NAT PBCS Operator Readiness

ICAO EUR/NAT
Third Workshop on PBCS

February 20-21, 2018

Our mission is to represent, lead and serve the airline industry.

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PBCS QUICK FACTS

- NAT SPG has operated reduced separations based on ADS-C/CPDLC for a number of years. PBCS is intended to replace the RLatSM (Phase 2) trial currently in effect.
- PBCS adopted as requirement for performance based separation effective Nov 2016
- NAT SPG, agrees to implement PBCS in NAT Region, applicable March 29, 2018
- NAT SPG publishes PfA stating their intent to implement PBCS, Regulators and Operators approve
- As the date approaches, most of Regulators and Operators, have not achieved the steps required to approve the operation.
- Impact will be felt by Regulators/Operators from the following Regions: CAR/SAM, EUR/NAT, MID/AFI, NACC

OPERATIONAL AUTHORIZATION GUIDE

ICAO publishes the "Operational Authorization Guidance for PBCS", in January 2018 to support states to authorize their operator. The guide aims to provide regulatory authorities and operators with a summary of guidance material contained in the *PBCS Manual (ICAO Doc 9869)* and other State regulatory documents with respect to PBCS operational authorization.

https://www.icao.int/APAC/Documents/edocs/PBCS%20Operational%20Authorization%20Guidance.pdf#search=PBCS

OPERATIONAL AUTHORIZATION GUIDE

The Manual contains;

- ***Appendix A*** *- Operational Authorization Checklist which lists;*

  Aircraft Eligibility; Engineering; Operations; CSP Compliance; MEL/MMEL; Flight Planning; Performance Monitoring; Training

- ***Appendix B*** *contains- Required training on Data Link and PBCS Operations for:*

  Flight Crew; Dispatchers and Flight Operations Officers; Engineering and Maintenance Personnel

PBCS READINESS ISSUES

- Not all Regulators have included PBCS requirements into their regulations
- The PBCS requirements are based on RTCA DO-306/ED-122 which include safety and performance requirement(e.g. 99.9% ET)
- Aircraft Manufacturers have issued an SOC or other material like ATS SR&O to confirm their fleets are capable of meeting the requirements, but still available only on limited types of aircraft, by one manufacturer.
- Different configurations of FMS and CMU combinations are creating confusion for operators seeking approvals

PBCS READINESS ISSUES

- NAT SPG ANSPs, have prepared the necessary modifications to their automation systems to accept the required flight plan characters indicating aircraft are capable, and excluding those that are not
- Tasks as outline in DOC 9869 PBCS Manual have not been completed
- Timeline for remaining approvals is unknown
- As mentioned, NAT OTS PBCS approved aircraft based on IATA Survey
    - Worst case 13% PBCS approved
    - Best case 45% PBCS approved

BOEING AIRCRAFT TESTING RESULTS (2/13/2018)

Model	FMC	CMU	PBCS P/F *
737 NG/Max	A4 HW with U12	RC 822-1239-151	Pass
		HI 965-0758-006	Fail
	C1 HW with U13	RC 822-1239-151	Pass
		HI 965-0758-006	Fail
747-400	Legacy FMC with BP16A	RC 822-1239-151	Fail
	NG FMC with BP3.1	RC 822-1239-151	Pass
747-8	NG FMC with BP3.1	RC 822-1239-151	Pass
		HI 963-2431-021	Feb 19th
757/767	Peg I HW with Peg 09	RC 822-1239-151	Pass
777	AIMS1 HW with BP16	n/a	Fail
MD11	923	RC 822-1239-151	Fail
		HI 965-0758-001	Pass

BOEING TEST RESULTS CONCERNS

- PASS/FAIL – “The actual expiration time is less than the required 99.9% but better than 99.0%. The 99.0% is used for pass/fail criteria.”

- No information on State Regulator / ICAO acceptance of expiration time being less than 99.9%

“FAIL” VS “RECORDED PERFORMANCE”

B777 AIMS1 BP16 “Failed” during the Boeing test

Results show expiration time (ET 99.9%) per performance requirement in DO-306/ED-122 was below 99.0%

AIMS1 BP16 operator sample data (JUL-DEC2017) indicates:

Data Source (FIR)	Operator/ Aircraft Type	ADS-C downlink Message Counts	95% RSP 180 benchmark ASP <=90 sec	99.9% RSP 180 benchmark ASP <= 180 sec	CPDLC Transaction Counts (WILCO Received)	95% RCP 240 benchmark ACP <= 180 sec	99.9% RCP 240 benchmark ACP <=210 sec
Anchorage	XXX/B772	6,062	98.1%	99.9%	138	100.0%	100.0%
Oakland	XXX/B772	7,938	98.9%	99.8%	216	99.5%	100.0%
Oakland	XXX/B773	2,237	98.8%	99.7%	22	100.0%	100.0%
Gander	YYY/B772	29,960	99.0%	99.9%	843	99.8%	100.0%
New York	YYY/B772	30,219	99.6%	99.9%	1,121	99.8%	99.8%
Oakland	YYY/B772	5,508	99.7%	99.8%	235	100.0%	100.0%
Reykjavik	YYY/B772	5,680	99.0%	99.9%	333	100.0%	100.0%
Santa Maria	YYY/B772	29,919	98.1%	99.8%	1,642	99.7%	99.9%
Shanwick	YYY/B772	37,838	97.8%	99.8%	2,307	99.4%	99.5%

The current PBCS framework will not accept these aircraft types due to the SOC requirement.

PHASE II TESTING CONFIGURATIONS

Model	FMC	CMU
737 NG 737 Max	U13 U12 U11 U10.8A	HI 965-0758-001
747-400 747-8	BP3.1	RC 822-1239-101
		HI 965-0758-001
		HI 965-0758-002 HI 965-0758-006
757 767	Peg 09	RC 822-1239-101
		HI 965-0758-001 HI 965-0758-002
		HI 822-0666-003
		MU-DLM-716C**
MD1	923	RC 822-1239-101
KC46		GE

NOTE: Boeing does not intend to support Iridium STC aircraft

ALL MODELS COMPLIANCE STATUS

Model	FMC Build	Compliance Status	ATS SR&O update	AFM update
737 NG/Max	U13/U12	Yes (with RC CMU -151)	Yes	No
737 NG/Max	U14 EIS	Planned 1Q2019	Planned for EIS	Will be included at EIS
747-400 w/ Legacy FMC	BP16A	No (lack of Latency Timer)	No	No
747-400 w/ NG FMC	BP3.1	Yes (with RC CMU -151)	Yes	No
747-400 w/ NG FMC	BP4 EIS	Planned 1Q2019	Planned for EIS	Will be included at EIS
747-8	BP3.1	Yes (with RC CMU -151)	Yes	No
747-8	BP4 EIS	Planned 1Q2019	Planned for EIS	Will be included at EIS
757/767 w/ Peg I	Peg '09	Yes	Yes	No
757/767 w/ Peg II	BP1 EIS	Planned 2Q2018	Planned for EIS	Will be included at EIS
777 AIMS 1	BP16	No	No	No
777 AIMS 2	BP17	Yes	Already done	Already included
787	EIS	Yes	Already done	Already included
777X	EIS	Planned1Q2020	Planned for EIS	Will be included at EIS
MD-11	923	Yes (with HI CMU -001)	Yes	No

ANTICIPATED NAT OPERATOR IMPACT

- ↗ Although information indicates the OTS will permit non-PBCS aircraft on some tracks, current NAT OPS Bulletin indicates all OTS Routes are PBCS
- ↗ Decrease operator predictability and awareness of non-PBCS flight planning restrictions or visibility of long term non-PBCS ATM plan
- ↗ Decrease in operational efficiency
- ↗ Decrease in % of flights cleared as filed (noting that some % of flights that are cleared as filed will not have been filed optimal or as desired)
- ↗ Increase in airspace control measures and delays may be caused by low percentage of capable aircraft
- ↗ Increase of fuel requirements (burn and contingency)
- ↗ Decreased and/or complicated tactical response for turbulence avoidance, and or emergency situations
- ↗ May impact non PBCS tracks / flight levels such as UPRs

ANTICIPATED NAT ANSP IMPACTS

- ↗ Increase in required staffing, airspace control measures, and delays
- ↗ Increase of complexity and controller workload
- ↗ Decrease in operational efficiency
- ↗ Decrease in predictability
- ↗ Decreased and/or complicated tactical response for turbulence avoidance
- ↗ May impact UPR availability outside of PBCS tracks / flight levels

REFERENCES AND REQUIREMENTS

ICAO

- *Annex 6 Operation of Aircraft*
- *Annex 11 Air Traffic Services*
- *Doc 4444 PANS-ATM Procedures for Air Navigation Services — Air Traffic Management*
- *Doc 10037 Global Operational Data Link (GOLD) Manual*
- *Doc 9869 Performance-based Communication and Surveillance (PBCS) Manual*

REFERENCES AND REQUIREMENTS

↗ ***RTCA DO-306/EUROCAE ED-122***
Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace

↗ ***FAA AC 90-117*** *(3 October 2017)*
Data Link Communications

↗ ***UK AIC Y 094/2017*** *(23 November 2017)*
Introduction of PBCS in the ICAO North Atlantic Region

↗ ***Transport Canada AC 700-041*** *(1 January 2018)*
Special Authorization for Required Communications Performance (RCP) 240 and Required Surveillance Performance (RSP) 180

Projected PBCS readiness of GA aircraft operators:

Further GA Operator Education is needed:

- Confusion of “airspace mandate” versus “separation approval standard”.
- GA operators are concerned that PBCS non-approval means they will be denied Datalink Mandate airspace.

Although PBCS has been discussed in various industry meetings for years, the average GA pilot was not aware of those proceedings:

- Public release of information has only been ***very recent***:
  - AC 90-117 published October 3, 2017
  - LOA 056 guidelines updated January 24, 2018
  - PBCS FAQ published on January 30, 2018
  - NAT OPS Bulletin published February 6, 2018

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PBCS Effect on GA aircraft operations- Operators Need to Know:

In the NAT region, March 29, 2018:

- ***Three NAT tracks*** will be designated as PBCS only for FL350-FL390 and will have reduced separation applied.

- The ***balance of the OTS*** and Random Airspace will be mixed mode, meaning some with and some without PBCS and separated accordingly.

Elsewhere, March 29, 2018:

- The performance-based separations are applied on a tactical basis by ATC when a particular pair of aircraft is equipped, *so an operator may or may not have them applied during the course of their flight and won't know whether or not they did*.

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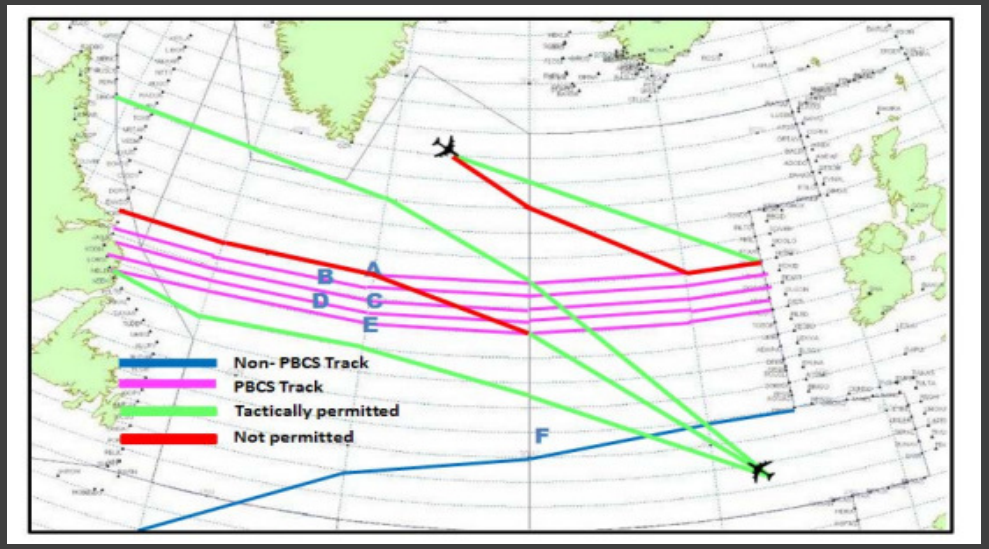
PBCS Effect on GA aircraft operations- Operators Need to Know:

NAT region, March 29, 2018 (per NAT OPS Bulletin 2018_001):

3.3 Operators / aircraft **not eligible for performance based separation may be permitted to**;

- Infringe *PBCS tracks* at FL350-FL390 inclusive at only one point (including Oceanic Entry/Exit Point) i.e. cross but not join an OTS *PBCS track*, and;
- Climb or descend through levels FL350-FL390 on a *PBCS track* provided the climb or descent is continuous.

Note such clearances will only be permitted on a tactical basis.



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