



# Sixth meeting of the PBN SG/6

Presented by UAE

Virtual meeting 10-11 November 2021

# PBN implementation status



## National PBN Implementation Plan

UAE PBN Implementation plan version 01\_2018.

- Short Term – 2014 - 2017
- Medium Term – 2018 – 2023
- Long Term – 2023 and beyond

Short term is fully implemented (Slide 4 has further detail)

- Mandated the carriage of GNSS equipment with effect from 07 December 2017

Medium term focusses on transitioning from RNAV-1 (GNSS) to Advanced RNP and the initial introduction of GBAS at selected airports.

- Mandated ADS-B OUT with effect from 01 January 2020

Long Term focusses on the use of advanced flight deck automation that integrates CNS capabilities. RNP, RCP, and RSP standards will define these operations.



## Status of Implementation

| RWY Ends | ILS / CAT | LNAV | LNAV/<br>VNAV | LPV | RNP AR | RNAV<br>SID | RNAV<br>STAR |
|----------|-----------|------|---------------|-----|--------|-------------|--------------|
| OMAA13L  | III       | X    | X             | N/A | Y      | Y           | Y            |
| OMAA13R  | I         | X    | X             | N/A | Y      | Y           | Y            |
| OMAA31L  | III       | X    | X             | N/A | Y      | Y           | Y            |
| OMAA31R  | III       | X    | X             | N/A | Y      | Y           | Y            |
| OMAD31   | I         | Y    | X             | N/A | X      | Y           | Y            |
| OMAD13   | X         | Y    | X             | N/A | X      | Y           | Y            |



## Status of Implementation

| RWY Ends | ILS / CAT | LNAV | LNAV/<br>VNAV | LPV | RNP AR | RNAV<br>SID | RNAV<br>STAR |
|----------|-----------|------|---------------|-----|--------|-------------|--------------|
| OMAL01   | I         | Y    | Y             | N/A | X      | Y           | Y            |
| OMAL19   | X         | Y    | Y             | N/A | X      | Y           | Y            |
| OMDB12L  | III       | Y    | Y             | N/A | X      | Y           | Y            |
| OMDB12R  | III       | Y    | Y             | N/A | X      | Y           | Y            |
| OMDB30L  | III       | Y    | Y             | N/A | X      | Y           | Y            |
| OMDB30R  | III       | Y    | Y             | N/A | X      | Y           | Y            |

# Implementation of CCO/CDO in Emirates FIR



## Implementation of CDO in Emirates FIR

In 2020 UAE has implemented CDO to Southern Emirates Airports.

This was achieved by removing the level restriction imposed by LOA between Emirates ACC and Bahrain ACC over points RESAR and ORSIS points which is used for all easterly arrivals to southern Emirates.

The optimum level was determined, in coordination with UAE national airline as a main used of Abu Dhabi international airport and Emirates ACC and Bahrain ACC.



## Implementation of CDO in Emirates FIR

Southern Emirates Airports Continued Descent Operation Analysis was carried out for four type of aircraft listed below:

- B777 – 300 ER
- B787 - 10
- A380 – 861
- A320 - 232



# Implementation of CDO in Emirates FIR

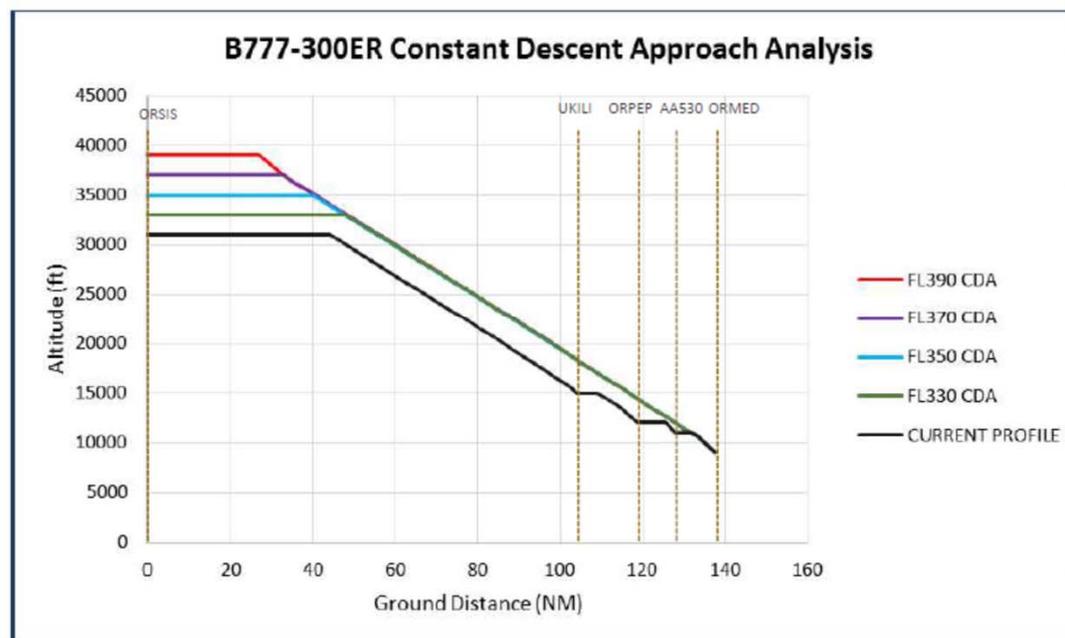
## B777-300ER (ORSIS to ORMED Waypoint)



| Profile         | Fuel (kg) | Δ (kg) |
|-----------------|-----------|--------|
| FL310 (Current) | 1990      | 0      |
| FL330 CDA       | 1252      | -738   |
| FL350 CDA       | 1140      | -850   |
| FL370 CDA       | 1047      | -943   |
| FL390 CDA       | 976       | -1014  |

| Waypoint | CDA Altitude (ft)       |
|----------|-------------------------|
| ORSIS    | 39000/37000/35000/33000 |
| UKILI    | 18300                   |
| ORPEP    | 14500                   |
| AA530    | 12000                   |
| ORMED    | 9000                    |

| General Assumptions |   |
|---------------------|---|
| Ave. Weight         | 220.0 T   |
| Wind / Temp         | 0 / ISA   |
| Speed               | CI45 (ORSIS – UKILI)<br>250 kts (UKILI – ORMED) |





# Implementation of CDO in Emirates FIR

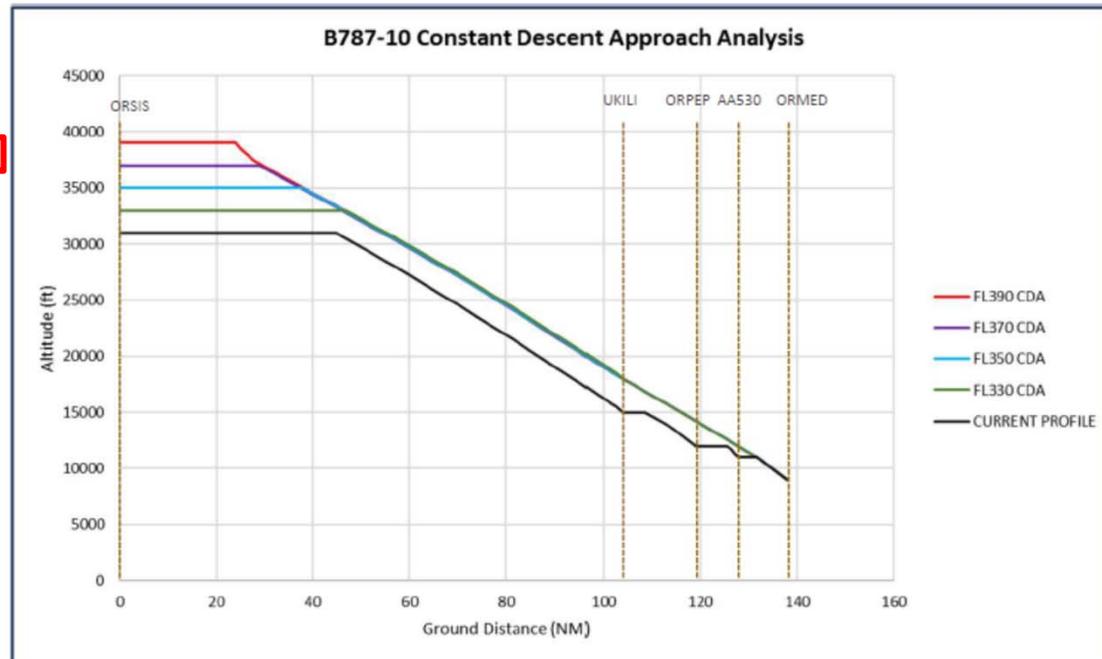
## B787-10 (ORSIS to ORMED Waypoint)



| Profile         | Fuel (kg) | Δ (kg) |
|-----------------|-----------|--------|
| FL310 (Current) | 1333      | 0      |
| FL330 CDA       | 883       | -450   |
| FL350 CDA       | 798       | -535   |
| FL370 CDA       | 716       | -617   |
| FL390 CDA       | 674       | -659   |

| Waypoint | CDA Altitude (ft)       |
|----------|-------------------------|
| ORSIS    | 39000/37000/35000/33000 |
| UKILI    | 18000                   |
| ORPEP    | 14250                   |
| AA530    | 12000                   |
| ORMED    | 9000                    |

| General Assumptions |  |
|---------------------|--|
| Ave. Weight         | 182.0 T  |
| Wind / Temp         | 0 / ISA  |
| Speed               | 290 kts (ORSIS – UKILI)<br>250 kts (UKILI – ORMED) |





# Implementation of CDO in Emirates FIR

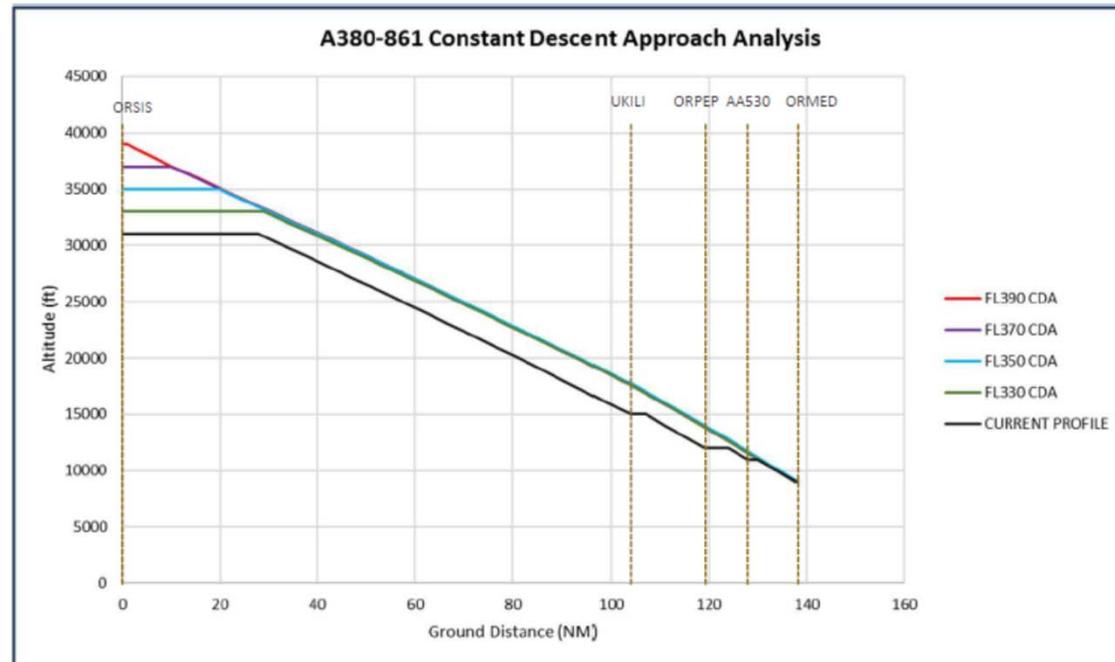
## A380-861 (ORSIS to ORMED Waypoint)



| Profile         | Fuel (kg) | Δ (kg) |
|-----------------|-----------|--------|
| FL310 (Current) | 1868      | 0      |
| FL330 CDA       | 1631      | -237   |
| FL350 CDA       | 1482      | -386   |
| FL370 CDA       | 1334      | -534   |
| FL390 CDA       | 1165      | -703   |

| Waypoint | CDA Altitude (ft)       |
|----------|-------------------------|
| ORSIS    | 39000/37000/35000/33000 |
| UKILI    | 17700                   |
| ORPEP    | 14000                   |
| AA530    | 11500                   |
| ORMED    | 9000                    |

| General Assumptions |  |
|---------------------|--|
| Ave. Weight         | 363.0 T  |
| Wind / Temp         | 0 / ISA  |
| Speed               | 290 kts (ORSIS – UKILI)<br>250 kts (UKILI – ORMED) |





# Implementation of CDO in Emirates FIR

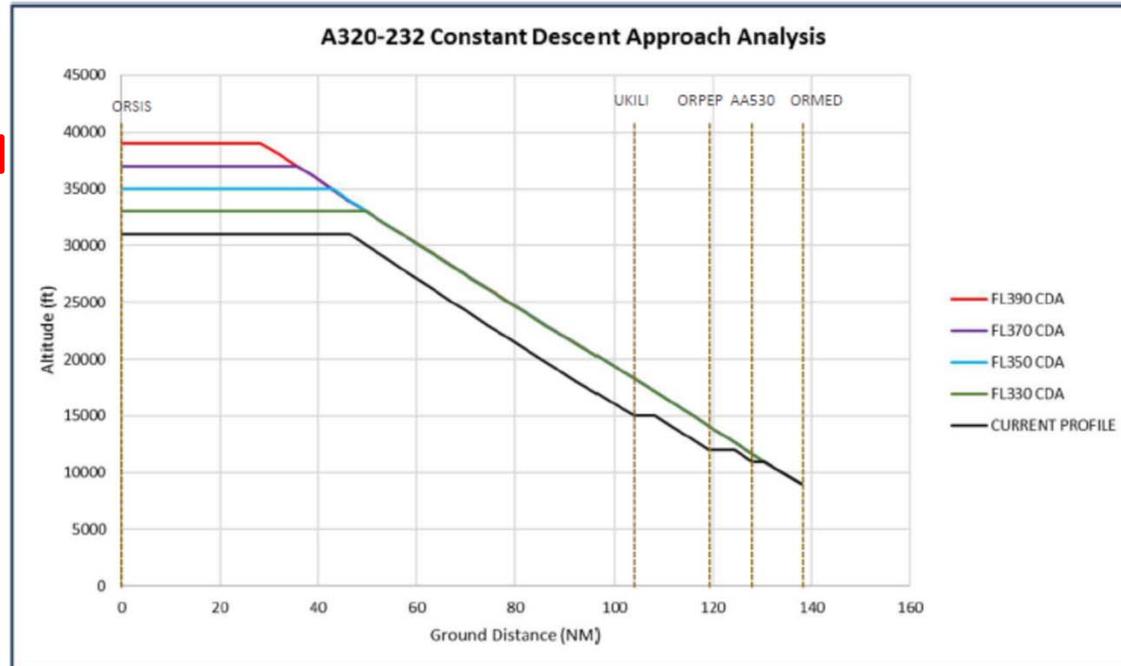


## A320-232 (ORSIS to ORMED Waypoint)

| Profile         | Fuel (kg) | Δ (kg) |
|-----------------|-----------|--------|
| FL310 (Current) | 464       | 0      |
| FL330 CDA       | 425       | -39    |
| FL350 CDA       | 396       | -68    |
| FL370 CDA       | 325       | -139   |
| FL390 CDA       | 298       | -166   |

| Waypoint | CDA Altitude (ft)       |
|----------|-------------------------|
| ORSIS    | 39000/37000/35000/33000 |
| UKILI    | 18300                   |
| ORPEP    | 14250                   |
| AA530    | 12150                   |
| ORMED    | 9000                    |

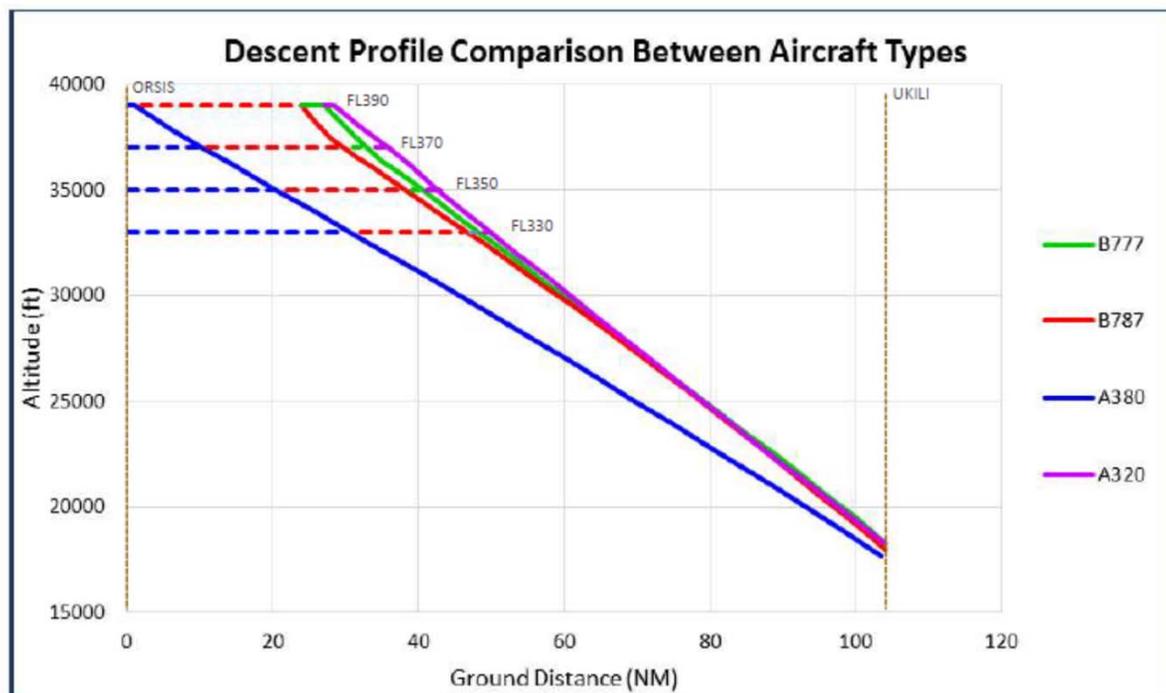
| General Assumptions |  |
|---------------------|--|
| Ave. Weight         | 59.5 T   |
| Wind / Temp         | 0 / ISA  |
| Speed               | 290 kts (ORSIS – UKILI)<br>250 kts (UKILI – ORMED) |





# Implementation of CDO in Emirates FIR

## CDA Comparison (RWY 31L/R Arrival)





# Implementation of CDO in Emirates FIR

## Summary



Potential Fuel Savings above FL310 Restriction (Historical max Flight Levels per aircraft)

| Flight Level | A320           |              |            | A380           |              |            | B777           |              |            | B787           |              |            |
|--------------|----------------|--------------|------------|----------------|--------------|------------|----------------|--------------|------------|----------------|--------------|------------|
|              | Number of Flts | Per Flt (kg) | Per Yr (T) | Number of Flts | Per Flt (kg) | Per Yr (T) | Number of Flts | Per Flt (kg) | Per Yr (T) | Number of Flts | Per Flt (kg) | Per Yr (T) |
| FL330        | 251            | 39           | 9.8        | 0              | 237          | 0          | 22             | 738          | 16.2       | 47             | 450          | 21.2       |
| FL350        | 1239           | 68           | 84.3       | 0              | 386          | 0          | 899            | 850          | 764.2      | 55             | 535          | 29.4       |
| FL370        | 1961           | 139          | 272.6      | 18             | 534          | 9.6        | 1473           | 943          | 1389.0     | 538            | 617          | 331.9      |
| FL390        | 606            | 166          | 100.6      | 2043           | 703          | 1436.2     | 220            | 1014         | 223.1      | 4622           | 659          | 3045.9     |

## CDA Flight Level Restriction Proposal

| Profile | Current Restriction | FL Proposal             |
|---------|---------------------|-------------------------|
| ORSIS   | FL310               | FL390/FL370/FL350/FL330 |
| UKILI   | FL150               | FL180                   |
| ORPEP   | FL120               | FL140                   |
| AA530   | FL110               | FL120                   |
| ORMED   | FL090               | FL090                   |



## Implementation of CDO in Emirates FIR

Achieved benefits for the first five month after implementation:

- ✓ **4000 aircraft** benefitted from the implemented procedure
- ✓ **1800 mt** of jet fuel;
- ✓ Reducing carbon dioxide emission by **5377 mt**

After successful implementation of CDO together with Bahrain ACC, Emirates ACC is currently studying the possibility of implementation of CDO and CCO with other neighbors .



# Thank you

