



International Civil Aviation Organization

The 11th Meeting of the Future Air Navigation Systems Interoperability Team-Asia (FIT-Asia/11)

Video Teleconference, 23 – 27 August 2021

Agenda Item 3: PBCS Developments and Implementation

PBCS MONITORING PROGRESS IN CHINA

(Presented by China)

SUMMARY

This paper presents the progress of the PBCS monitoring development in 2020 on the routes L888, Y1, as well as Y2, and introduces the Chinese PBCS Monitoring System.

1. INTRODUCTION

1.1 The PBCS operation in China has been implemented since 2018, supporting the operation on the routes L888 (SANLI-XKC), Y1, and Y2, after the completion of ATC system upgrades, and the publication of the prescriptions. The prescriptions included the Aeronautical Information Publication (AIP) and the Advisory Circular (AC), guiding the operation of data link applications in L888, Y1, and Y2, in accordance with *Annex 6, the Performance-based Communication and Surveillance (PBCS) Manual* (ICAO Doc. 9869) and *the Global Operational Data Link (GOLD) Manual* (ICAO Doc. 10037).

1.2 After years of work, the monitoring program witnesses constant improvements. This paper presents further improvements of the PBCS implementation in China and introduces the upgraded PBCS Monitoring System.

2. DISCUSSION

2.1 The ADS-C and CPDLC are two data link applications on the routes L888, Y1, and Y2, under the responsible areas for Lanzhou Air Control Center (ACC) and Urumqi ACC. The prescribed specifications for PBCS operations are RSP 180/D and RCP 240/D.

2.2 To refine the PBCS monitoring program in the two centers, efforts were made for the PBCS performance monitoring project in 2020, including the development of the real-time monitoring system and the data link post-implementation analysis system.

2.3 The construction of the real-time data link performance monitoring system is complete. The system will be fully ready to support the two centers by the end of 2021. It is designed to fulfill the functions as below:

Message latency alarm

2.4 The real-time system will alarm the controller once the transaction time exceeds the requirements, enabling them to properly identify and recognize the situation. The system will automatically generate problem reports, and the controller will be responsible to decide if the problem report should be saved, and further investigated. It is designed that the alarm will work with the RCP 240 and RSP 180 specifications.

PBCS data collection and transmission

2.5 The real-time system will collect the messages generated by CPDLC, ADS-C, and transmit the messages to the post-implementation analysis system for the record, as well as statistical purposes.

Manual problem reports submission

2.6 The real-time system does not solely deliver auto-generated problem reports, but also the entries filled manually by controllers. Both the auto reports and the manual reports will be transmitted to the post-implementation system for further investigation as appropriate.

2.7 The PBCS post-implementation system is also developed this year. It supports users including Chinese ATMB, Chinese regional ATMB, ATC units, and Chinese operators to support PBCS monitoring with the functions below:

Nuisance data removal

2.8 The nuisance messages may impose negative influence on the overall efficiency of the post-implementation system, if not removed in time. The nuisance messages include duplicated reports, zero-delivery-time reports, and messages occurring during outage. The post-implementation system is designed to remove the nuisance messages from the ATC system.

Post-implementation monitoring

2.9 This system receives performance data from the real-time monitoring the system to conduct PBCS performance analysis. This function allows system to provide the data link performance analysis by media or operator (Figure1). In addition, the system also supports the analysis below:

- Performance comparison by period, aircraft type, or operators (Figure2).
- Scatter diagram presenting non-compliance messages (Figure3).
- Transmission time analysis of non-compliance messages (Figure4).

OPERATOR				
2020.01—2020.06				
Colour Key Meets Criteria 99.0%-99.99% Under Criteria	CPDLC			
	Message Count	95%	99.90%	
		% <= 90sec	% <= 180sec	
By Media Type				
VHF	838	97.85	98.21	
SAT	843	91.34	93.11	
SV	609	98.85	99.17	
By Remote Ground Station (RGS) Ground Earth Station (GES)				
Type	Designator			
SAT	RGS1	240	91.25	92.5
SV	RGS2	310	100	100
SAT	RGS3	113	98.23	98.23
SAT	RGS4	131	96.18	97.7

Figure 1: CPDLC Performance Analysis by Media

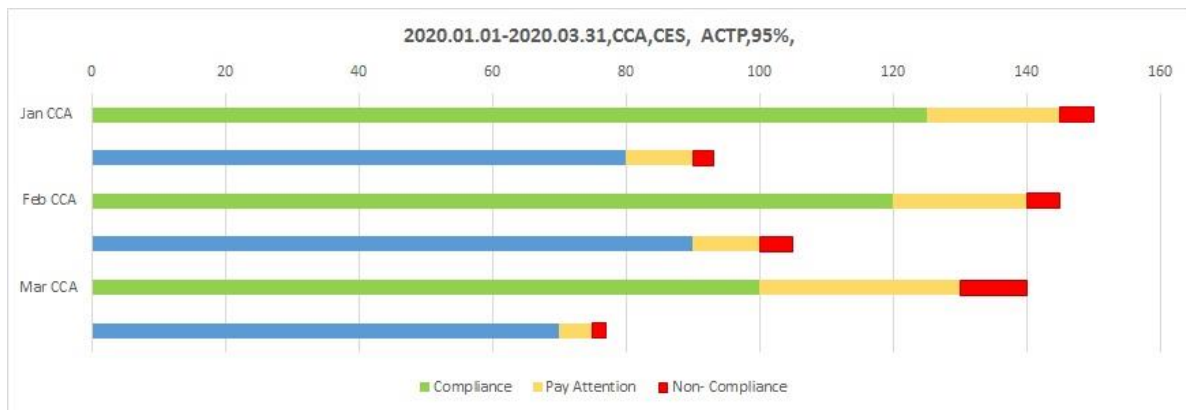


Figure 2: Data Link Performance Comparison

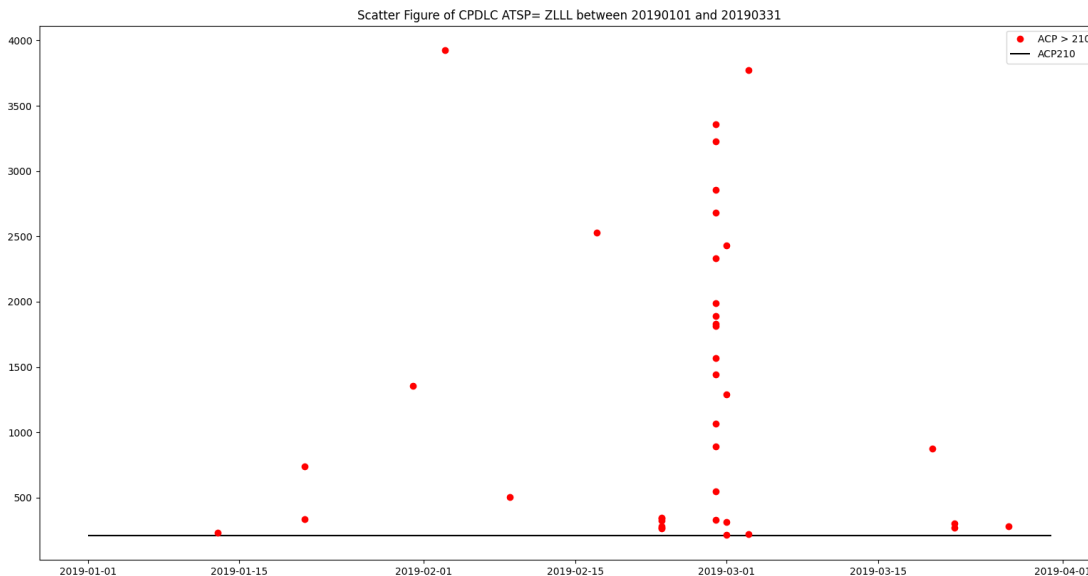


Figure 3: Scatter Diagram of Non-Compliance Messages

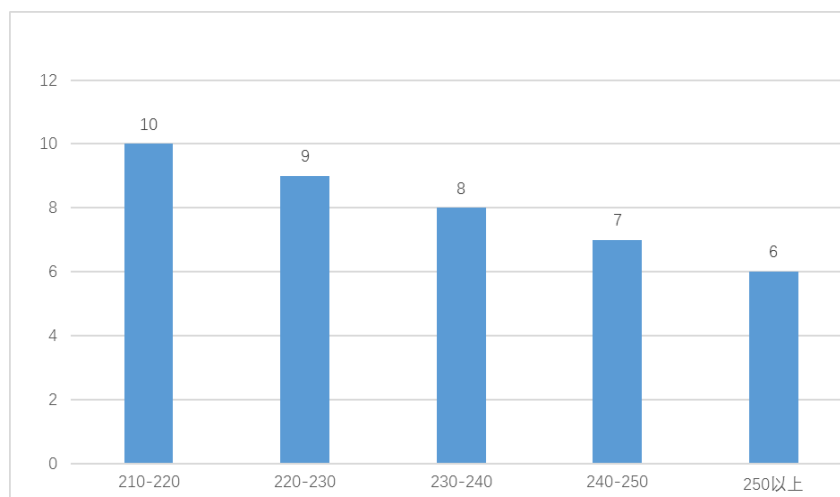


Figure 4: Transmission Time Analysis of non-Compliance Messages

Annual data link performance report generation

2.10 States implementing PBCS are required to conduct continuous monitoring and provide annual reports to the FIT-Asia meeting as requested. The system can provide annual data link performance information, this will reduce the work burden for the stakeholders. The stakeholders could download the analysis result and generate the final report.

Data link performance report generation for stakeholders

2.11 The system automatically conducts monthly data link performance on a rolling three-month basis. The registered stakeholders such as regional ATMB, ATC units, and operators are authorized to download the PBCS monitoring reports from the system. The function benefits the future investigation and resolve of non-compliance reports.

Aircraft PBCS approvals management

2.12 Operators could submit their aircraft PBCS approvals through the platform. It allows the stakeholders to check and modify the approval information as appropriate, with which the approvals can be maintained and extracted to the KSN website.

PBCS capacity verification

2.13 The system matches the aircraft approvals with the flight plans to verify the PBCS indicators filled in the flight plan. Operators could inquire about non-approved aircraft through the system and confirm the status of the approval with higher efficiency.

Problem report collection and management

2.14 The post-implementation system receives problem reports extracted from the real-time system, maintaining and integrating all problem reports for future investigations. Registered operators are authorized to submit problem reports directly into the system, reducing their potential workload.

- 2.15 Further actions as below shall be taken:
- a) Clarification of the roles the stakeholders shall play in the PBCS monitoring program through a regulatory document.
 - b) Effective information-exchange mechanisms with other states for efficient international problem reports investigations.
 - c) Efficient data exchange within the global PBCS community.

2.16 Both systems are expected to be online by the end of 2021, optimizing the operation while reducing workload for stakeholders. Further efforts will be done to improve the PBCS monitoring framework in China and reported to the community.

3. ACTION BY THE MEETING

- 3.1 The meeting is invited to:
- a) note the information contained in this paper; and
 - b) discuss any relevant matters as appropriate.

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