



| ICAO

CAPACITY & EFFICIENCY

B0–CDO, B0-TBO and B0-CCO Implementation in the AFI and MID Regions

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Presentation Outline

- **Generalities**
- **Status of implementation**
- **Challenges**



Performance Improvement Area 4:

Efficient Flight Path – *Through Trajectory-based Operations*



Thread: Continuous Descent Operations (CDO)

- To use performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs).**
- This will optimize throughput, allow fuel efficient descent profiles and increase capacity in terminal areas.**



Thread: Continuous Descent Operations (CDO)

Benefits

Efficiency	<ul style="list-style-type: none">• Cost savings and environmental benefits through reduced fuel burn.• Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted.• Reduction in the number of required radio transmissions.• Optimal management of the top-of-descent in the en-route airspace.
Environment	As per efficiency
Predictability	<ul style="list-style-type: none">• More consistent flight paths and stabilized approach paths.• Less need for vectors.
Safety	<ul style="list-style-type: none">• More consistent flight paths and stabilized approach paths.• Reduction in the incidence of controlled flight into terrain (CFIT).• Separation with the surrounding traffic (especially free-routing).• Reduction in the number of conflicts.
Cost Benefit Analysis	<ul style="list-style-type: none">• If implemented within the ICAO CDO manual framework, it is



B0-CDO (MID Region)

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)

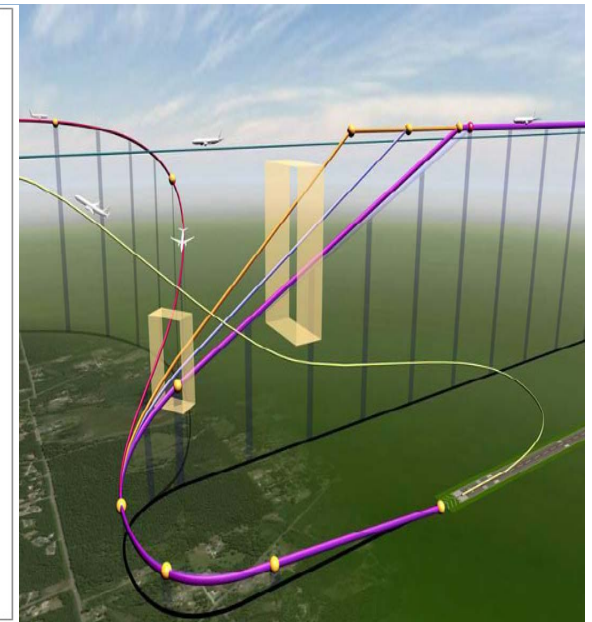
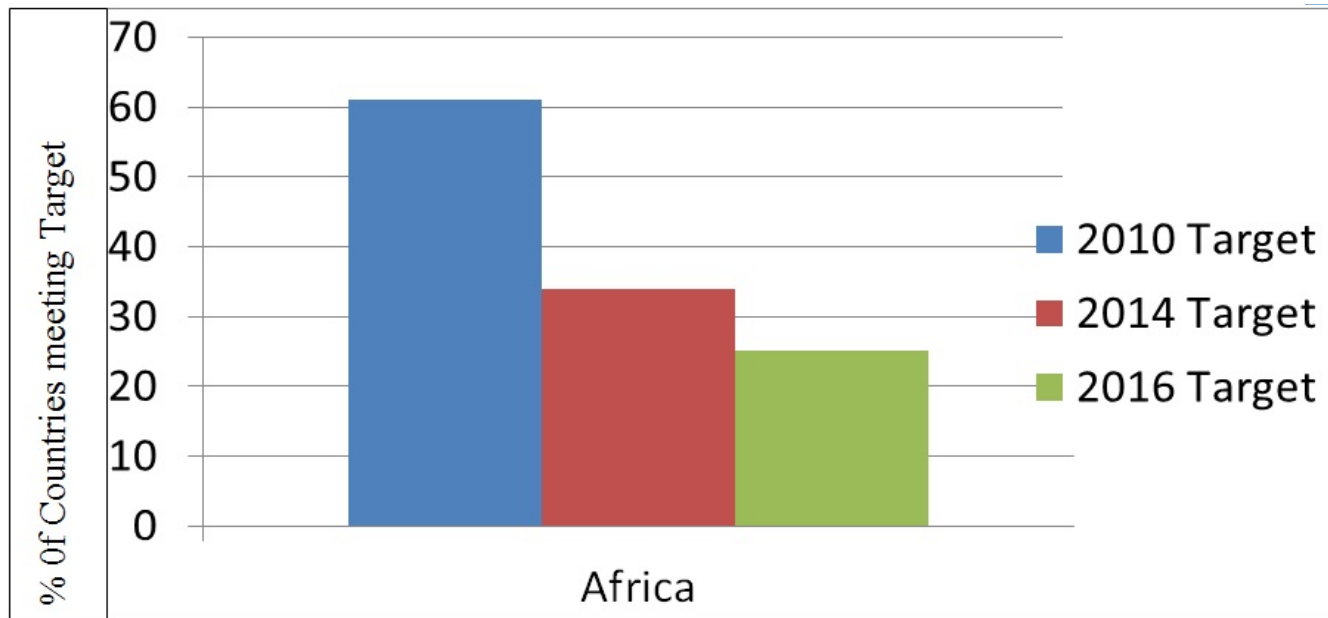
Elements	Applicability	Performance Indicators/Supporting Metrics	Target
PBN STARs	In accordance with States' implementation Plans	Indicator: % of International Aerodromes/TMA with PBN STAR implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented as required.	100% by Dec. 2025 for the identified Aerodromes/TMAs 100% by Dec. 2025 for the International Aerodromes/TMAs
International aerodromes/TMAs with CDO	In accordance with States' implementation Plans	Indicator: % of International Aerodromes/TMA with CDO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented as required.	100% by Dec. 2025 for the identified Aerodromes/TMAs

Only Qatar implemented CDO



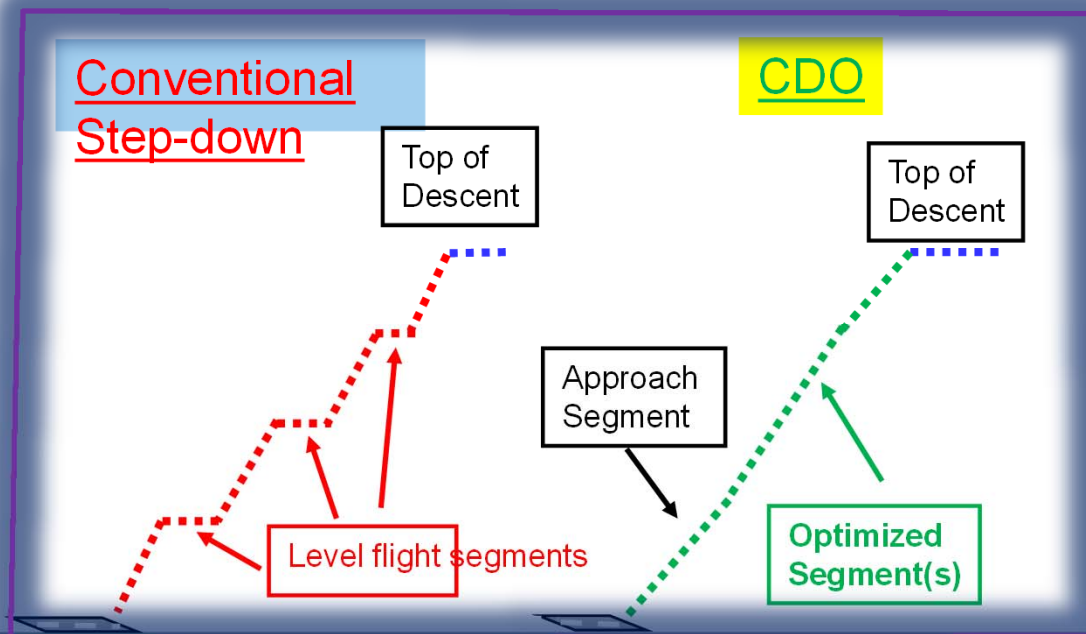
B0-CDO (AFI Region)

- The AFI approach – Every new STAR should be designed to accommodate CDO
- Regional PBN Plan - STARS in accordance with A37-11
- However, implementation is lagging



B0-CDO - AFI Region (Cont.)

- An upfront challenge is lack of progress in airspace concepts
 - Lack of airspace design
 - Obstructs figuring out which STARs would enable CDO
- Acknowledging existing delays, AFI Plan Steering Committee has recommended to APIRG/20 adjustment of 2016 targets to 2018
 - Implementation of PBN
 - Implementation of CDO





Thread: Trajectory-Based Operations (TBO)

To implement an initial set of data link applications for surveillance and communications in ATC, supporting flexible routing, reduced separation and improved safety.





Thread: Trajectory-Based Operations (TBO)

Benefits

Capacity	A better localization of traffic and reduced separations allow increasing the offered capacity.
Efficiency	Routes/tracks and flights can be separated by reduced minima, allowing to apply flexible routings and vertical profiles closer to the user-preferred ones.
Flexibility	ADS-C permits to make route changes easier
Safety	Increased situational awareness; ADS-C based safety nets like cleared level adherence monitoring, route adherence monitoring, danger area infringement warning; better support to search and rescue.
Cost Benefit Analysis	The business case has proven to be positive due to the benefits that flights can obtain in terms of better flight efficiency (better routes and vertical profiles; better and tactical resolution of conflicts).



B0-TBO (AFI Region)

- APIRG
 - 2001- Concl. 13/78: *AFI En-route Surveillance Plan & ATS Automation (Including ADS-C/CPDLC)*
 - 2010 -Concl. 17/25: Urging CPLDC implementation and RCP
- Status as of 2 Nov 2015
 - 12 States- Operational CPDLC, some with ADS-C
 - 14 States- Various stages of implementation – Pre operational



B0-TBO-AFI Region (Cont.)

- Operational Datalink Workshop Nairobi 2-6 Nov 2015: Recommendation to APIRG/20 (30/11/2015)
 - Training for controllers, technicians, managers, and supervisors, as appropriate
 - PBCS monitoring Ref. Doc 9869 Ed. 2
 - Establish a central reporting agency (CRA) for the AFI region to improve system performance
 - Take advantage of CPDLC implementation to facilitate automatic/silent handovers of air traffic
 - recognized and highlighted the need for cooperative effort at regional level and to involve all stakeholders (e.g. operators, CSPs, aircraft manufacturers, avionics suppliers)
- Noted the challenge of various role players (including State Telkom) in the systems performance



Thread: Continuous Climb Operations (CCO)

To implement continuous climb operations in conjunction with performance-based navigation (PBN) to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles and increase capacity at congested terminal areas.



Thread: Continuous Climb Operations (CCO)

Benefits

Efficiency	<ul style="list-style-type: none">• Cost savings through reduced fuel burn and efficient aircraft operating profiles.• Reduction in the number of required radio transmissions.
Environment	<ul style="list-style-type: none">• Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted.• Environmental benefits through reduced emissions.
Safety	<ul style="list-style-type: none">• More consistent flight paths.• Reduction in the number of required radio transmissions.• Lower pilot and air traffic control workload.
Cost Benefit Analysis	<ul style="list-style-type: none">• It is important to consider that CCO benefits are heavily dependent on each specific ATM environment.• Nevertheless, if implemented within the ICAO CCO manual framework, it is envisaged that the benefit/cost ratio (BCR) will be positive.



B0-CCO (MID Region)

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

Elements	Applicability	Performance Indicators/Supporting Metrics	Targets
PBN SIDs	In accordance with States' implementation Plans	Indicator: % of International Aerodromes/TMA with PBN SID implemented as required.	100% by Dec. 2016 for the identified Aerodromes/TMAs
		Supporting Metric: Number of International Aerodromes/ TMAs with PBN SID implemented as required.	100% by Dec. 2018 for all the International Aerodromes/TMAs
International aerodromes/ TMAs with CCO	In accordance with States' implementation Plans	Indicator: % of International Aerodromes/TMA with CCO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CCO implemented as required.	100% by Dec. 2018 for the identified Aerodromes/TMAs

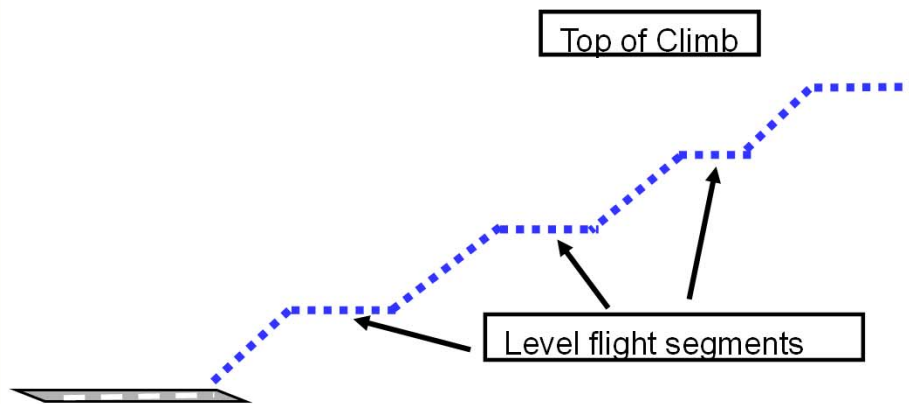
Only Qatar implemented CCO



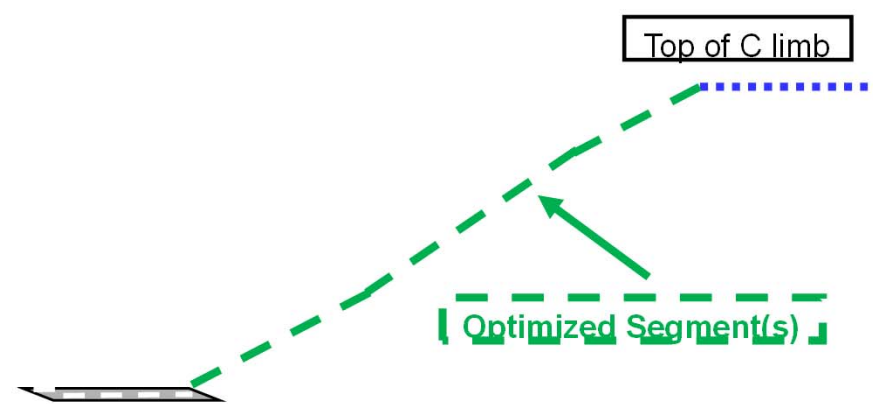
B0-CCO (AFI Region)

- The AFI approach – **Similar to CDO:**
 - Every new SID should be designed to accommodate CCO
- Regional PBN Plan - SIDs in accordance with A37-11
- Implementation is lagging, much more than CDO
- Challenges are also similar, **LACK OF AIRSPACE DESIGN**
- Some air operator policies make the situation more complex – *Engine wear management policies*

Conventional Departure



Continuous Climb Operations





Thank You