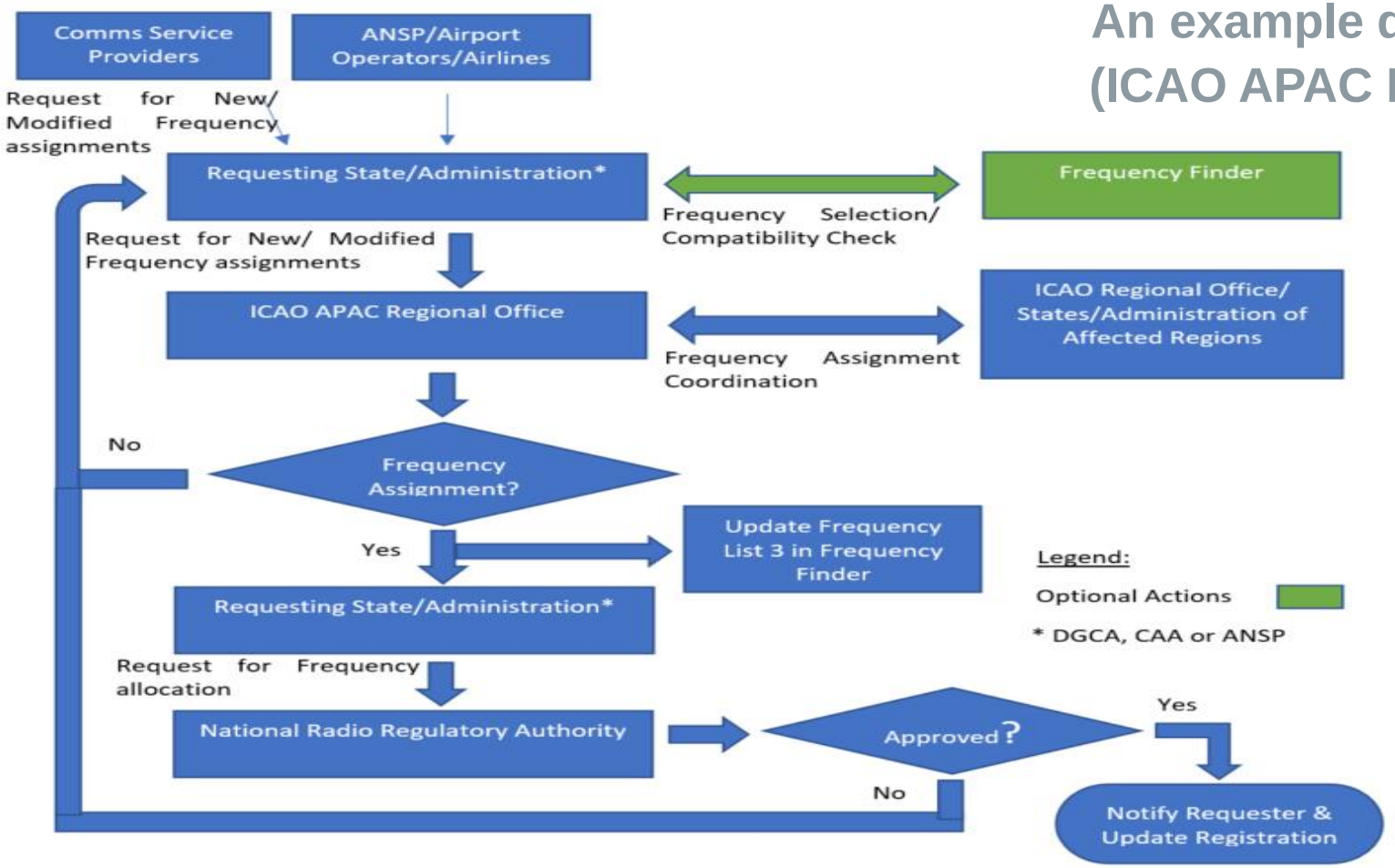
- To facilitate the final coordination performed by the Regional Office, States/Administrations are encouraged to use the ICAO's Frequency Finder to select their proposed frequencies and perform compatibility checks before submitting their requests to the Regional Office.

- Upon receipt of the requests, the Regional Office will use the Frequency Finder to perform similar compatibility checks and frequency selection, if required. When a proposed/selected frequency may affect other air navigation regions, the Regional Office will coordinate with the respective Regional Offices or States of the affected regions.

Note.- Frequency Finder is the ICAO aeronautical radio frequency management tool for VHF COM and NAV frequency assignments.

ICAO Coordination and Assignment procedures for VHF aeronautical mobile (route) services (AM(R)S) (117.975-137 MHz)

An example diagram (ICAO APAC Region)



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Frequency assignment planning

Future work

- The 2022 update added material on radionavigation systems (ILS, VOR, DME and GBAS), as developed with the help of NSP. Editorial update of this material is planned in the near future
- Future work will concentrate on refining the existing criteria and adding criteria for systems such as LDACS
- The Handbook and other relevant material can be downloaded from the FSMP website (Repository section) at http://www.icao.int/safety/fsmp

Thank You!

More information: Frequency Spectrum Management Panel (FSMP)
https://www.icao.int/safety/FSMP

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