PANS-OPS Flight Procedure Design Training for CAAs

23 August – 03 September 2021

05 – Merging methodology

(Doc. 8168, vol. 2, Part III, Section 1, Chap. 1, §1.5.3 1 1.5.4)

Content

1. Final approach protection
2. Merging methodologies

Final approach protection

- **At FAF XTT changes from 1 to 0.3 NM**

AT THE LOCATION where XTT is changing, take the SMALLEST XTT.

XTT = 1 NM

- **At FAF BV changes from 1 to 0.5 NM**

AT THE LOCATION where BV is changing, take the BV of the PRECEDING phase.

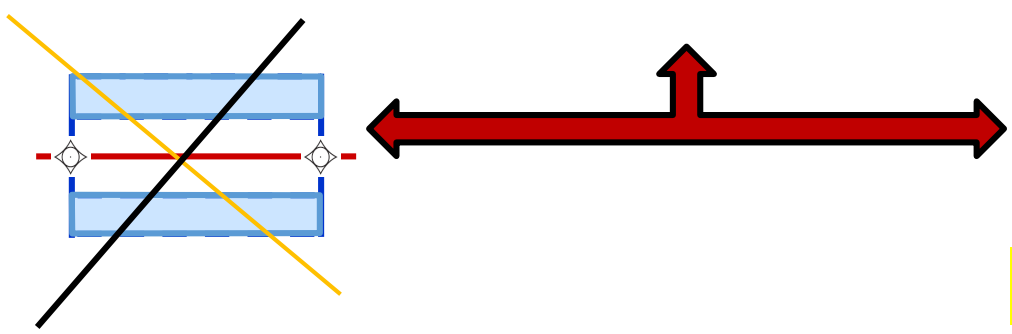
BV = 1 NM

½ AW = 1.5 x 0.3 + 1 = 1.45 NM

Final approach protection

- At IF ½ AW = 1.5 x 1+ 1 = **2.5 NM**
- At FAF ½ AW = 1.5 x 0.3 + 1 = **1.45 NM**

What is the associated protection area?



MERGING Methodology

Merging methodologies

- MERGING methodologies apply:
  - Each time the area is NOT a corridor:
    - Each time there is a CHANGE OF XTT;
    - Each time there is a CHANGE OF Phase of flight (BV).
  - Whether a waypoint is located or not.
- Two merging methodologies:
  - FIRST METHOD is to be applied when BV is CHANGING whether XTT is changing or not;
  - SECOND METHOD is to be applied when ONLY XTT is changing and not the BV.

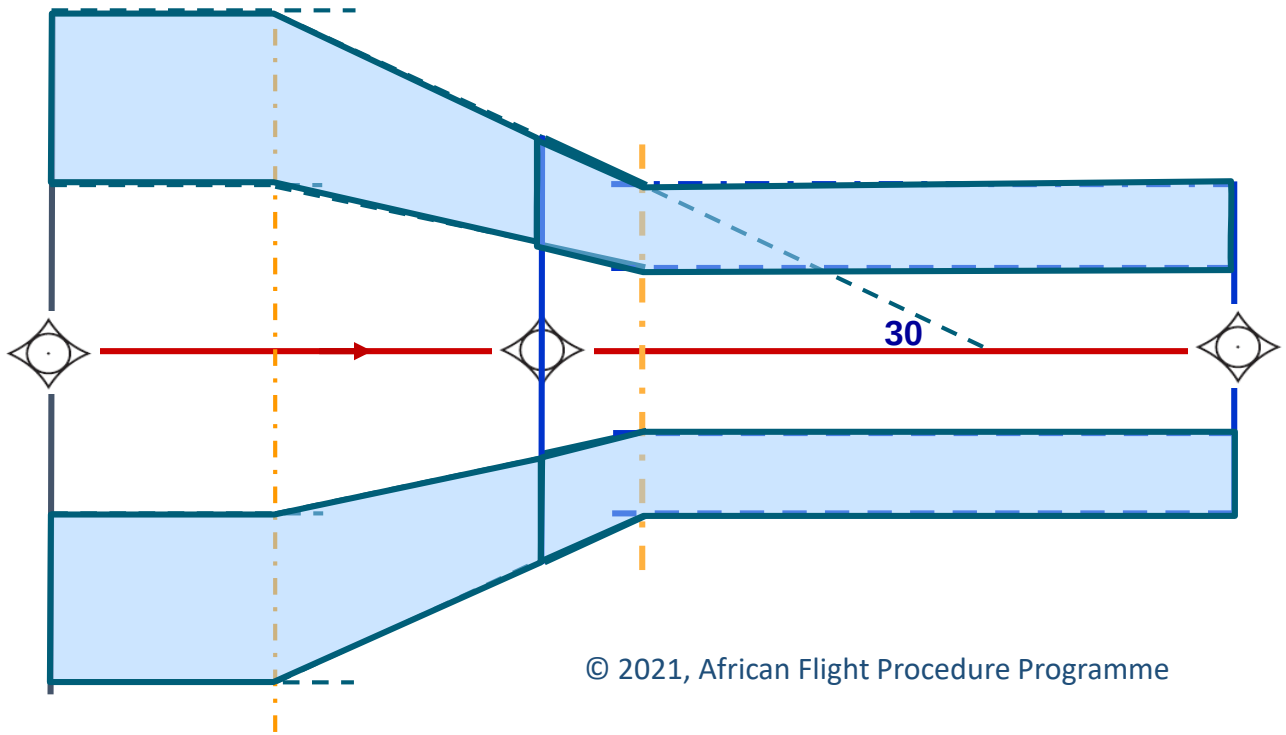
Where does a change of BV occurs?

- For A-RNP, RNP1, RNPCH, RNAV 1/2 with GNSS sensor only, it occurs at:
  - 30 NM of ARP;
  - FAF;
  - 15 NM of ARP.

These changes occur at a waypoint, or at a specific location whether a waypoint is located or not.

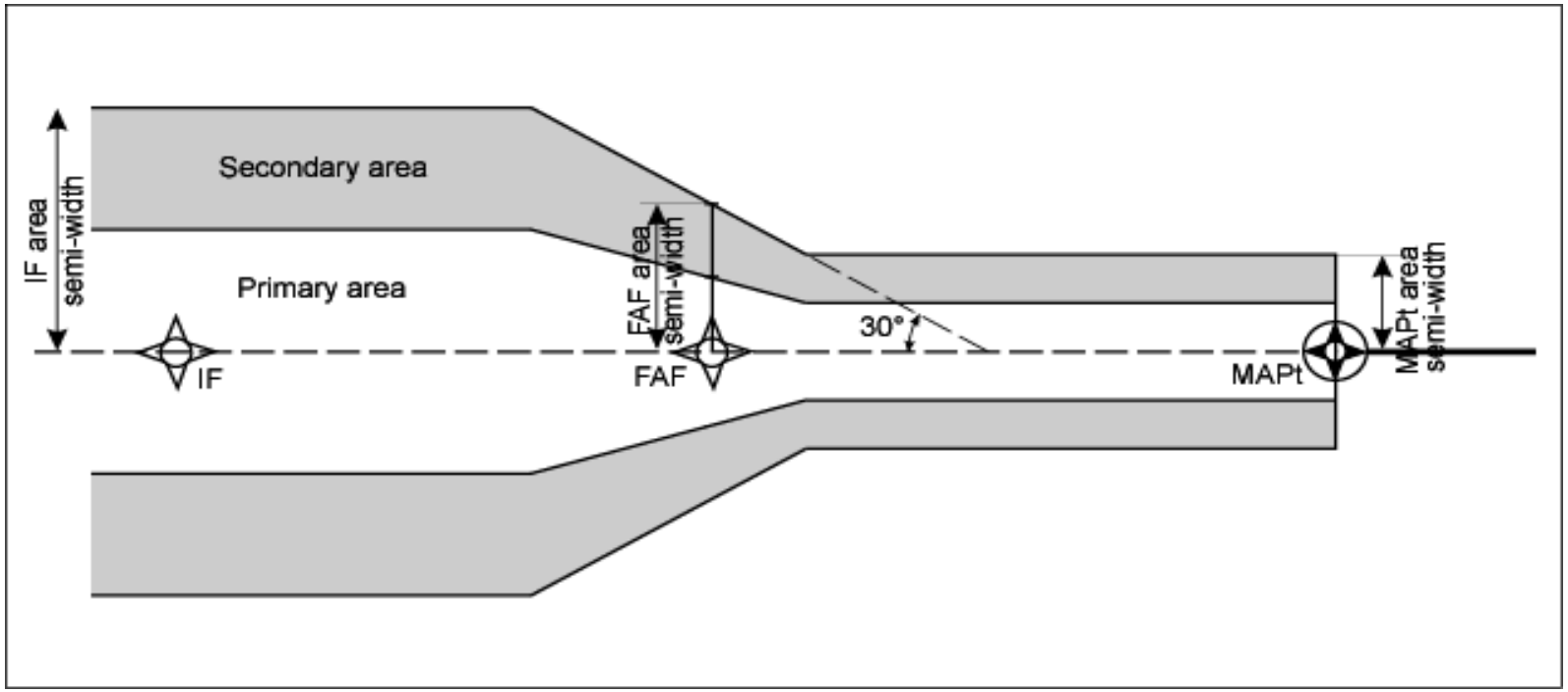
First method: BV is changing Area Width1 > Area Width 2

- Case where area width of the subsequent segment is smaller than the preceding one:
  - ☞Merge with a 30° line to the NOMINAL track ANCHORED AT THE POINT of change.



First method: BV is changing at a waypoint

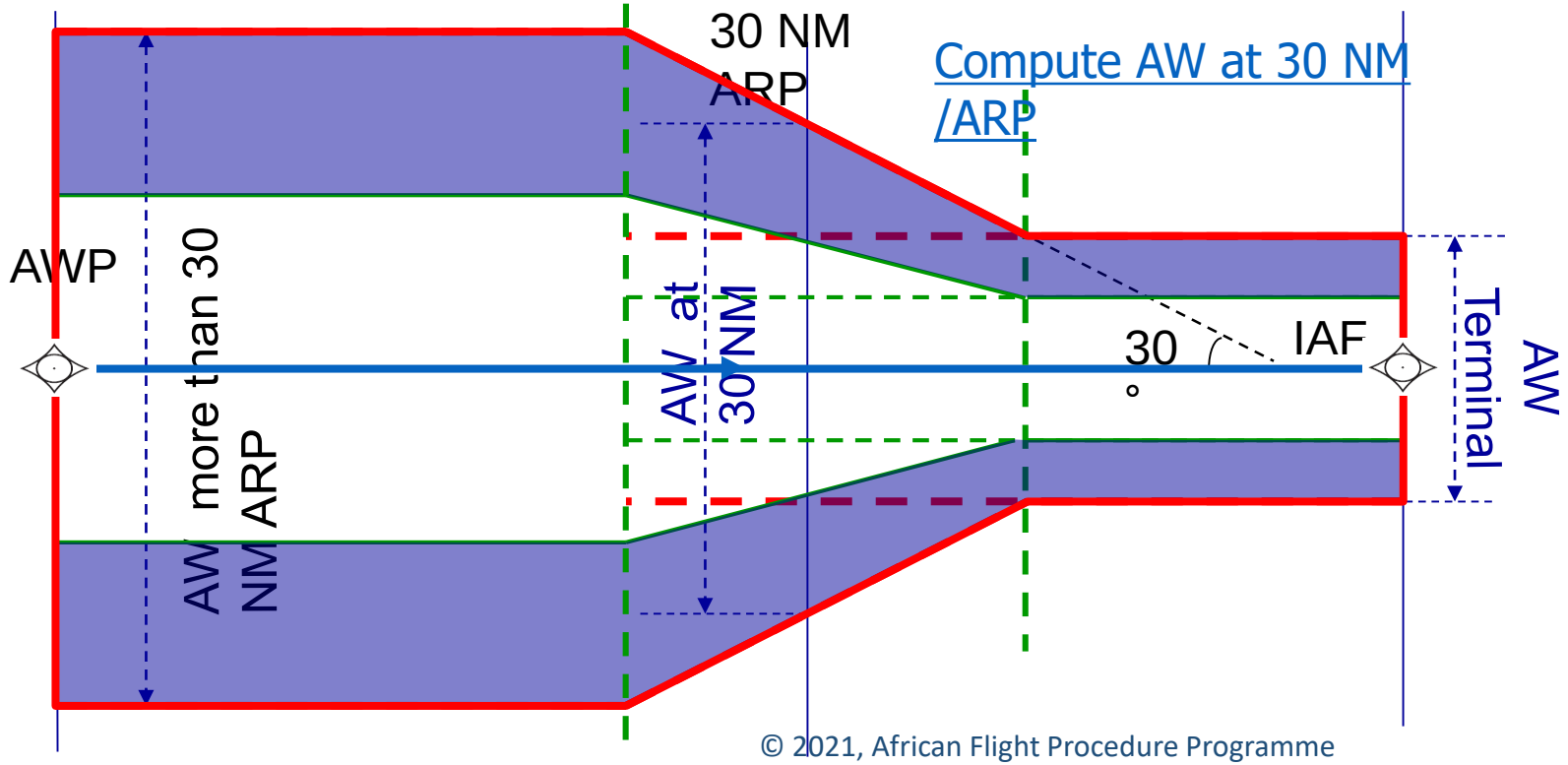
- Example: FAF transition from terminal to approach



Merging methodologies

First method: BV is changing at a location (not a waypoint)

- Example: Transition from Route to terminal mode



First method: BV and XTT are changing

- Example for RNAV 1/2 STAR with GNSS sensor at 30 NM ARP:
  - At 30 NM ARP XTT changes from 2 to 1 NM

AT the LOCATION where XTT is changing, Take the SMALLER value of XTT.

XTT = 1 NM

- At 30 NM ARP BV changes from 2 to 1 NM

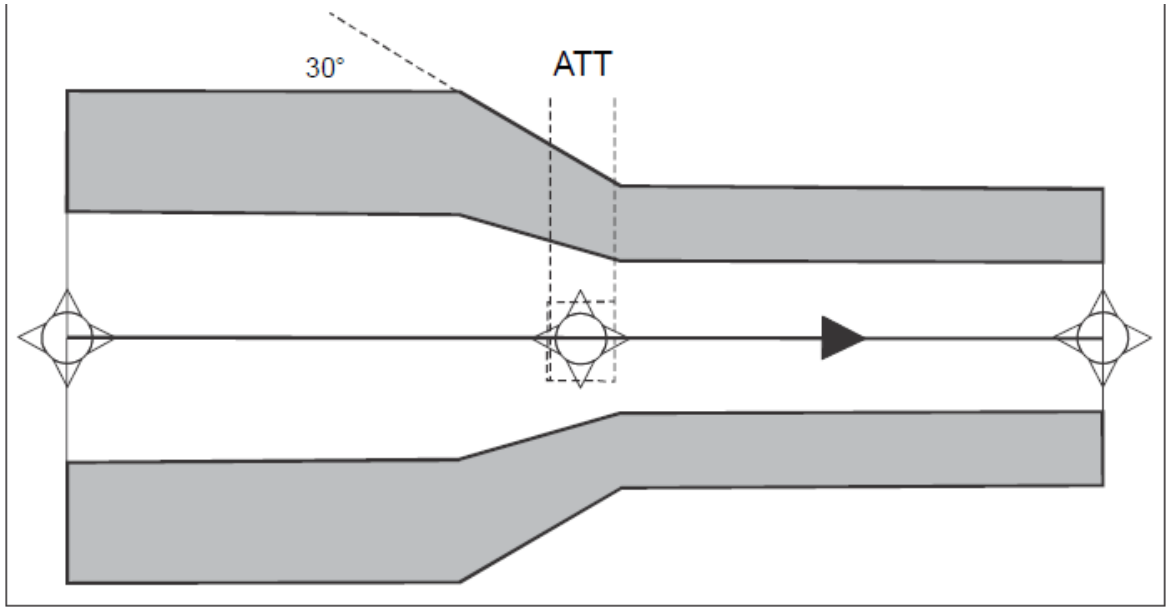
AT THE LOCATION where BV is changing, take the BV of the PRECEDING phase.

BV = 2 NM

½ AW = 1.5 x 1 + 2 = 3.5 NM

Second method: Only XTT is changing

- Case where Area width 1 > Area width 2 (**area width of the subsequent segment is smaller than the preceding one):**
  - ☞ When XTT only is changing merge with a 30° line to the NOMINAL track ANCHORED at the LATEST XTT of the point of change.



Where does a change of XTT ONLY occurs?

- In A-RNP:
  - ☞As this application is scalable, different RNP values can be used in the same phase of flight;
    - Example: RNP1 within 30 NM: then from an identified waypoint RNP0.5 until IF.

- In RNAV 1/2 with DME/DME sensor.

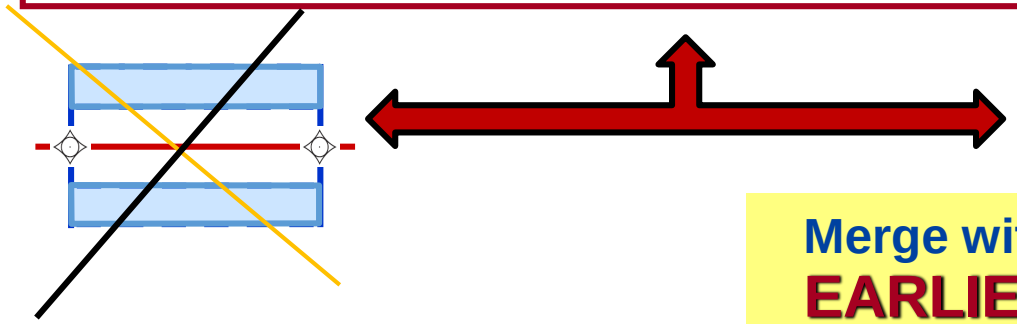
Merging methodologies

Merging methodology applicable for both methods:

Case Area width area 1 < Area width 2

Navigation specification		RNP	FTE	IMAL	ATT	XTT	BV	1/2AW
RNP APCH	< 30 Nm ARP	1	0.5		0.8	1	1	2.5
	FAF	0.3	0.25		0.24	0.3	1	1.45
	MAPT	0.3	0.25		0.24	0.3	0.5	0.95
	MA <15 NM	1	0.5		0.8	1	0.5	2

What is the associated protection area?



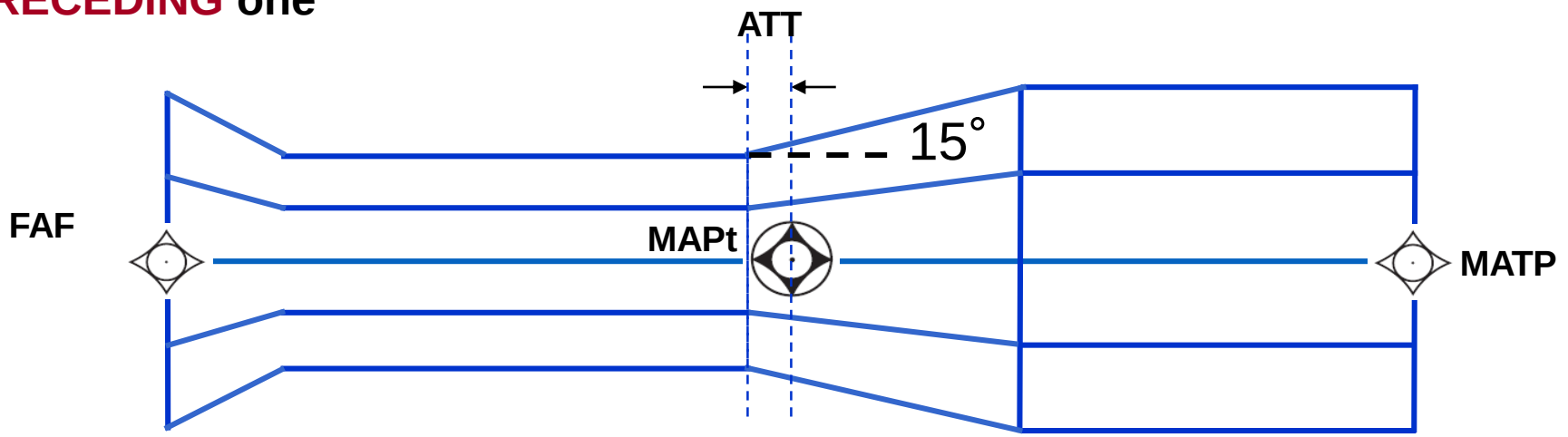
MERGING Methodology

Merge with a 15° SPLAY at the EARLIEST limit of the point of change

Merging methodologies

Merging methodology applicable for both methods:
Case Area width area 1 < Area width 2

Case where area width of the SUBSEQUENT segment is GREATER than the PRECEDING one

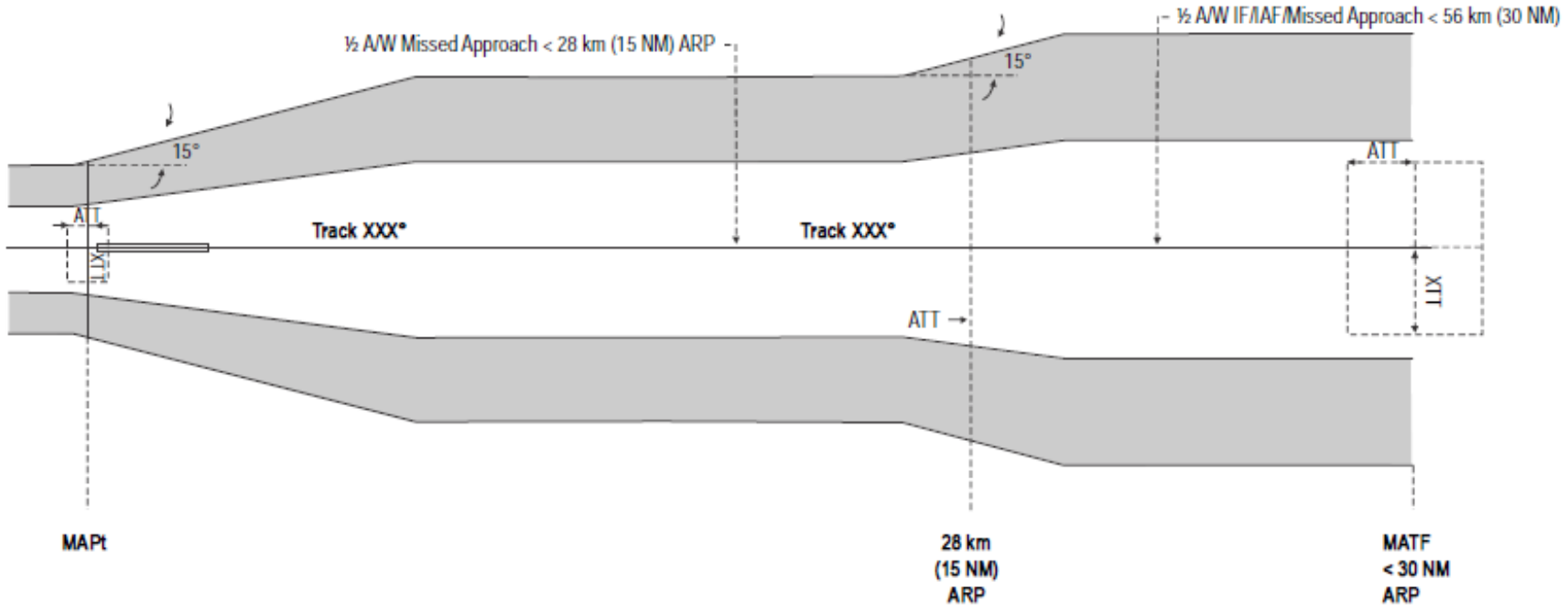


Merge with a 15° SPLAY at the EARLIEST limit of the point of change

Case illustrated : change of XTT at a waypoint

Merging methodologies

Merging methodology applicable for both methods:
Case Area width area 1 < Area width 2

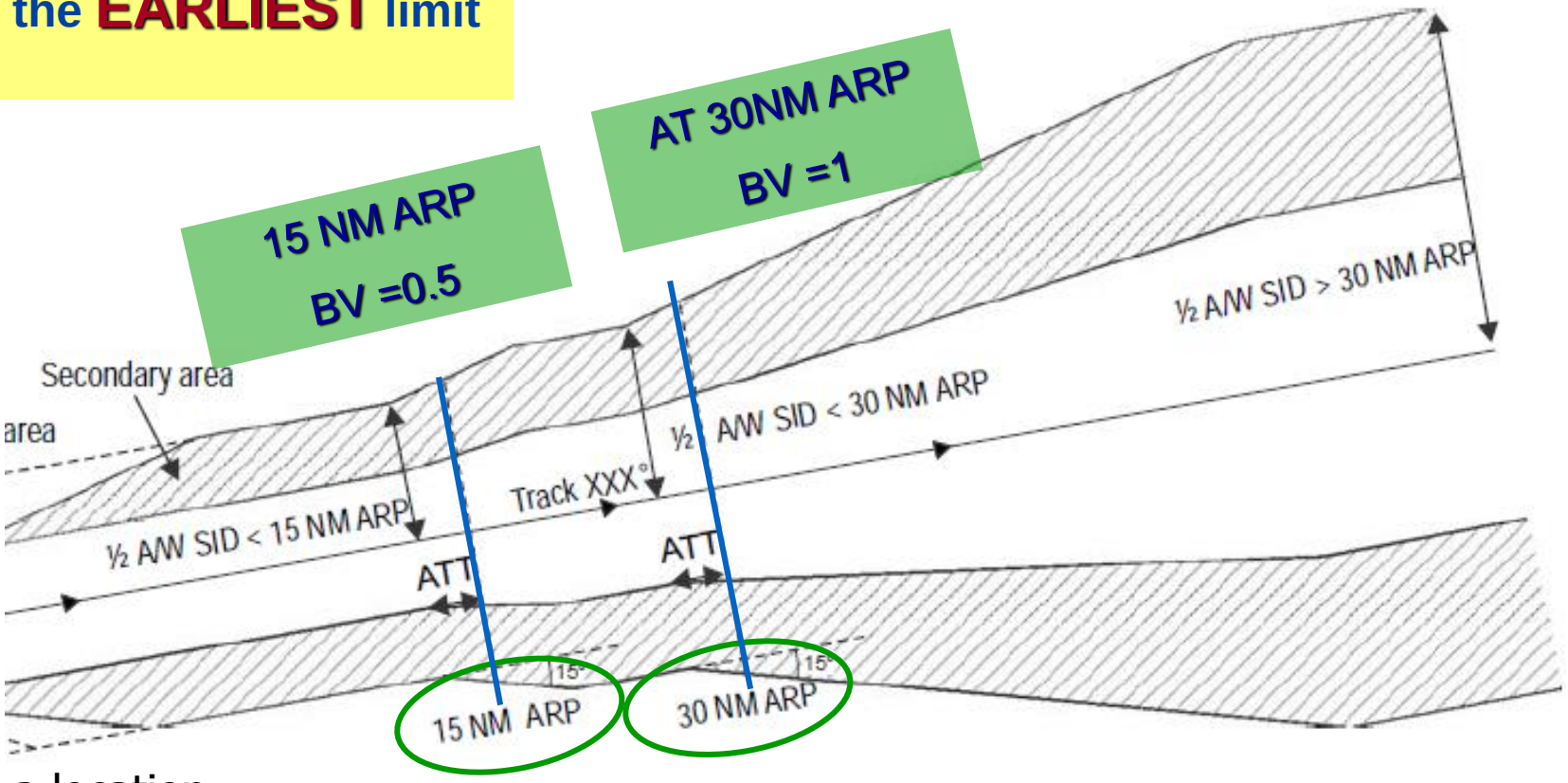


Merging methodologies

Merging methodology applicable for both methods:

Case Area width area 1 < Area width 2

Merge with a 15° SPLAY at the EARLIEST limit of the point of change



Case illustrated : change of BV at a location

Questions:

Alexandre DAMIBA
adamiba@icao.int