PBCS: Operator Approvals

UNITED STATES

NAT PBCS Workshop/3

20-21 February 2018

Paris, France

Federal Aviation Administration

Overview

- AC 90-117

- FANS-CRA website overview

- FAA PBCS FAQ

FAA Flight Standards
AC 90-117 Updates

Federal Aviation Administration

Prepared by:
Mark Patterson
mark.patterson@faa.gov

Overview

- **Background**

- **What drove the changes?**

- **New Guidance Material**

Background

FAA data comm guidance material

- AC 90-117

    3 Oct 2017 (published)

    Supersedes AC 120-70C

- Data Link Communications (A056) Compliance Guide (v12.17)

    24 Oct 2017 (original version posted on AFS-470 data comm web page)

    Supersedes Draft A056 job aid

    https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs470/datacomm/

- N8900.446

    12 Dec 2017 (published)

    Includes new A056 templates

    29 March 2018 – A056 mandatory revision date

- 8900.1 revision (change 565)

    12 Dec 2017 (published)

What drove the changes?

1. ICAO Performance-based Communication and Surveillance (PBCS) implementation **(29 March 2018)**

2. FAA domestic en route data communications implementation **(May 2018 flight test / Oct 2018 IOC)**

AC 90-117: Contents

1. **Aircraft eligibility**

2. **Operator eligibility**

3. **Communication Service Providers**

4. **Performance monitoring**

5. **Problem reporting**

6. **Flight planning**

Aircraft/Operator Eligibility

Paradigm shift…

Operators responsibility to determine eligibility based on:

    1. Interoperability

    2. Subnetwork

    3. Aircraft Performance

Determine aircraft PBCS eligibility

1. **Does aircraft have a Statement of Compliance (SoC)?** Documentation from the aircraft manufacturer, the operator, the manufacturer of the data link system, or another party indicating the aircraft data link system meets the aircraft-allocated requirements of Required Communication Performance (RCP) and Required Surveillance Performance (RSP) specifications stated in the AFM, AFM Supplement, or other acceptable documentation (e.g. OEM capabilities document)? **SOCs are accomplished by the entity that owns the design approval for the aircraft data link installation.**

GULFSTREAM G450
AIRPLANE FLIGHT MANUAL

17. Data Link Communications

The FAA has approved the aircraft data link system to the criteria contained in AC 20-140B for the following data link capabilities. This design approval does not constitute operational authorization.

Data Link Type	Aircraft-Allocated Performance	Subnetworks
ATN B1[1]	PM-CPDLC at Initial Continental Performance using ->	VDL M2
FANS 1/A (+)[2]	CPDLC at RCP 240 using -> ADS-C at RSP 180 using -> CPDLC-DCL using ->	VDL M0/A/2, SATCOM (Inmarsat)

[1] For airplanes equipped with ASC 092, Protected Mode – Controller Pilot Data Link Communication (PM-CPDLC).
[2] For airplanes SN 4001–4229 with ASC 071 and SN 4230 and subsequent.

NOTE:

Appropriate operational approval must be obtained prior to using data link communications capability. Requirements and operational guidance are found in AC 120-70C.

NOTE:

When using PM-CPDLC, COM / NAV 3 radio must be in "data" mode.

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ATN B1[1]	PM-CPDLC at Initial Continental Performance using ⇒	VDL M2
FANS 1/A+	CPDLC at RCP 240 using ⇒ ADS-C at RSP 180 using ⇒ CPDLC-DCL using ⇒	VDL M0/A/2, SATCOM (Inmarsat)

[1] For airplanes equipped with ASC 039, Protected Mode – Controller Pilot Data Link Communication (PM-CPDLC)

Determine aircraft PBCS eligibility

No SoC? <u>Alternate means of compliance</u>

1. Operators may provide a detailed submission validating the aircraft's current system meets the RCP/RSP applicable requirements. As a minimum, this submission should include information on avionics continuity, integrity, availability, and safety and monitoring/alerting requirements (refer to RTCA DO-306/EUROCAE ED-122).

2. **Equipment manufacturer support should be solicited to acquire suitable documentation.**

2. **Does demonstrated performance meet RCP/RSP allocations?**

   - Latest ANSP PBCS monitoring reports can be found at:
     https://www.faa.gov/air_traffic/separation_standards/PBCS_Monitoring/
     http://www.fans-cra.com/

   - **If not enough data available - initial compliance may be based on the SoC with demonstrated performance being monitored as data is collected.**

3. **Does MEL/MMEL show RCP/RSP capabilities?**

Determine operator PBCS eligibility

Has operator established and documented the following for PBCS?

1. Normal and abnormal procedures, including contingency procedures
2. Flight crew qualification and proficiency requirements
3. Appropriate maintenance procedures to ensure continued airworthiness
4. Training program for relevant personnel consistent with the intended operations
5. A performance monitoring process
6. A problem reporting process
7. A contract/service agreement with Communication Service Provider (CSP) that includes:
   a) Failure notifications (to operator and ANSPs)
   b) Recording data link messages
   c) CSP integrity
   d) Compliance with CSP allocations for RCP/RSP
   e) Adequate subnetwork coverage for the route flown

   OR

   Alternate means of compliance – operator/ANSP active PBCS Global Charter membership

Determine operator PBCS eligibility

Performance monitoring process:

1. Establish process to address substandard performance whether the source of that report is from the operator's own monitoring process, Communication Service Provider (CSP), or CAA

Problem reporting process:

1. The operator should establish procedures to report data link communication problems to the FANS-Central Reporting Agency (CRA)

2. Ensures effective identification, tracking, and follow-up of data link-related events

3. Permits record-keeping of various problems and solutions

http://www.fans-cra.com/

Performance Monitoring - oceanic

FAA conducts performance monitoring:

- New York, Oakland, Anchorage (monitoring since 2009)

- Actual Communication Performance (ACP) and Actual Surveillance Performance (ASP) analyzed

- Semi-annual report with an emphasis on performance against 95% requirement which represents expected performance for normal operations

Operators must address substandard performance:

- Operator's monitoring process, CSP, FAA, or foreign authority

"Fail" may result in:

- Temporary suspension of eligibility for performance-based separation

- Unable to file P2/RSP180 until causes identified and problem resolved

Performance Monitoring - oceanic

Eligibility for RCP240 and RSP180 currently based on 95% criteria

1. Initial approval
   - Use most recent data posted on the FAA monitoring website and www. FANS-CRA.com
   - "Pass" (green) → supports SOC in determining aircraft eligibility
   - "Fail" (red) → operator provided additional information showing deficiency (allocations, etc).
   - **"Insufficient data" → all other aircraft and operator requirements determine eligibility**
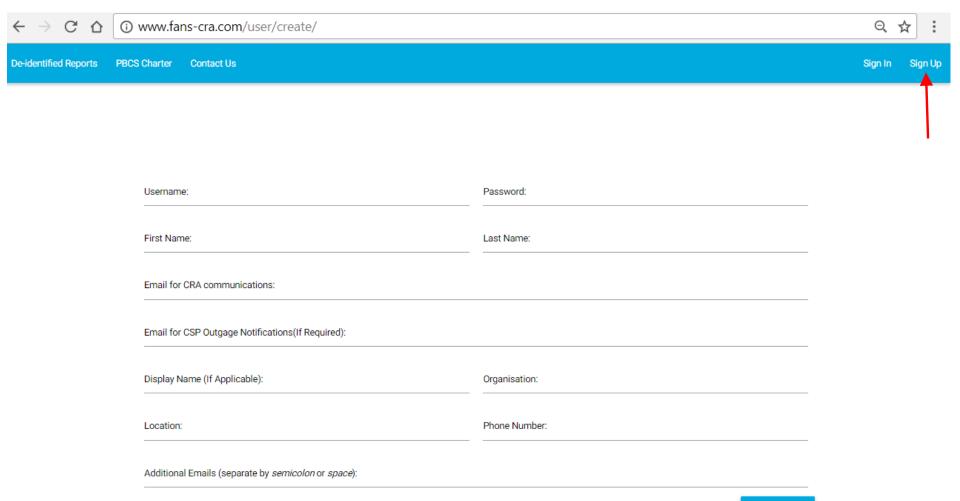
2. Ongoing
   - Operator/CSP monitor own performance (monitoring program/process) → pro-active engagement
   - FAA runs at least semi-annual report considering all available monitoring data
   - "Pass" → no issues
   - "Fail" → need for corrective action plan, may result in authorization downgrade

FANS
Central Reporting Agency (CRA) Website

Federal Aviation Administration

Central location for PBCS tools and information www.FANS-CRA.com

1. **Hosts the Central Reporting Agency (CRA)**
   - AKA Data Link Monitoring Agency (DLMA) in the NAT
2. **Must register for account to obtain secure access**
   - Available to any FANS data link stakeholder
   - **Only 1 account per company/organization (if multiple users, expected to share common username and password)**
3. **Allows stakeholders to log data link problems reports**
4. **Maintains "FANS Problem Solution Tracker"**
5. **Hosts PBCS Charter**
6. **Results provided by fleet and by registration numbers for contributing FIRs**
   - Anchorage, New Zealand, Oakland, Gander, New York, Reykjavik, Santa Maria, Shanwick
   - ACP and ASP shown against 95% and 99.9%

De-identified Reports   PBCS Charter   Contact Us   Sign In   Sign Up

Username: Password:

First Name: Last Name:

Email for CRA communications:

Email for CSP Outgage Notifications(If Required):

Display Name (If Applicable):   Organisation:

Location: Phone Number:

Additional Emails (separate by *semicolon* or *space*):

SIGN UP

Problem reporting, investigation, resolution

Appendix D.   Post-implementation monitoring and corrective action (CPDLC and ADS-C)   App D-35
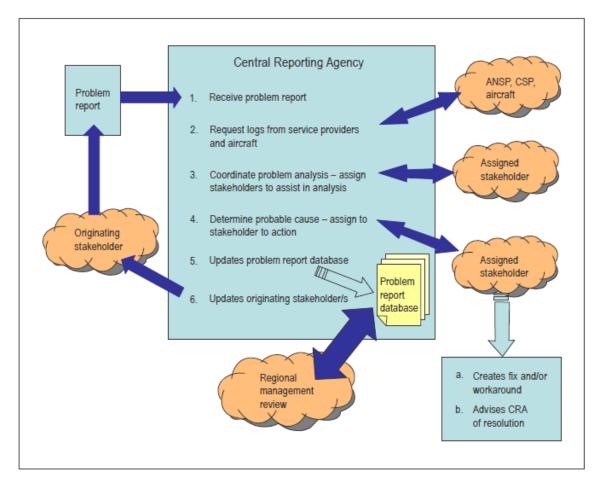
Figure D-13.   Problem reporting and resolution process

Problem investigation and resolution

- **It is crucial that events are reported shortly after event so that the entity collecting data for the analysis task can request and obtain necessary data in a timely manner, as much of it is subject to limited retention**

- **Data collection typically involves obtaining logs from involved parties. May include:**
  - aircraft maintenance system logs
  - built-in test equipment data dumps for some aircraft systems
  - SATCOM activity logs
  - logs/printouts from the flight crew and recordings/logs from the ANSPs involved in the problem

Problem investigation and resolution

- **Following a problem's identification and resolution, a considerable period of time may elapse while software updates are applied to all aircraft in a fleet**

  - Procedural methods to mitigate the problem may need to be developed while the solution is being coordinated

- **The regional monitoring entity should identify the need for such procedures and develop recommendations for implementation by the ANSPs, CSPs and operators involved**

www.FANS-CRA.com
Problem report form

Originator's Reference Number:

Title:

Date UTC (YYYY-MM-DD):
2017-10-19

Time UTC:

Registration:

Flight Identifier:

Departure and Arrival Airports:

Aircraft Type:

Active Center:

Next Center:

Position:
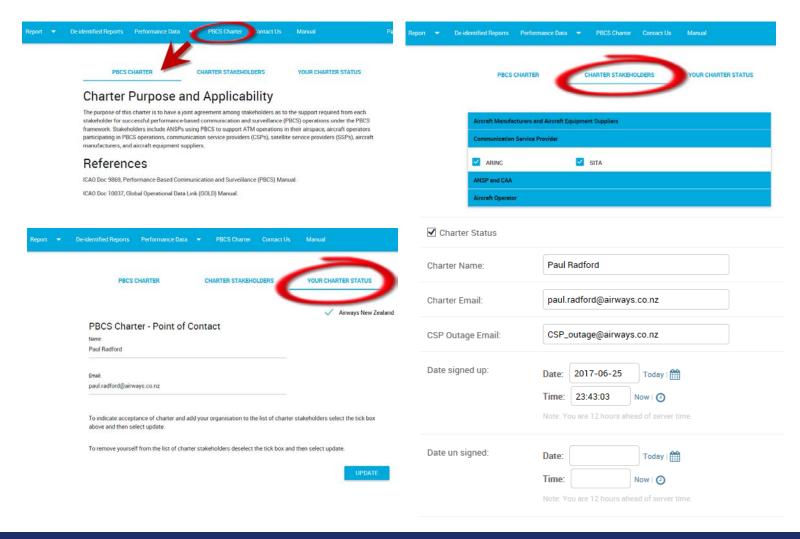
Description:

ADD FILES   Select files to upload

SUBMIT

FANS Problem Solution Tracker

- Record of current FANS1/A problems and status (Aircraft, Ground, Network)

- Workarounds and proposed solutions

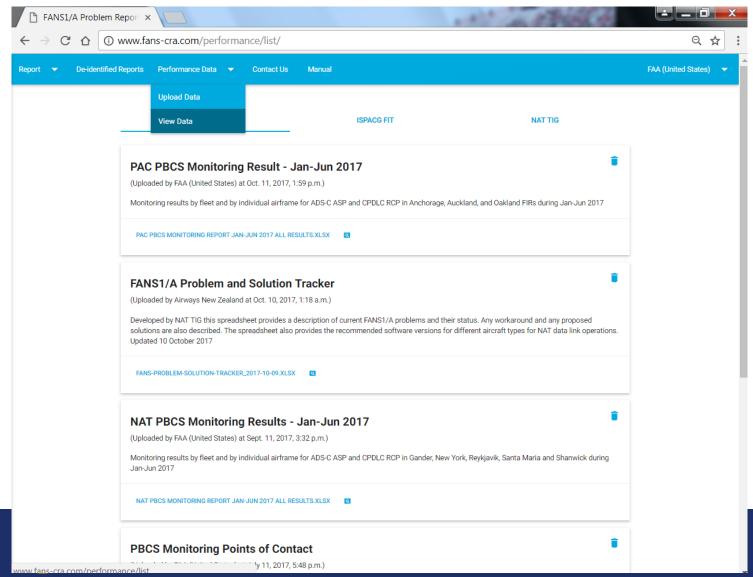- Recommended software versions for data link operations

Color coding legend:

(green)	Problem fixed or a fix is available
(orange)	Workaround is available
(purple)	There is a pending fix to the problem
(red)	Fix to the problem is not available
(yellow)	Needs to be further discussed by NAT TIG
(blue)	New issue that has not been reviewed by NAT TIG
(gray)	Not applicable
Red text	Revised or new text that has not been reviewed by NAT TIG

Recommended software versions for NAT data link operations

Aircraft type	FANS software	ACARS software	Notes
A318/A319/A320/A321	CSB7.4	CSB7.4	Aircraft with Thales FMS should have FMS software version S5 or S6 or S7
A330/A340	CLR7.4	CLR7.4	Aircraft with Thales FMS should have FMS software version T3 or T4 or T5
A350	CLV1.3.1	S3.1	
A380	CLA4.1	S2.1	
MD11	FMS Pegasus -921	Honeywell CMU Mark II: 998-6063-501 or -521 Rockwell Collins CMU-900: 832-9548-012	
B736/7/8/9	FMS U12		
B744	With original FMS: Load 16 With B748 FMS: BPV3.1		
B748	FMS BPV3.1		
B75x	FMS Pegasus 2009		
B76x			
B77X		With AIMS-1: BPV16 With AIMS-2: BPV17A	
B78X		CMF BPV4	

PBCS Global Charter – web interface

Performance data
www.FANS-CRA.com

PBCS
FAQ

Is performance-based communication and surveillance (PBCS) similar to performance-based navigation (PBN)?

– Yes, but with some notable differences….

– PBN concept applies required navigation performance (RNP) and area navigation (RNAV) specifications to the navigation element

– PBCS concept applies required communication performance (RCP) and required surveillance performance (RSP) specifications to communication and surveillance elements.

– RCP and RSP must involve requirements for the air traffic service provision and communication services due to the additional complexity and interdependencies of the aircraft and operator with those elements

– **Before 29 March 2018**, an aircraft will indicate eligibility for performance-based separation (23NM/30NM Lateral, 23NM/30 NM/50NM Longitudinal) by specifying that their navigation equipment has been certified to meet RNP4, and simply that they have ADS-C and CPDLC.

– **After 29 March 2018**, an aircraft will indicate eligibility for performance-based separation by specifying not only that their navigation equipment meets certain criteria but that their surveillance (ADS-C) and communication (CPDLC) equipment also meets defined criteria (RSP180, RCP240)

Do I need RCP240 and RSP180 approvals to continue using my ADS-C and CPDLC equipment?

- No. RCP240 and RSP180 approvals simply indicate the you are eligible for performance-based separation (23NM/30NM Lateral, 23NM/30 NM/50NM Longitudinal) in the airspace where they are applicable.

- The separation standards being applied to a pair of aircraft are transparent to the pilot but performance-based separation standards allow air traffic controllers additional flexibility in separating aircraft that are appropriately qualified.

Do I need an RCP240 or RSP180 approval for use of CPDLC in domestic airspace?

– No. At this time there are no CPDLC applications in domestic airspace that require RCP240.

– RCP for use in domestic applications is coming soon. At this time, no plans for use in FAA domestic airspace, but being considered in European airspace, Brazilian airspace, some States within Asia-Pacific region…

Will I be excluded from any airspace if I do not have RCP240 and RSP180 approvals?

– The only airspace currently planning to implement tracks that will require PBCS to file is in the NAT OTS. There will still be non-PBCS tracks in the OTS for which PBCS approvals will not be required.

– All other airspace in which performance-based separation minima are currently applied will allow aircraft with and without RCP240 and RSP180 approvals to enter and use the airspace in a mixed-mode operation after 29 March 2018, similar to the current approach.

– If you do not have RCP240/RSP180 approvals you will always have the larger separations, e.g. 10-min, applied, and not be eligible for the lower standards in cases where it may be beneficial.

Do I need RCP240 and RSP180 approvals to be eligible for the climb and descend procedure (CDP)?

- No. CDP is an approved procedure that is used by some air traffic service providers to enable clearance of climb and descent requests at less than 30nmi longitudinal separation when specified conditions are met.

Will I be penalized if I do not obtain RCP240/RSP180 approvals?

- Not necessarily. While it may be easier for RCP240/RSP180 approved aircraft to obtain optimal flight profiles, especially during high traffic periods, and particularly for NAT flights using the OTS, the application of these standards is generally tactical in nature for ATC.

- An aircraft may not have performance-based separation applied at all on an individual, or possibly may never have had it applied to any of its flights.

- In addition, the separation standards applied to a flight at a given time depend on the qualifications of that aircraft as well as the aircraft around them. Even if a you have an RCP240/RSP180 approvals, if the aircraft nearby does not also have the approvals, the separation standards cannot be applied.

How do I know if I can file "P2" in item 10a and "SUR/RSP180" in item 18 of my flight plan?

- You must obtain an approval for RCP240 to file "P2" and for RSP180 to file "SUR/RSP180" from your State regulatory authority, certifying that your operation meets all of the aircraft and operator requirements.

- The performance monitoring statistics, which measure the ability of your aircraft to meet the RCP240/RSP180 latency requirements, provide one small part of the full set of requirements for an initial approval.

Do I have to sign the "PBCS Global Charter" if I am not seeking RCP240/RSP180 approvals?

- No.

How do I provide proof to my regulator that I have signed the "PBCS Global Charter" to ensure my CSP meets their PBCS requirements (in lieu of contract update, if accepted by regulator as means of compliance)?

– Save or print a snapshot of the "CHARTER STAKEHOLDERS" on the FANS-CRA website after you have signed, ensuring that your CSP has also signed and is shown in the snapshot in addition to your company name – see Figure below. No letter of proof will be provided by the FANS-CRA website.

Monitoring Data FAQ

Q **What if I have a fleet of the same aircraft type with different data link configurations?**

A Details of differences should be provided to assess performance separately for different data link configurations.

Q **What if I have a fleet approvals and my fleet is meeting but individual airframes within my fleet are not meeting?**

A Persistent performance issues for individual aircraft should be further investigated and corrective action should be taken or airframe may be restricted from filing "P2" and "RSP180"

Monitoring Data FAQ

Q **What if my fleet/aircraft is currently (prior to 29 March 2018) not meeting time/continuity requirements?**

A Operator should investigate, with help from DLMA via submission of a problem report if needed, and corrective action should be taken

Q **What if my fleet/aircraft is currently meeting time/continuity requirements but falls below after my approval is issued?**

A Cases of performance falling below requirements after approval is issued will be further investigated and monitored. If issue persists, operator may be restricted from filing "P2" and "RSP180" until corrective action is taken and issue in performance improves above requirements. If issue is not corrected within specific time period, approval status may be affected.

Q **What if my fleet/aircraft is currently meeting time/continuity requirements in one FIR but falling below in another?**

A Aircraft with RCP240/RSP180 approval must meet performance requirements in all airspace where they make use of performance-based separation minima requiring RCP240 and RSP180. All performance issues must be investigated and resolved.

Actual Surveillance Performance (ASP)

RSP 180 specification (surveillance data delivery times and RSP continuity)				
RSP	180			**RSP**
95%	90			95%
RSP 180/D allocations – CPDLC or ADS-C example				
Time +/- 1 second at position (RNP at UTC)	Monitored operational performance			ATM (ATSU system updated)
99.9%	180			OT
95%	90			DT
RSMP/RSTP A	Aircraft system	D1 Network	D2 ATSU system	**RSMP/RSTP** Z
99.9%	5	170	5	99.9%
95%	3	84	3	95%

ASP

1   2

1	Downlink sent	Aircraft time at position
2	Downlink received	Date/time ATSU receives position report

Actual Communication Performance (ACP)

RCP 240 specification (communication transaction times and RCP continuity)										
RCP	240									RCP
95%	210									95%
RCP 240/D allocations – CPDLC example										
ATM	Controller issues ATC instruction	Monitored operational performance							Controller receives response	ATM
99.9%	$P_{C/ATSU}(30)$	210							$P_{C/ATSU}(30)$	ET
95%	$P_{C/ATSU}(30)$	180							$P_{C/ATSU}(30)$	TT
RCMP		RCTP			RCP PORT	RCTP				RCMP
99.9%		$P_{RCTP}(150)$			60	$P_{RCTP}(150)$				99.9%
95%		$P_{RCTP}(120)$			60	$P_{RCTP}(120)$				95%
RCTP		ATSU system	Network	Aircraft system		Aircraft system	Network	ATSU system		RCTP
99.9%		$P_{ATSU}(15)$	$P_{NET}(120)$	$P_{AIR}(15)$		$P_{AIR}(15)$	$P_{NET}(120)$	$P_{ATSU}(15)$		99.9%
95%		$P_{ATSU}(10)$	$P_{NET}(100)$	$P_{AIR}(10)$		$P_{AIR}(10)$	$P_{NET}(100)$	$P_{ATSU}(10)$		95%

Note. — $P_{[SUBSCRIPT]}([value])$ means part of the specified [value], and that the combination of all the allocations in the row, denoted by, $P_{[SUBSCRIPT]}$ equals the [value] specified.

1	Uplink Sent	Date/time ATSU sent CPDLC clearance to the aircraft
2	MAS Received	Date/time ATSU receives the MAS for the CPDLC clearance
3	WILCO Sent	Date/time aircraft sends WILCO response for the CPDLC clearance
4	WILCO Received	Date/time ATSU receives WILCO response for the CPDLC clearance