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PANS-OPS Flight Procedure Design Training for CAAs

23 August – 03 September 2021





07 – Arrival procedures

(Doc. 8168, vol. 2, Part I, Section 4, Chap. 2, Part III, Sections 1, 2 & 3)

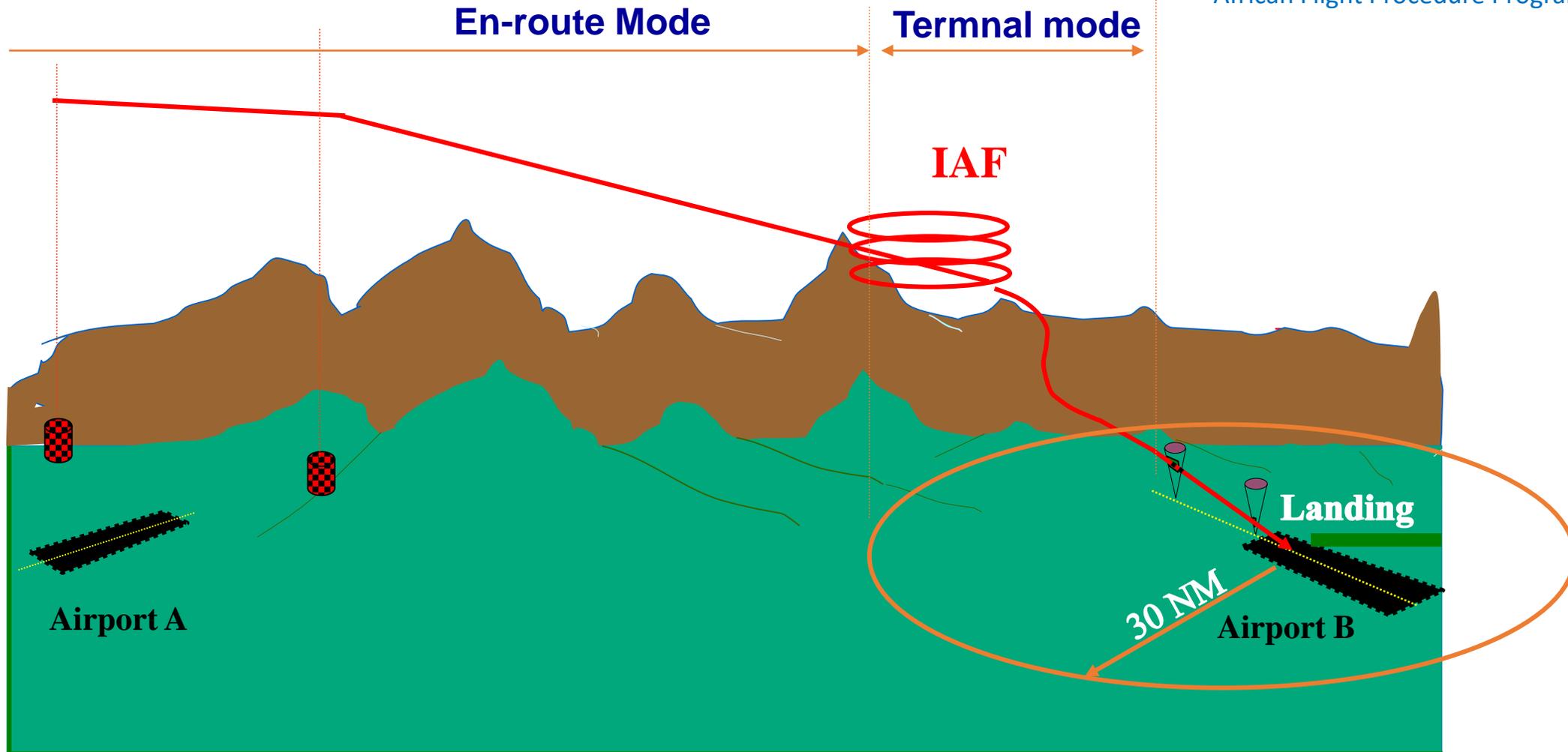




- 1. General**
- 2. Standard Arrival Routes**
- 3. Omnidirectional arrivals**
- 4. Publications**



- Two types of arrival procedures:
 - ☞ Standard Arrival Routes (STARs);
 - ☞ Omnidirectionnal arrival:
 - Minimum Sector Altitude (MSA);
 - Terminal Arrival Altitudes (TAA).
- STARs:
 - ☞ Arrival Waypoint (AWP): Start point;
 - ☞ Initial Approach Point (IAF).
- MOC: 300 m.

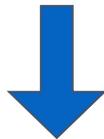


General method for area width calculation

1

XTT value

(according to navigation specification)



Identify distance to ARP for
Buffer Value (BV)



Semi- Area Width calculation

$$1/2 \underline{AW} = 1.5 \text{ XTT} + \text{BV}$$

2

If part of the arrival is at a distance > 30 Nm

Calculate AW at 30 NM using



BV
of
ENROUTE



XTT of
subsequent
segment



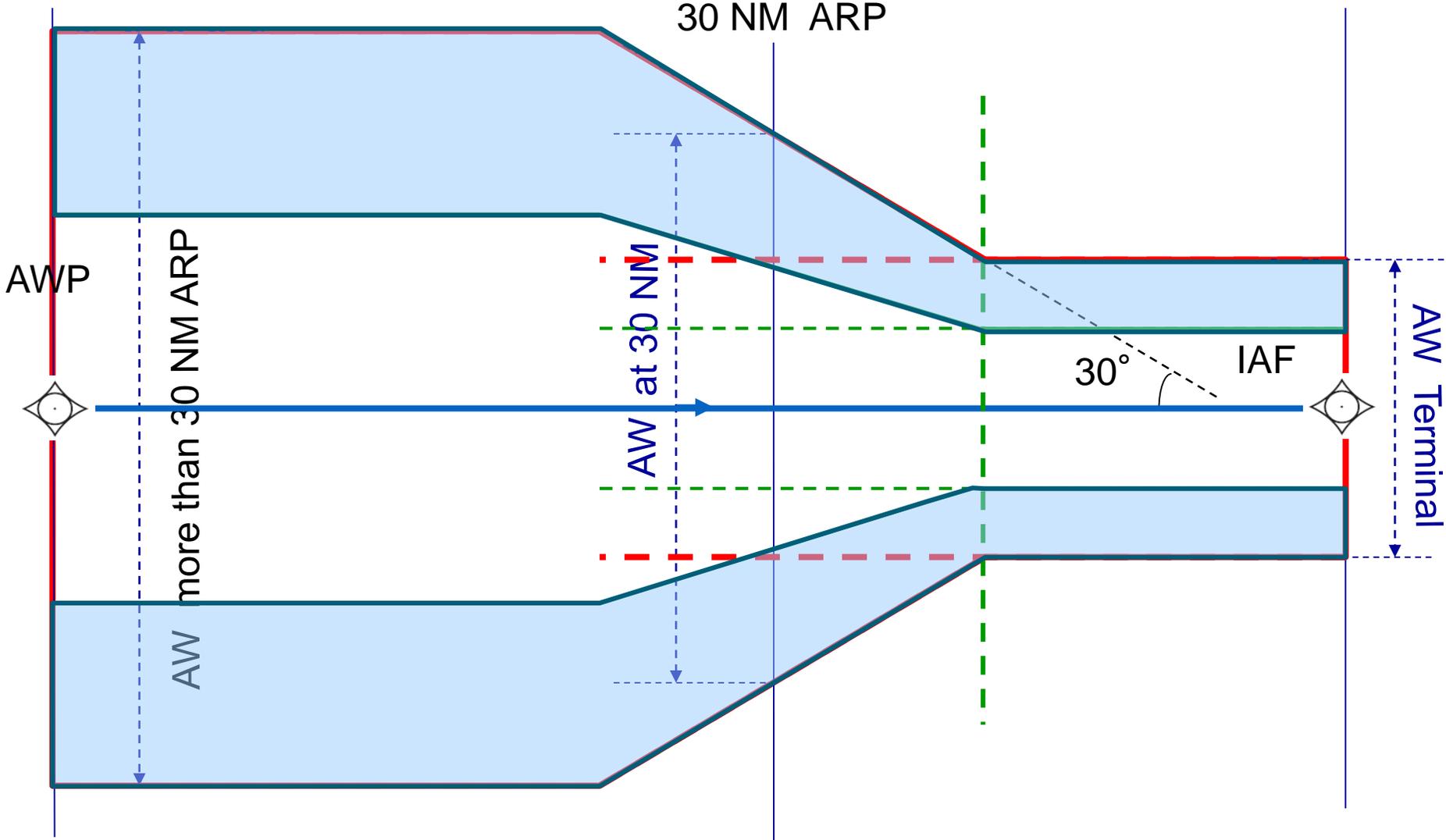
**Apply MERGING
method to connect**



Example for RNAV 1 with GNSS

- ❑ BV for en-route is 2 NM;
- ❑ XTT of less than 30 NM is 1 NM;
- ❑ $\frac{1}{2}$ AW at 30 NM is :
 - 👉 $1.5 \times 1 + 2 = 3.5$
- ❑ $\frac{1}{2}$ AW at **MORE** than 30 NM : 5 NM;
- ❑ $\frac{1}{2}$ AW at **LESS** than 30 NM is : 2.5 NM.
- ❑ Merging method :
 - 👉 **30° ANCHORED** by the semi-area width (3.5 NM) at the **point of change** (30 NM) to
 - 👉 **TAPER** to 2.5 NM;
 - 👉 **SPLAY** up to 5 NM.

MERGING METHOD





Protection parameters

- FO or FB waypoint;
- Pilot reaction delay : 6 s;
- Bank angle delay : 5 s;
- Bank angle : 25°;
- Descent gradient : 15% max;
- MOC : 300 m up to 600 m;
- Secondary area principle.



□ Two type of omnidirectional arrivals:

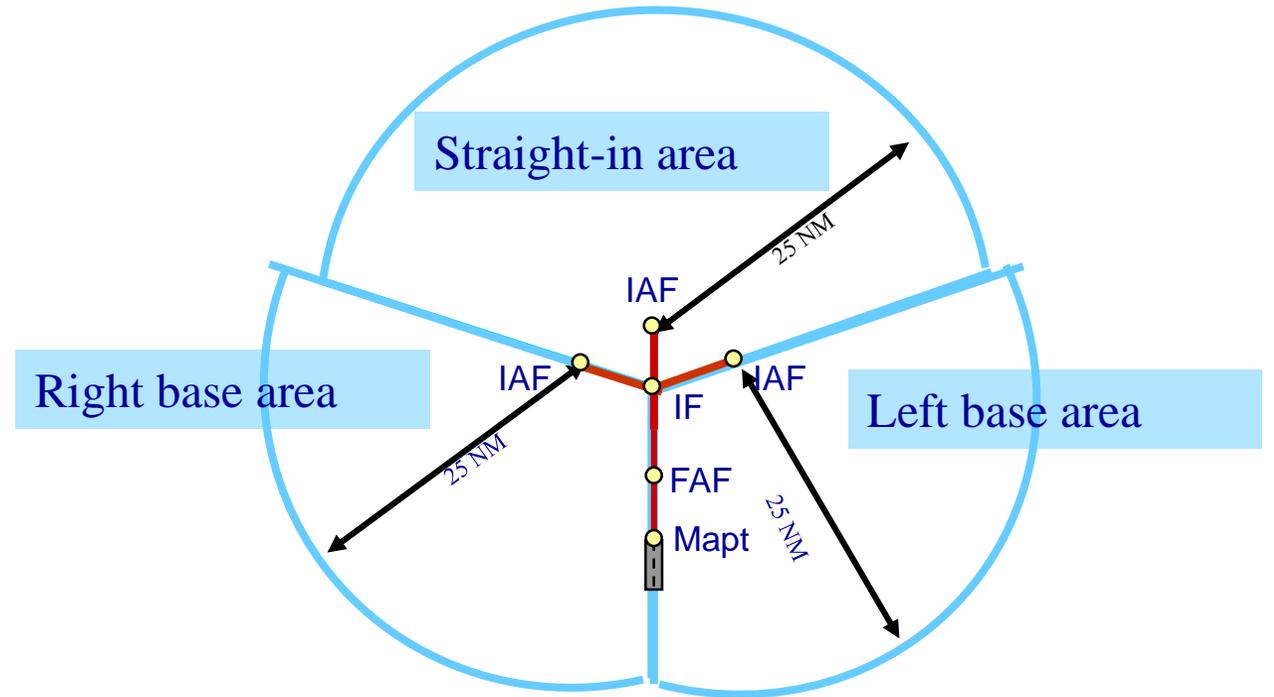
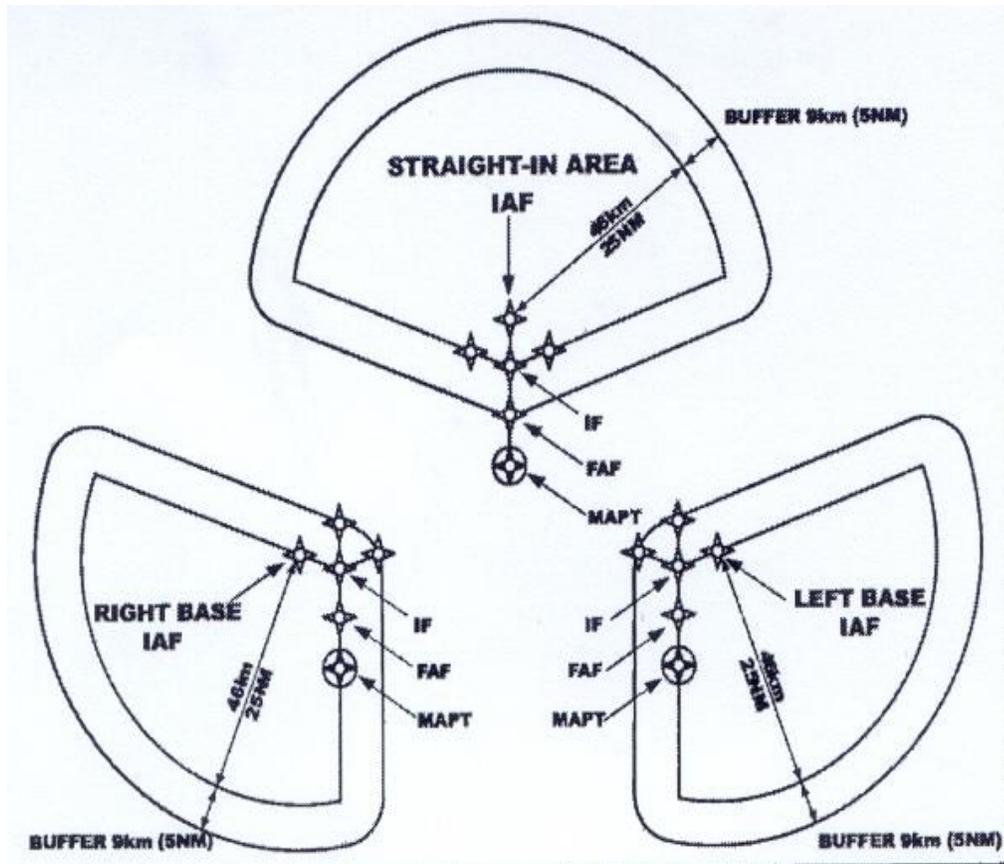
☞ MSA :

- Cercle of 25 NM radius (+ 5 NM Buffer):
 - Centered either on:
 - ✓ ARP/HRP or,
 - ✓ Navaid.

☞ TAA:

- Associated with T and Y bar concept;
- Not relevant when associated to IAFs with long initial segment.
- Portions of 25 NM radius cercles of (+ 5 NM Buffer):
 - Centered either on IAFs or IF.

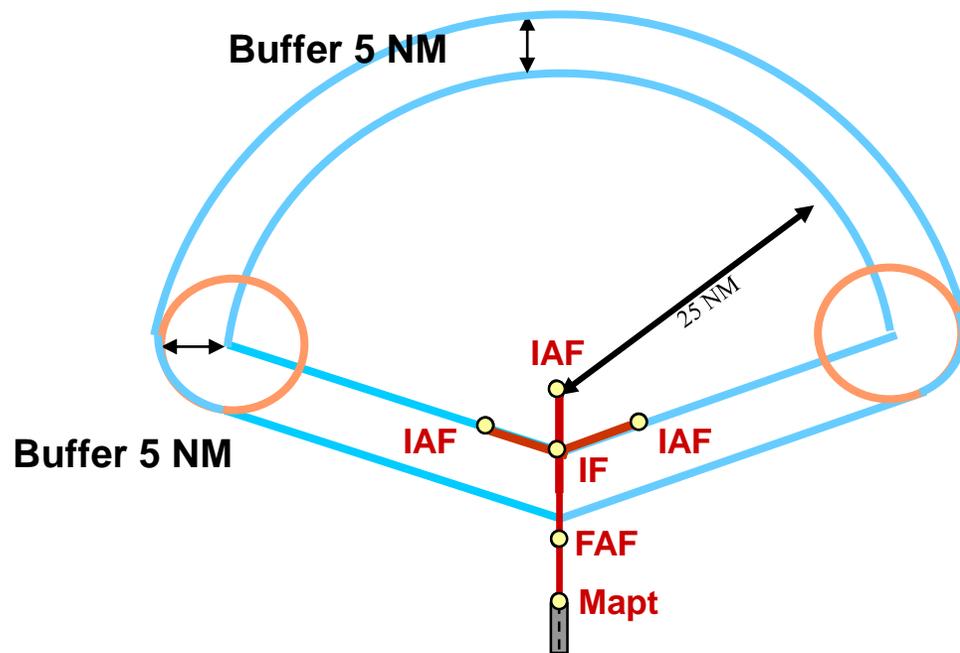
Terminal Arrival Altitudes



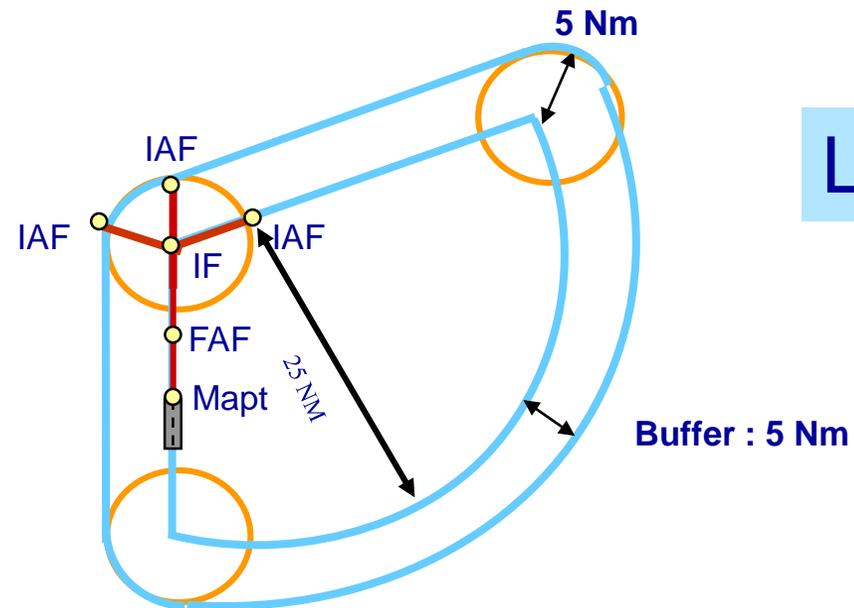
Lateral boundaries : left and right base initial segments

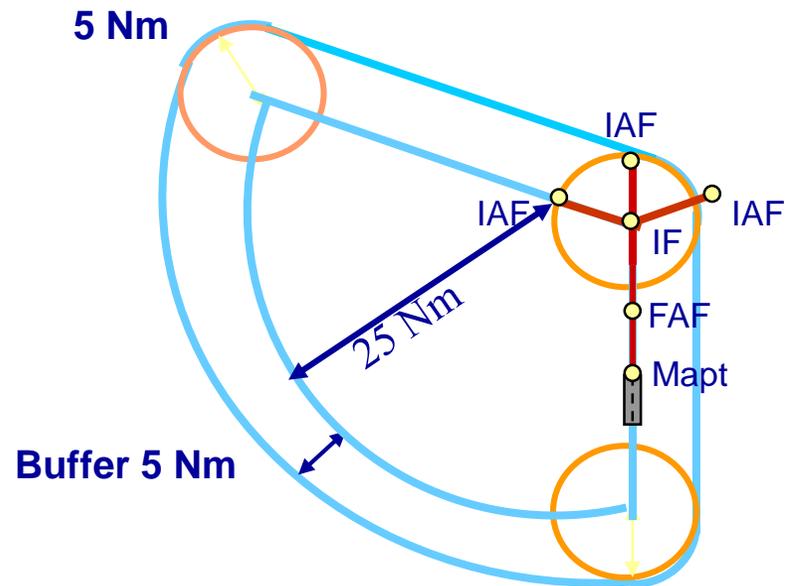
Outer boundaries : arcs of 25 Nm radius centred on each IAF

Straight-in area



Left base area





Right base area

□ Step down arc and subsector:

☞ Step down arc can be defined:

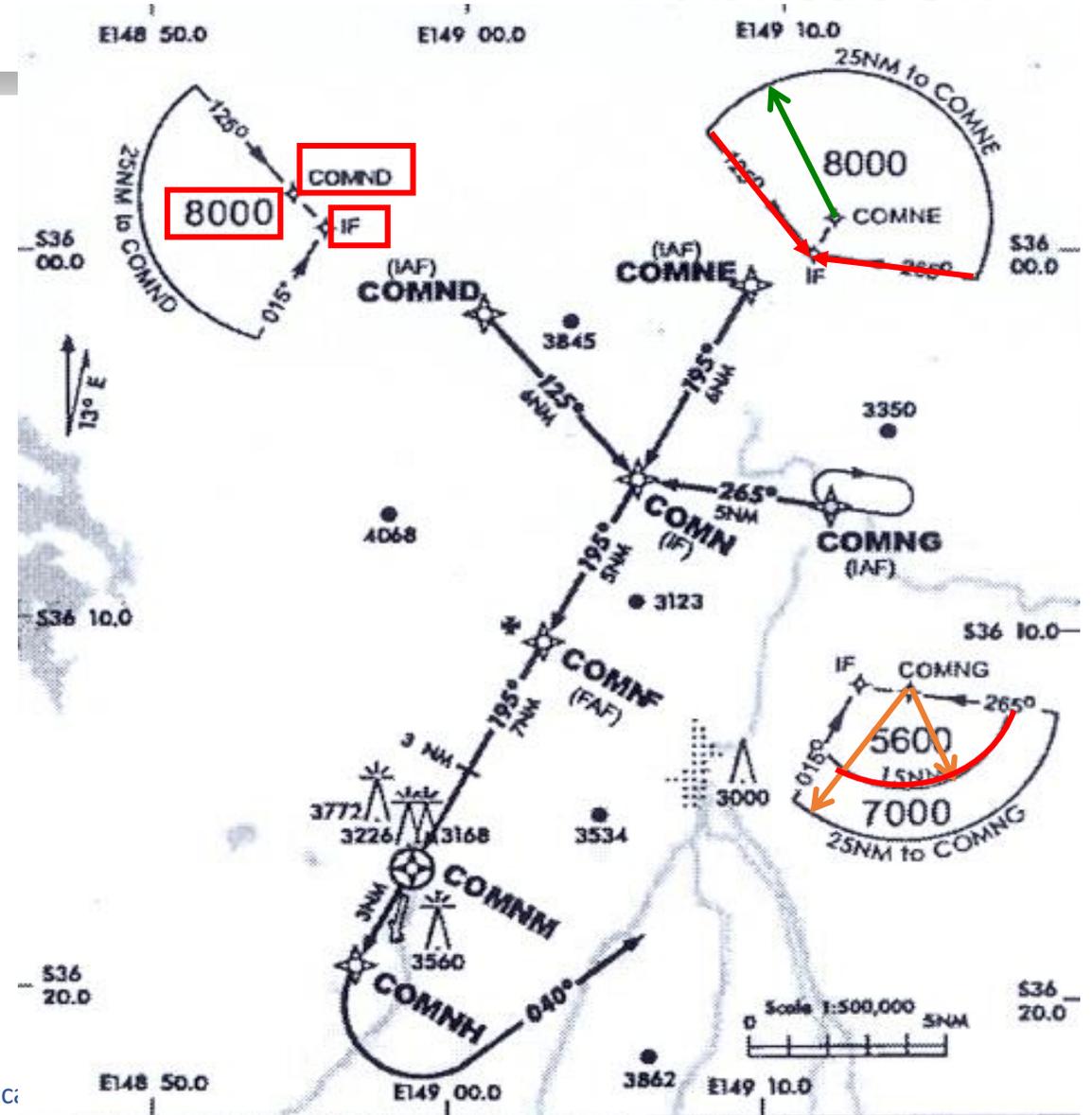
- Radius: 10 NM.

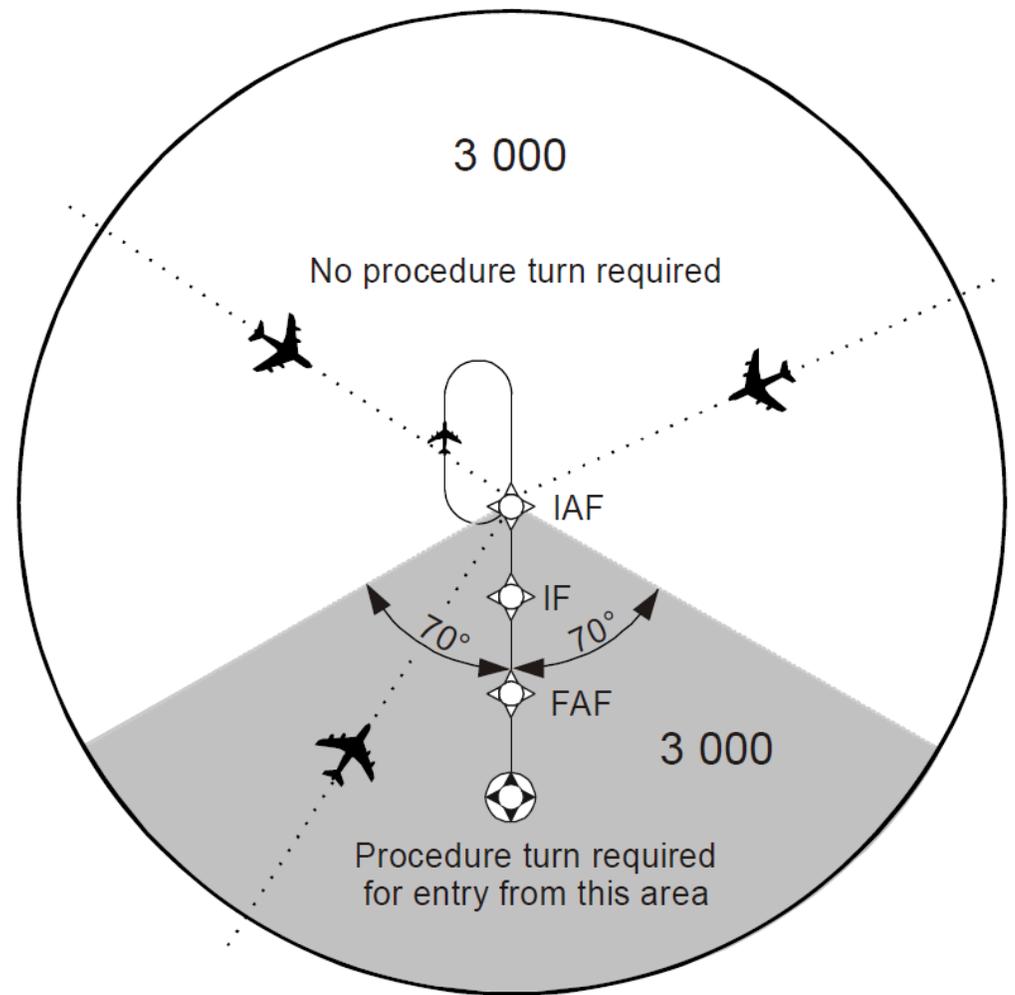
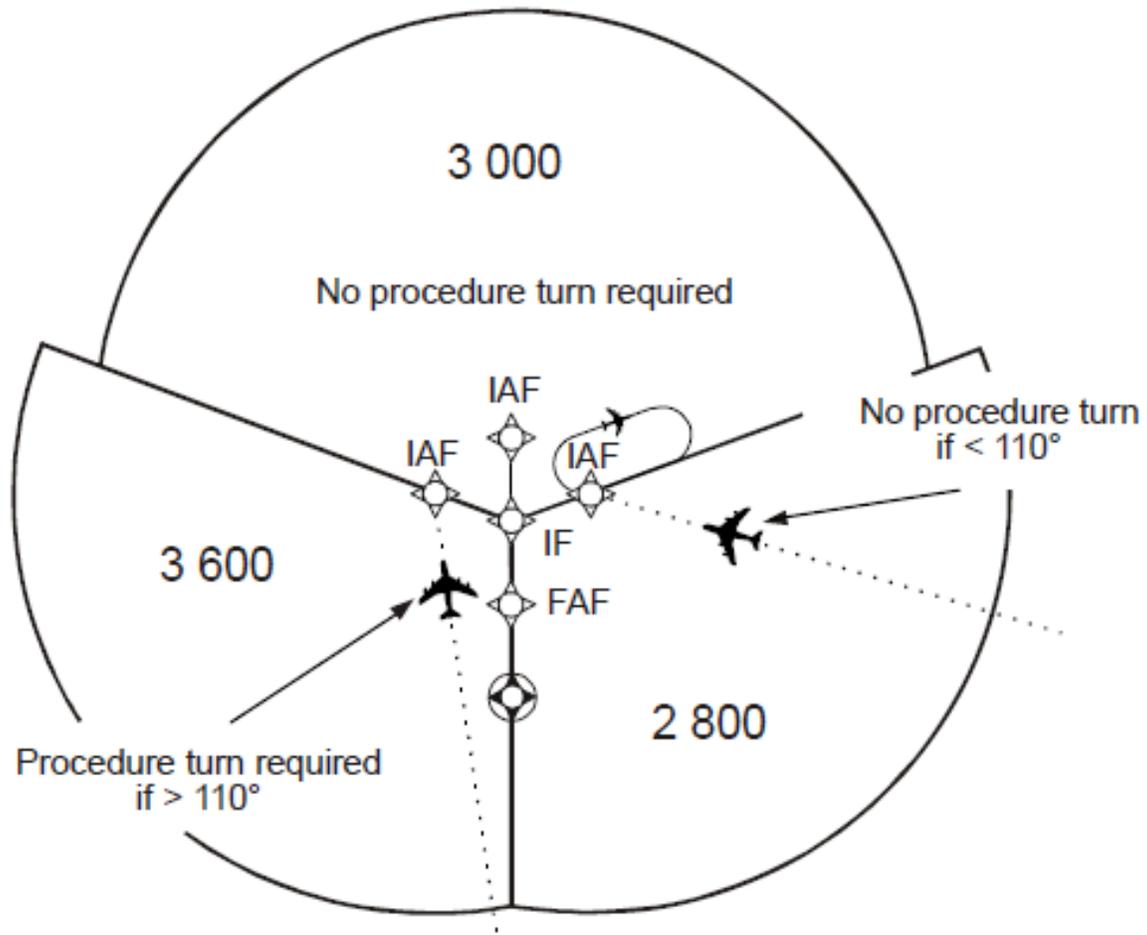
☞ Radial sub-sector can be defined in the straight-in area:

- Minimum 30°:

- If step down arc, minimum 45°.

- ❑ MOCA of each sector or subsector:
 - ☞ Rounded up to hundred of ft.
- ❑ 25 NM arc **CENTRED** on IAF.
- ❑ Display the **NAME OF IAF** of the sector;
- ❑ Lateral boundaries extended to IF;
- ❑ Display the **ACRONYM** IF;
- ❑ Step down arc centred on IAF.





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