



ICAO MID



الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY



CCO-CDO Workshop

ICAO MID Workshop on the Continuous Climb Operations (CCO) /
Continuous Descent Operations (CDO) Implementation

Abu Dhabi, UAE

13 – 14 June 2022

CDO/CCO Overview

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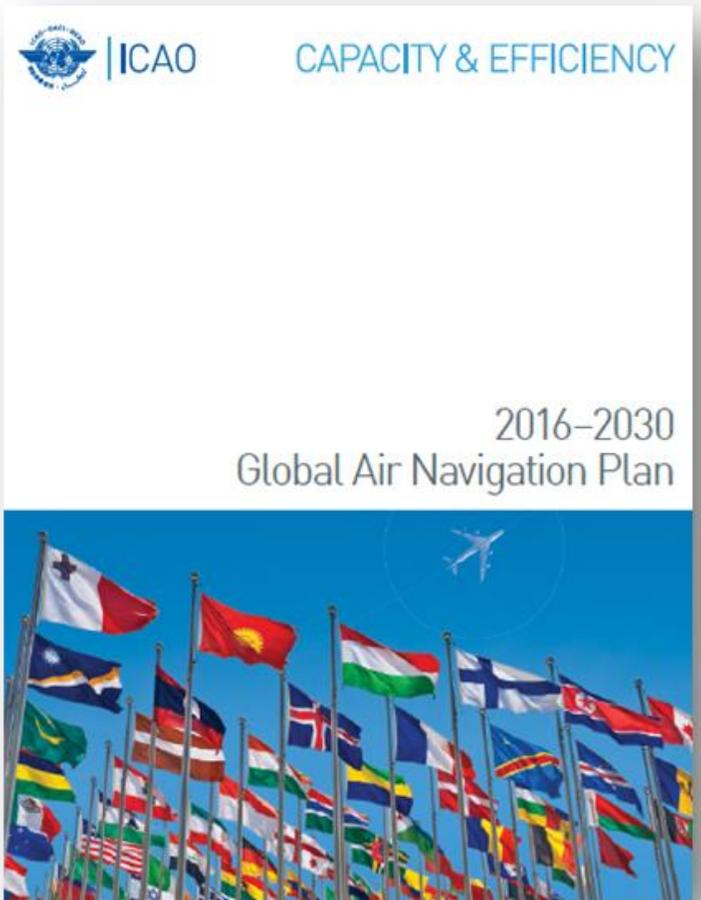
Objectives

By the end of this presentation you will be familiar with:

- ✔ CDO and CCO in the GANP
- ✔ Explain what CDO and CCO are
- ✔ List the benefits of CCO/CDO
- ✔ Explain the factors that affect CCO/CDO
- ✔ Describe the impact of airspace/procedures design on CCO/CDO
- ✔ Discuss the advantages and disadvantages of open and closed STARs
- ✔ Basic and enhanced CCO design example
- ✔ Integrating CCO and CDO Designs



APTA Thread in the GANP



APTA			
APTA-B0/1	PBN Approaches (with basic capabilities)	Operational	  
APTA-B0/2	PBN SID and STAR procedures (with basic capabilities)	Operational	  
APTA-B0/3	SBAS/GBAS CAT I precision approach procedures	Operational	  
APTA-B0/4	CDO (Basic)	Operational	  
APTA-B0/5	CCO (Basic)	Operational	  
APTA-B0/6	PBN Helicopter Point in Space (PinS) Operations	Operational	  
APTA-B0/7	Performance based aerodrome operating minima – Advanced aircraft	Operational	  
APTA-B0/8	Performance based aerodrome operating minima – Basic aircraft	Operational	  



APTA Threads/CCO-CDO Elements Prioritization and Monitoring

APTA: priority 1 Elements, applicability, performance Indicators, supporting Metrics, and Targets

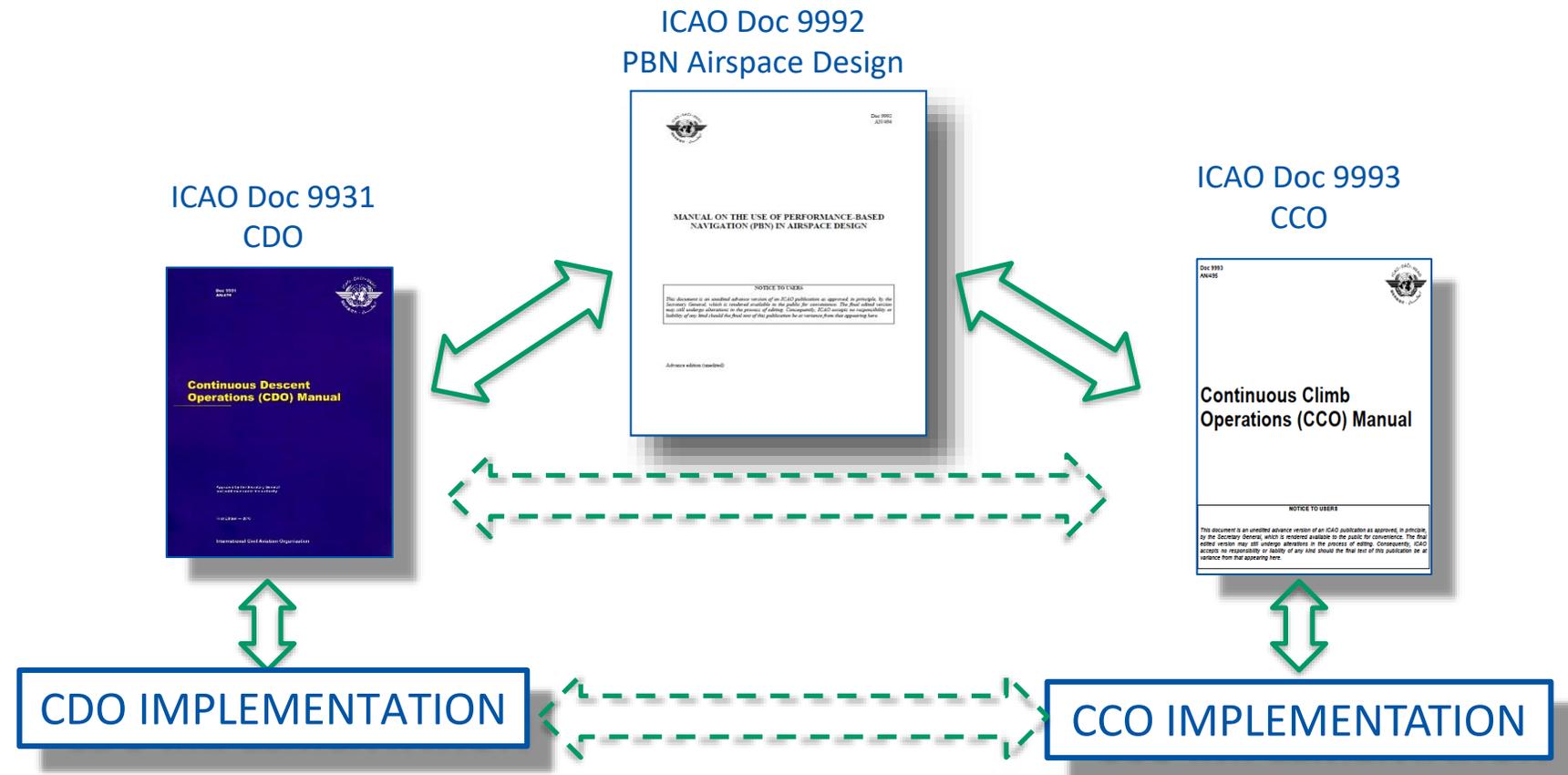
Elements	Applicability	Performance Indicators/Supporting Metrics	Targets
APTA B0/4 CDO (Basic)	OBBI, OIIE, OIKB, OIFM, OJAI, OLBA, OOMS, OTHH, OTBD, OEJN, OEMA, OEDF, OERK, HSSK, HSPN, OMAA, OMAL, OMAD, OMDW, OMDB, OMSJ, OMRK and OMFJ	Indicator: % of International Aerodromes/TMA with CDO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented as required.	100% Dec 2021
APTA B0/5 CCO (Basic)	OBBI, OIIE, OIKB, OIFM, OJAI, OLBA, OOMS, OTHH, OTBD, OEJN, OEMA, OEDF, OERK, HSSK, HSPN, OMAA, OMAL, OMAD, OMDW, OMDB, OMSJ, OMRK and OMFJ	Indicator: % of International Aerodromes/TMA with CDO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented as required.	100% Dec 2021



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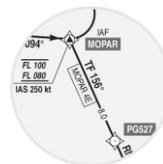


What is CCO/CDO?

ICAO provides the following definitions:

- Continuous Climb Operations (CCO) is an operation, enabled by airspace design, procedure design and ATC, in which a departing aircraft climbs without interruption, to the greatest possible extent, by employing optimum climb engine thrust, at climb speeds until reaching the cruise flight level.
- Continuous Descent Operations (CDO). An operation, enabled by airspace design, procedure design and ATC facilitation, in which an arriving aircraft descends continuously, to the greatest possible extent, by employing minimum engine thrust, ideally in a low drag configuration, prior to the final approach fix /final approach point.

enablers for CCO/CDO:

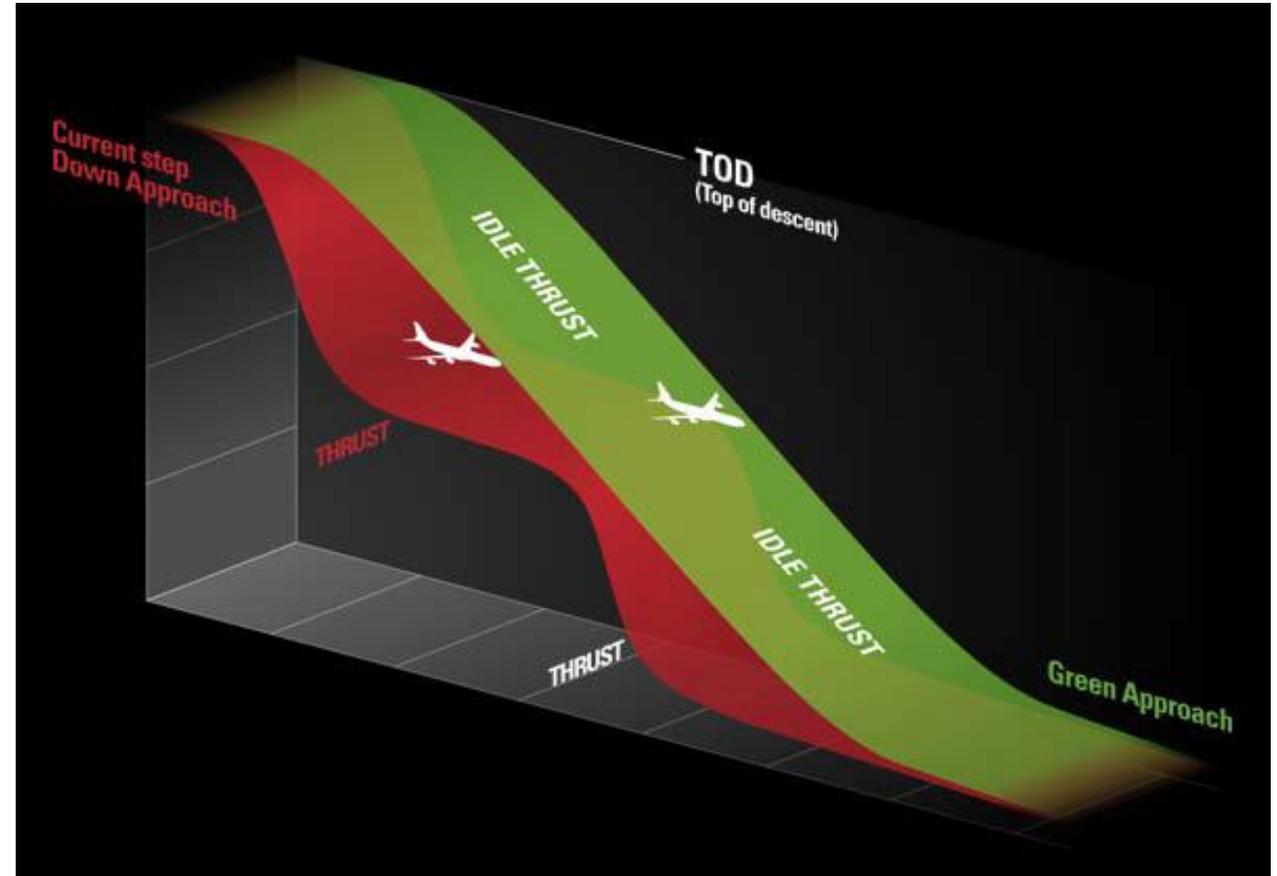




Conventional Step Step-down

Vs

Continuous Descent Operations





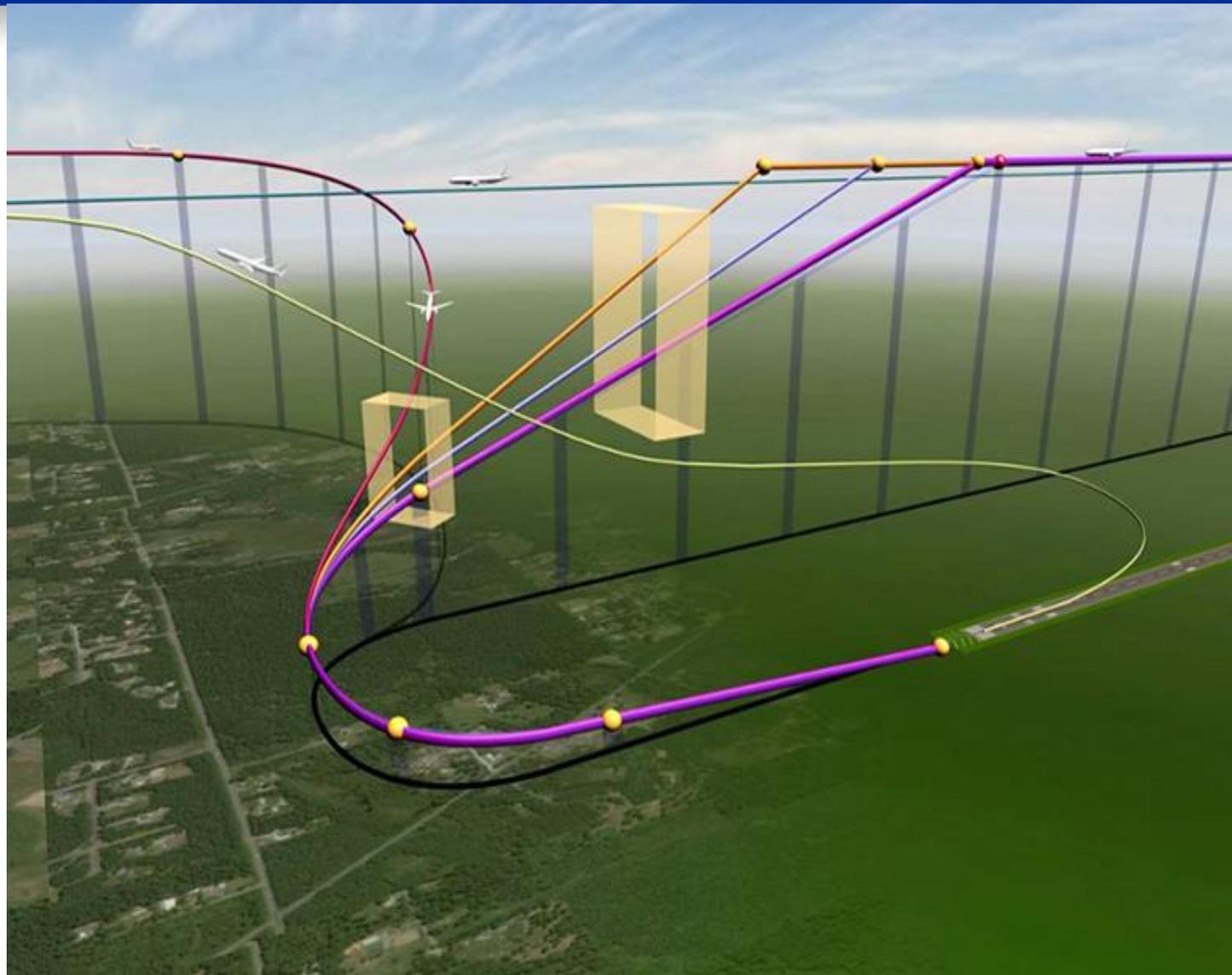
Why CCO/CDO beneficial

→ Increase:

- Flight predictability
- Airspace efficiency & capacity
- Safety

→ While Reducing:

- Noise
- Fuel burn
- Emissions
- Pilot & controller communications and workload





Why CCO/CDO beneficial



Source: Eurocontrol



Factors affecting CCO/CDO

- Capacity
- CCO CDO " the art of the possible "





Airspace Design

Arrivals and departures conflicting at crossing points close to the airport that cause level restrictions or vectors

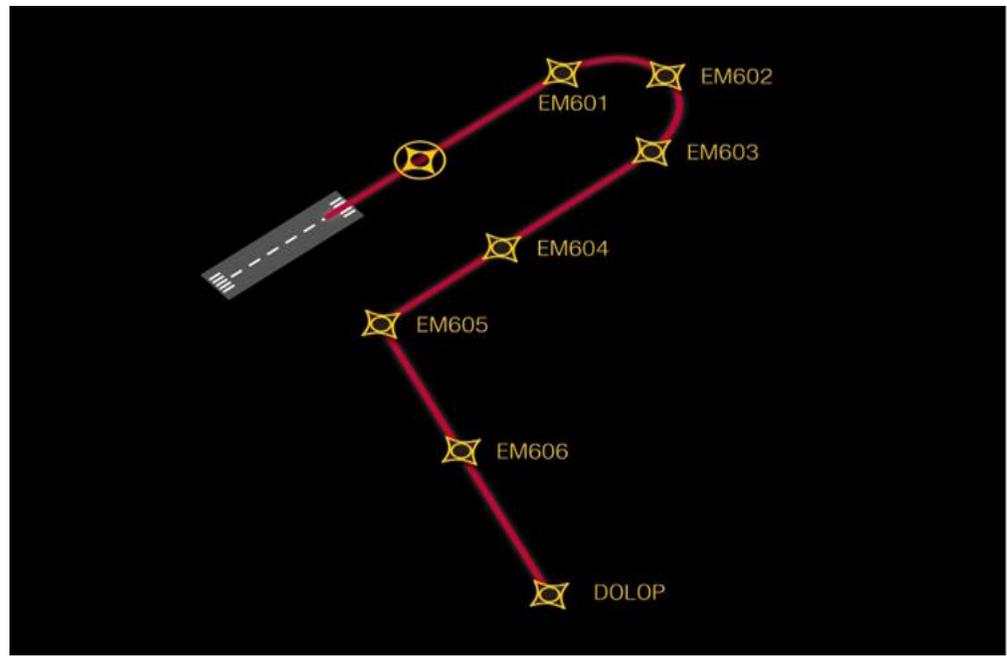
Vs

Arrivals and departures crossing points that have been designed so that aircraft do not need to level off

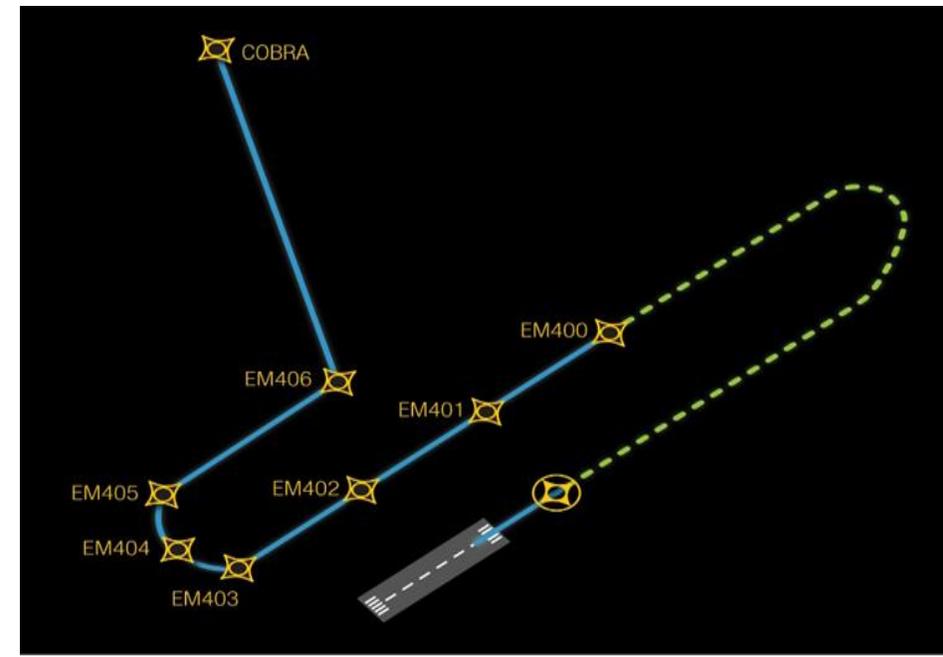


Procedures design : arrival procedures

Closed path designs



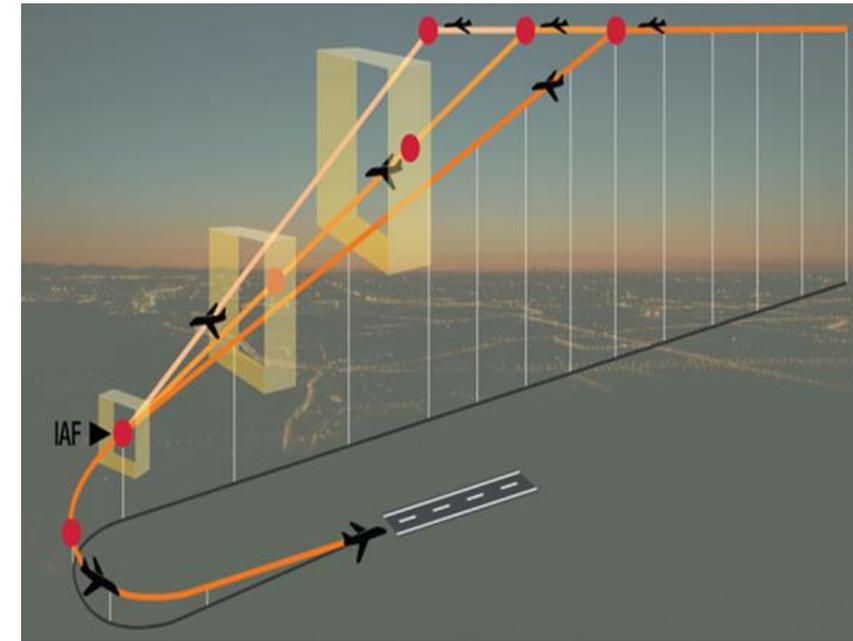
Open path designs





Closed path designs

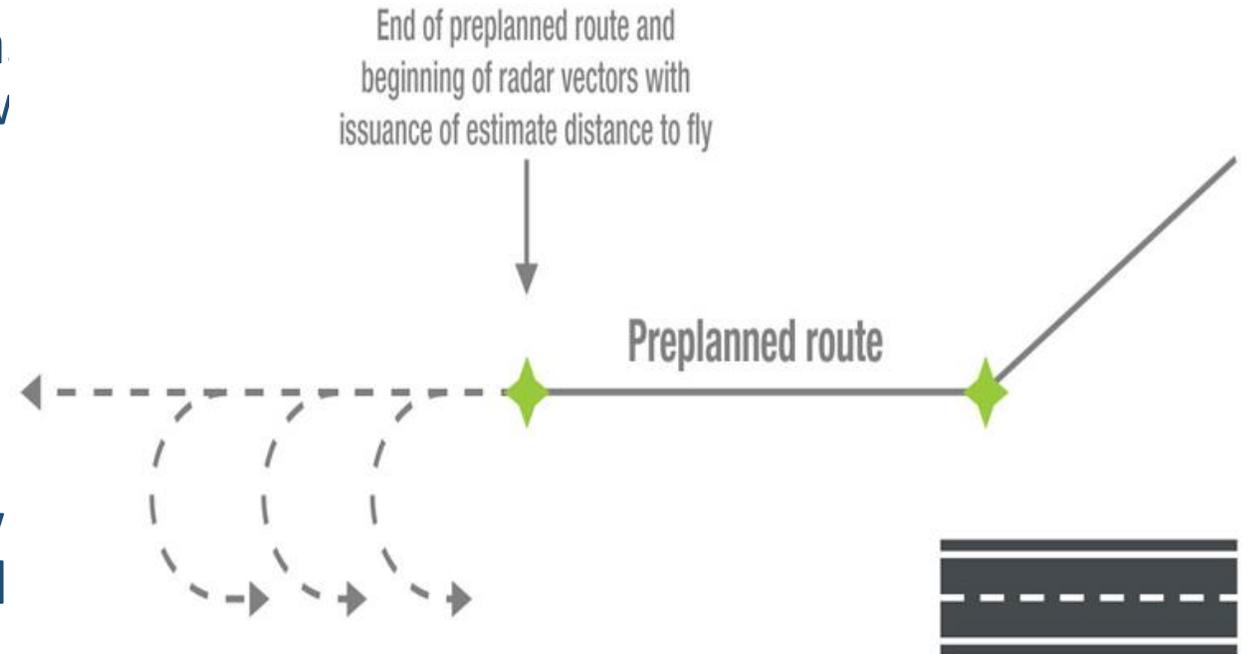
- Allows the aircraft to leave the En-route phase on a pre-defined continuum which will take it to the FAF/FAP of the landing runway.
- The procedure may be published with crossing levels, level windows and/or speed constraints.
- The route is published in the AIP and can be pre-programmed into the FMS.
- An ideal design is one with the minimum amount of distance flown, with no speed or altitude restrictions.
- Closed path designs support CDO





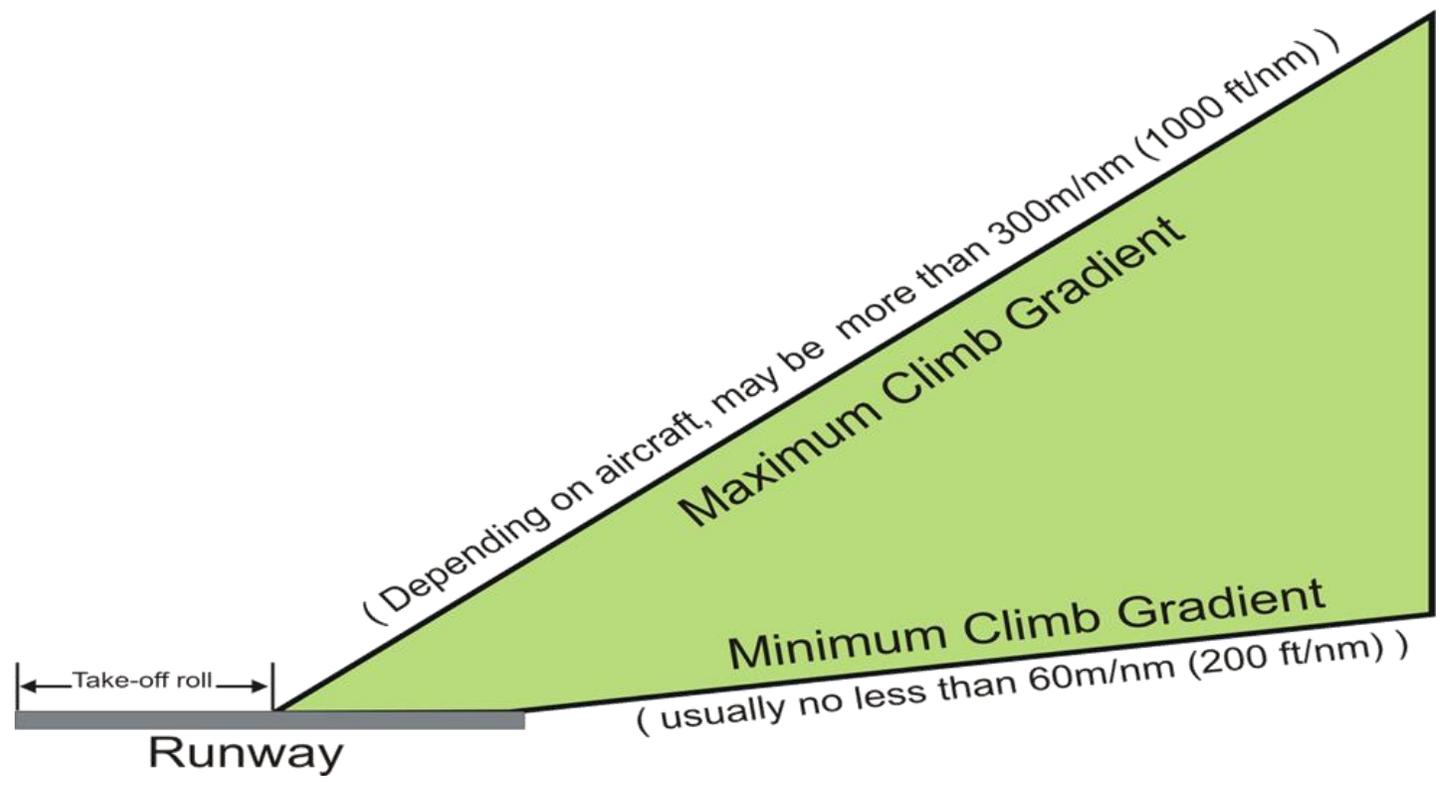
Open path designs

- Finishes before the FAF/FAP.
- Allows the aircraft to leave the En-route phase of flight on a pre-defined continuum which will take it to a metering fix or waypoint.
- The route is published in the AIP. Once the aircraft reaches this waypoint, it will be vectored by air traffic control onto the final approach.
- ATC has the possibility to extend the downwind leg or turn the aircraft in early for the arrival.
- Requires ATC to communicate information on the TDG.





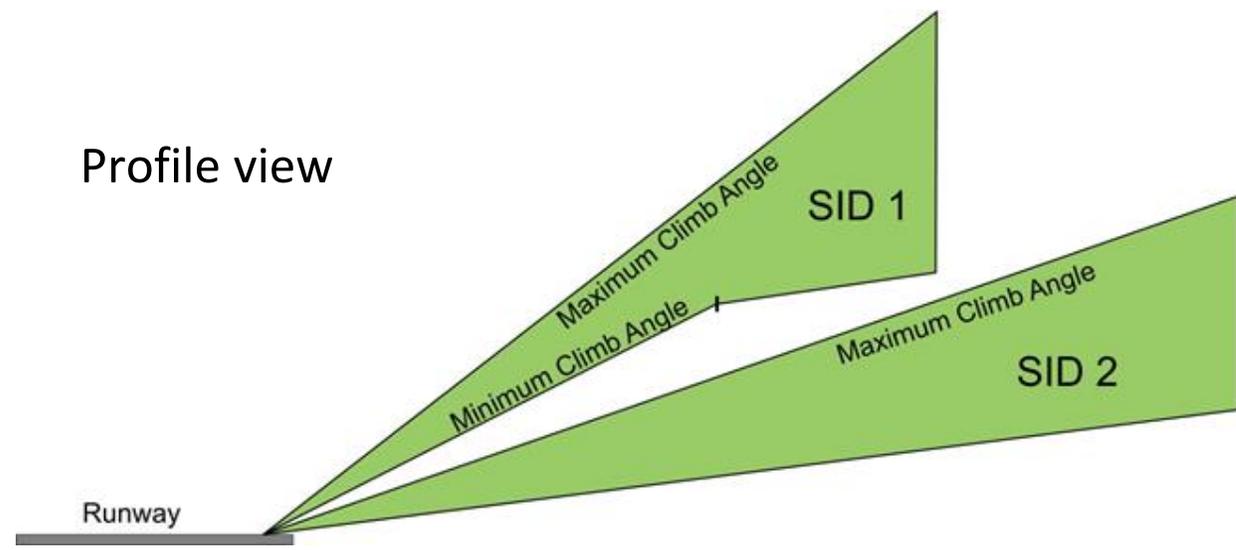
CCO design



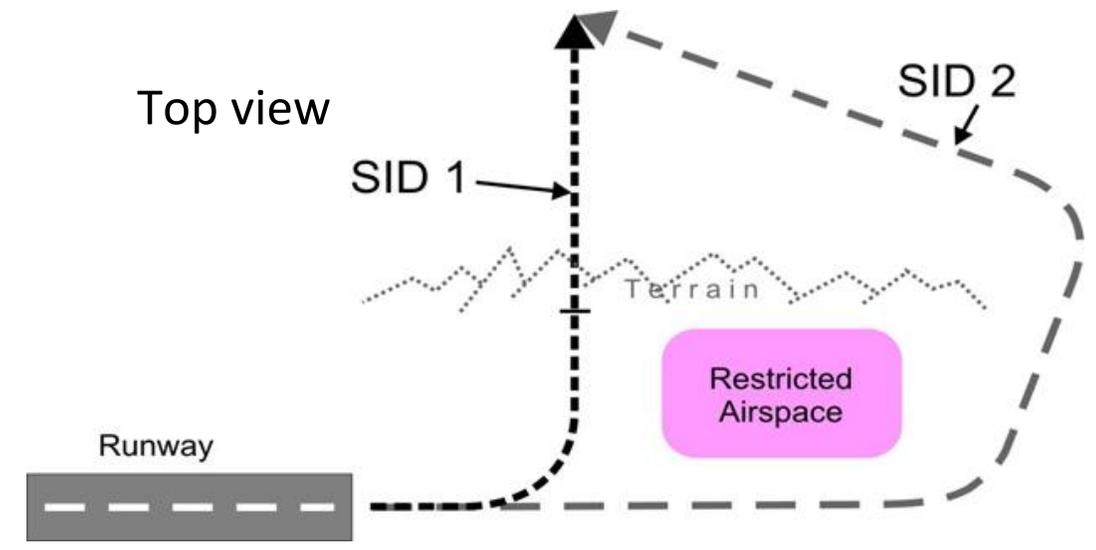


Enhanced CCO design with multiple PDGs

Profile view

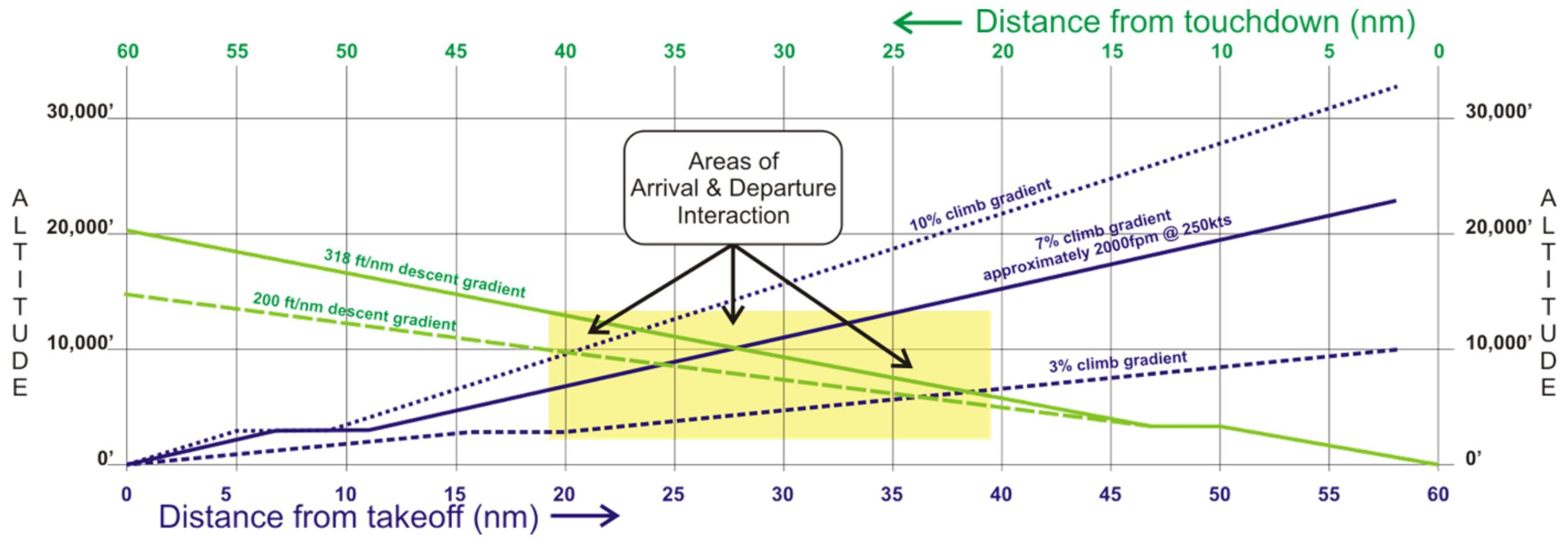


Top view



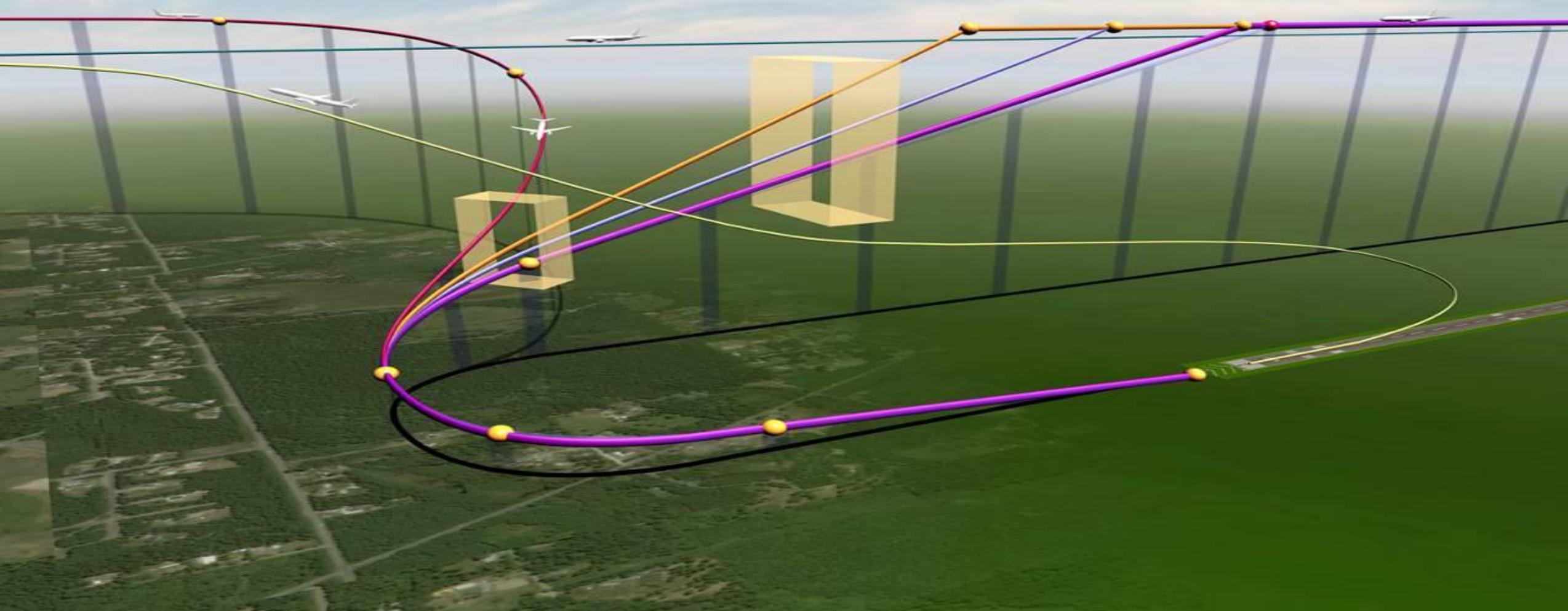


Profile Interaction





Integrating CCO and CDO Designs





CCO/CDO Key takeaways

- CCO / CDO optimisation should be considered as an integral part of the airspace change process;
- CCO and CDO should be enabled to / from as high a level as possible (depending upon local conditions);
- Emphasising the importance of the environmental assessment in the airspace change process;
- Emphasising that external environmental experts should be involved in the airspace change process;
- Emphasising that Aircraft Operators should be involved in the airspace change process;
- Introducing 'good practice' principles of airspace and procedure design to enable more optimised CCO and CDO; and
- Detailing the pros and cons of various arrival procedures to enable CDO in different operational environments.



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THANK YOU

