



*International Civil Aviation Organization*  
**ICAO Thirteenth Meeting of the FANS Interoperability Team – Asia (FIT-Asia/13)**

Bangkok, Thailand, 06 – 09 June 2023

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**Agenda Item 4: Review of ADS/CPDLC Operations and Performance**

**DATA LINK PERFORMANCE REPORT FOR CHINA**

(Presented by China)

**SUMMARY**

This paper presents data link performance data for 2022 for the Urumqi FIR (ZWWW) and Lanzhou FIR (ZLLL) , and information on actions taken to identify and rectify the causes of performance issues

**1. INTRODUCTION**

1.1 **Tables 1 to 8** summarize Automatic Dependent Surveillance – Contract (ADS-C) and Controller-Pilot Data Link Communications (CPDLC) performance where the Required Surveillance Performance (RSP) and Required Communications Performance (RCP) criteria stipulated in ICAO Doc 4444 – Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) were not met. Actions taken to address performance not meeting the criteria are discussed, together with the outcomes of such actions.




1.2 ADS-C and CPDLC operation is applied in the routes L888 (SANLI-XKC), Y1 and Y2, operated by Lanzhou Air Control Center (ACC) and Urumqi ACC. The data link performances in the routes were measured against the RCP 240 and RSP 180 specifications for PBCS operations.

1.3 This report provides observed performance of the operational data link systems for the above-mentioned data link routes, collected from Lanzhou and Urumqi FIR for the period from Jan. 2022 to Dec. 2022.

**2. DISCUSSION**

Lanzhou FIR ADS-C RSP180 Performance – Media Type, RGS and GES

2.1 **Table 1** outlines overall ADS-C performance per media type, Remote Ground Station (RGS) and Ground Earth Station (GES) for downlinks sent within the Lanzhou FIR during 2022, where performance did not meet the RSP180 performance criteria. The message count of second half was larger than that of first half. The SATCOM and VHF met 95% requirements. As for 99.9%, while the majority of data transfers are completed successfully in time, some stations lack consistency with the requirement, which may affect the delivery. The HF communication failed to meet all requirements. There were 3 RGS/GES (ALA, IG1, IST7) that failed all requirements, they will require additional attention moving forward.

FIR		ZLLL					
Criteria		RSP180					
Period		Jan-June 2022			July-December 2022		
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95%	99.90%	Message Counts	95%	99.90%	
		% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec	
<b>By Media Type</b>							
SATCOM	88700	98.29	99.58	102139	98.07	99.60	
VHF	99927	99.51	99.80	135871	99.55	99.82	
HF	16	31.25	62.50	24	33.33	66.66	
ALL	188643	98.90	99.60	238034	98.90	99.70	
<b>By Remote Ground Station (RGS) Ground Earth Station (GES)</b>							
Designator	Type	(only RGS/GES with message counts >100 recorded)					
ALA	VHF	371	91.10	94.07	242	92.14	95.04
ALA1	VHF	1596	99.31	99.62	1957	99.69	99.84
APK1	SAT	54202	99.35	99.82	59749	99.48	99.90
APK2	VHF	8886	99.26	99.87	12189	99.19	99.81
ASB1	VHF	2533	99.72	99.84	2398	99.83	100
ASF1	VHF	128	99.21	99.21			
AVK	VHF	791	99.62	99.87	1001	99.50	99.60
BAV	VHF	385	98.96	100	575	98.60	99.13
BAVV	VHF	139	99.28	99.28	544	100	100
BFJ	VHF	129	98.44	99.22	139	99.28	99.28
BUD	VHF	511	99.80	99.80	739	100	100
BXH1	VHF	2063	99.51	99.80	2292	99.56	99.78
CIT1	VHF	2543	99.68	99.84	1883	99.94	99.94
CKG	VHF	465	98.92	99.35	1389	99.64	99.85
CND7	VHF	176	99.43	99.43	213	98.59	100
CTU	VHF	544	99.63	99.81	649	99.53	99.69
DEBT	VHF	617	100	100	387	99.48	99.48
DNH	VHF	1988	99.64	99.79	2535	99.72	99.88
ERZ	VHF	252	99.20	99.60	447	100	100
ESB7	VHF	669	99.55	100	639	95.46	97.18
EUA1	SAT	9225	95.39	99.40	8860	94.92	99.37
EUA2	SAT	2438	96.06	99.13	3715	95.63	99.13
FRAT	VHF	168	99.40	99.40	121	100	100
GMP1	VHF	199	98.99	100	418	99.52	99.76
GOQ	VHF	1448	99.44	99.79	3475	99.76	99.85
GUW1	VHF	873	99.08	99.08	768	98.95	99.60
GYD1	VHF	4169	99.59	99.78	4533	99.60	99.75
HAN1	VHF				103	99.02	99.02
HAN7	VHF	104	100	100	157	99.36	99.36

FIR		ZLLL					
Criteria		RSP180					
Period		Jan-June 2022			July-December 2022		
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria		Message Counts	95%	99.90%	Message Counts	95%	99.90%
			% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
HET	VHF	745	100	100	1222	99.75	99.83
HKG	VHF	219	99.54	99.54	429	99.53	100
HKG1	VHF	205	98.04	98.04	264	98.48	99.24
HKG2	VHF	423	99.05	99.52	436	99.54	100
HKGV	VHF	625	99.68	99.84	1712	99.94	100
HNDv	VHF	154	96.10	98.7	197	98.47	100
ICN	VHF	554	98.55	99.09	1009	99.50	99.70
ICN2	VHF	420	99.52	99.76	825	99.75	99.87
IFN1	VHF	273	97.80	98.16			
IG1	SAT	2565	94.69	98.55	3409	93.37	98.76
IGW1	SAT	4956	96.36	98.44	7296	96.08	98.56
INC	VHF	1367	99.63	99.78	1498	99.73	99.79
IST	VHF	158	99.36	99.36	194	99.48	100
IST7	VHF	262	92.36	97.70	345	84.92	93.91
IST8	VHF	611	99.34	99.67	765	98.56	99.86
ISTS	VHF	225	97.77	99.11	413	96.36	97.82
IZOV	VHF	111	99.09	100	155	96.12	96.77
JGN	VHF	3073	99.44	99.67	3827	99.71	99.81
KJH	VHF	385	99.74	99.74	508	99.40	99.60
KLVT	VHF	141	99.29	99.29	125	100	100
KRL	VHF	585	99.65	99.65	1093	99.54	99.63
KTWT	VHF	213	99.53	99.53	153	100	100
KWJ1	VHF	195	99.48	100	248	99.59	99.59
KWL	VHF	263	98.85	99.23	406	99.50	100
KXX1	VHF	2384	99.74	99.87	2095	99.37	99.80
LEJ7	VHF	387	99.74	99.74	576	100	100
LHW	VHF	3472	99.30	99.59	4593	99.49	99.73
MCT1	VHF	128	100	100	156	98.71	99.35
MFM	VHF	136	100	100	376	99.20	99.73
NNG	VHF	639	99.68	99.84	989	99.59	99.69
NNGV	VHF	220	99.54	99.54	704	100	100
PEK	VHF	207	99.51	99.51	334	99.70	100
SCO1	VHF	1539	99.61	99.93	1695	99.70	99.82
SXR1	VHF				135	97.77	97.77
SZF7	VHF	1166	99.91	99.91	1420	99.50	99.71
SZX	VHF	260	99.23	100	621	99.51	99.83




FIR		ZLLL					
Criteria		RSP180					
Period		Jan-June 2022			July-December 2022		
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria		Message Counts	95%	99.90%	Message Counts	95%	99.90%
			% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
SZXV	VHF	182	98.35	100	445	94.60	99.55
TBS1	VHF	614	100	100	645	99.68	99.84
TCG	VHF	1183	99.15	99.66	1224	99.75	99.91
TFU	VHF	2311	99.74	99.91	2539	99.29	99.72
TPE7	VHF	352	99.43	99.43	128	100	100
TSN	VHF	477	99.79	99.79	884	99.77	99.88
URC	VHF	1422	99.92	100	1987	99.74	99.84
VAR7	VHF	213	100	100	350	99.71	99.71
VAS7	VHF	192	97.91	98.95	248	98.79	99.59
VOG1	VHF	158	99.36	99.36			
XNN	VHF	209	98.56	99.04	220	99.54	100
XXA	SAT	3894	97.27	99.51	5731	97.19	99.73
XXF	SAT	4077	97.74	99.60	6595	97.24	99.68
XXI	SAT	699	96.42	99.42	922	96.63	99.45
XXP	SAT	6644	98.40	99.29	5862	97.30	98.77
YIN	VHF	164	100	100	165	99.39	99.39
ZHA	VHF	228	100	100	364	99.45	99.45




**Table 1:** Lanzhou FIR ADS-C Downlink Latency per Media Type, RGS and GES

Lanzhou FIR ADS-C RSP180 Performance – Aircraft Operator/Type

2.2 **Table 2** summarizes overall ADS-C performance per Aircraft Operator/Type for downlinks sent within the Lanzhou FIR during 2022, where performance did not meet the RSP180 performance criteria. For the most operator/type, the 95% requirement was achieved, only 1 operator/type failed. For the 99.9% requirements, 3 operators failed to meet in both half of the year.

FIR		ZLLL					
Criteria		RSP180					
Period		Jan-June 2022			July-December 2022		
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria		Message Counts	95%	99.90%	Message Counts	95%	99.90%
			% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>							
AAR/B744		1527	99.08	99.47	955	97.80	98.32
AEA/A332		315	99.68	99.68			
AFR/B772		160	95.62	96.87	354	99.15	100




FIR	ZLLL					
Criteria	RSP180					
Period	Jan-June 2022			July-December 2022		
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95%	99.90%	Message Counts	95%	99.90%
		% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>						
AFR/B77W	1948	98.81	99.89	1785	98.09	99.66
AZG/B744	504	95.43	98.01	869	98.15	98.84
BOX/B77L	15035	99.04	99.80	20384	98.92	99.80
CAL/B77W	1329	99.17	99.84			
CCA/A333	401	98.25	99.25			
CCA/B789	300	98.33	99.00	182	98.90	100
CES/A319	468	97.22	100	256	94.53	100
CFG/B763	258	98.83	99.22	301	99.66	99.66
CLX/B744	5534	97.81	99.20	6612	98.03	99.50
CPA/B744	437	98.85	99.54	2341	98.63	99.74
CPA/B748	2407	98.96	99.62	5702	98.96	99.78
CPA/B77W	7894	98.32	99.48	13283	98.57	99.79
DLH/B744	510	98.62	99.60	831	99.15	100
ETD/B773	420	99.28	99.76			
ETD/B789	879	99.20	99.88	1416	98.87	99.71
ETH/B777	1647	98.66	99.63	1090	99.08	99.63
ETH/B788	147	100	100	1192	99.32	99.41
EVA/B77W	1550	99.54	99.61			
FDX/B77L	9959	97.54	99.18	8045	97.47	99.20
GEC/B77L	1145	98.16	99.73	893	98.43	99.66
GTI/B744	1089	99.26	100	1256	98.80	99.52
GTI/B748	428	98.13	98.83	152	100	100
ICV/B744	2812	97.51	98.50	4169	95.73	98.20
KAL/A333	581	99.48	99.82	1042	98.75	99.42
KAL/B744	513	98.63	99.41	349	98.56	99.14
KAL/B748	5064	99.07	99.74	5143	98.77	99.65
KAL/B773	342	99.12	99.70	618	97.08	99.51
LOT/B788	1565	98.01	99.55	1875	98.93	100
NCR/B744	131	99.23	100	651	98.00	99.07
QQE/GLF6	147	89.11	100			
QTR/B77L	3893	98.56	99.74	4177	98.73	99.78
QTR/B77W	7744	98.02	99.34	6819	98	99.09
RUN/B744	5928	98.27	98.83	4157	97.81	98.19
SOO/B77L	861	98.49	99.18	2906	98.27	99.34
THY/A332	13397	99.61	99.73	18257	99.95	99.99

FIR	ZLLL					
Criteria	RSP180					
Period	Jan-June 2022			July-December 2022		
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95%	99.90%	Message Counts	95%	99.90%
		% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>						
THY/A333	2215	99.90	100	4131	99.24	99.80
THY/B77W	16534	99.18	99.88	20634	98.89	99.75
UAE/A388	848	100	100	7188	99.52	99.73
UAE/B772	625	97.44	99.84	940	96.91	99.57
UZB/B763	1134	99.29	100	447	98.65	99.10
WGN/B744	250	98.80	99.60			
DHK/B763				492	99.39	99.59
SWR/A343				356	99.71	99.71

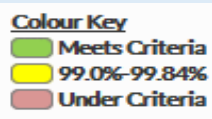
**Table 2:** Lanzhou FIR ADS-C Downlink Latency per Aircraft Operator/Type

Lanzhou FIR CPDLC RCP240 Performance – Media Type, RGS and GES

2.3 **Tables 3A and 3B** summarize overall CPDLC performance per Media Type, RGS and GES for messages sent within the Lanzhou FIR during 2022, where performance did not meet the RCP240 performance criteria. The VS communication didn't meet the ACTP 95% and 99.9% requirement in the first half of the year, but it turned better in the last half of the year, and the message count were only 11 in the whole year. The HS communication (with 4 message count) didn't meet the 95% and 99.9% requirement in the last half of the year

FIR	ZLLL						
Criteria	RCP240						
Period	Jan - Jun 2022						
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95.00%	
		ACP	ACTP	ACP	ACTP	PORT	
		% <= 180sec	% <= 120sec	% <= 210sec	% <= 150sec	% <= 60sec	
<b>By Media Type</b>							
SAT	770	97.79	99.61	97.92	99.61	97.66	
VHF	68	98.52	100	98.52	100	98.52	
SV	25	96.00	100	96.00	100	96.00	
VS	3	100	66.66	100	66.66	100	
HS	1	100	100	100	100	100	
ALL	867	97.80	99.53	97.92	99.53	97.69	
<b>By Remote Ground Station (RGS) Ground Earth Station (GES)</b>							
Designator	Type	(RGS/GES with message counts >100)					
APK1	SAT	650	97.53	99.69	97.69	99.69	97.53

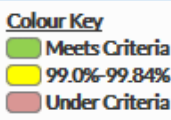
**Table 3A:** Lanzhou FIR CPDLC Performance Latency per Media Type, RGS and GES – Jan-Jun 2022.

FIR		ZLLL					
Criteria		RCP240					
Period		Jul - Dec 2022					
	Message Counts	95% benchmark		99.9% Benchmark		95.00%	
		ACP	ACTP	ACP	ACTP	PORT	
		% <= 180sec	% <= 120sec	% <= 210sec	% <= 150sec	% <= 60sec	
By Media Type							
SATCOM		602	98.33	98.50	98.50	98.83	98.00
VHF		125	100	99.20	100	100	99.20
SV		12	100	100	100	100	100
VS		8	100	100	100	100	100
HS		4	75.00	50.00	75.00	50.00	100
ALL		751	98.53	98.40	98.66	98.80	98.26
By Remote Ground Station (RGS) Ground Earth Station (GES)							
Designator	Type	(RGS/GES with message counts >100)					
APK1	SAT	486	98.55	99.58	98.76	99.79	98.55

**Table 3B:** Lanzhou FIR CPDLC Performance Latency per Media Type, RGS and GES Jul-Dec 2022

Lanzhou FIR CPDLC RCP240 Performance – Aircraft Operator/Type

2.4 **Tables 4A and 4B** summarize overall CPDLC performance per Aircraft Operator/Type for messages sent within the Lanzhou FIR during 2022, where performance did not meet the RCP240 performance criteria. Only 2 operators' message count was above 100 during the whole year, and the performance was good in the most requirement.

FIR		ZLLL					
Criteria		RCP240					
Period		Jan - Jun 2022					
	Message Counts	95% benchmark		99.9% Benchmark		95%	
		ACP	ACTP	ACP	ACTP	PORT	
		% <= 180sec	% <= 120sec	% <= 210sec	% <= 150sec	% < 60secs	
By Aircraft Operator / Type (only message counts >100 recorded)							
CLX/B748		159	99.37	100	99.37	100	99.37

**Table 4A:** Lanzhou FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2022

FIR	ZLLL					
Criteria	RCP240					
Period	Jul - Dec 2022					
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95%
		ACP	ACTP	ACP	ACTP	PORT
		% < = 180sec	% < = 120sec	% < = 210sec	% < = 150sec	%< 60secs
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>						
/	/	/	/	/	/	/

**Table 4B:** Lanzhou FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2022

Urumqi FIR ADS-C RSP180 Performance – Media Type, RGS and GES

2.5 **Table 5** summarizes overall ADS-C performance per media type, Remote Ground Station (RGS) and Ground Earth Station (GES) for downlinks sent within the Urumqi FIR during 2022, where performance did not meet the RSP180 performance criteria. Very similar to the Lanzhou FIR, The SATCOM and VHF met 95% requirements, and the 99.9% was not fully met. The HF communication didn't meet all the requirement, yet the number of HF messages sent in the year remained small. Most RGS/GES met the requirement, but the IG1 was still failed to achieve all the requirement.

FIR	ZWWW						
Criteria	RSP180						
Period	Jan-June 2022			July-December 2022			
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria	Message Counts	95%	99.90%	Message Counts	95%	99.90%	
		% < = 90sec	% < = 180sec		% < = 90sec	% < = 180sec	
<b>By Media Type</b>							
SATCOM	49085	98.04	99.54	41390	97.85	99.55	
VHF	54406	99.47	99.77	60446	99.57	99.84	
HF	9	33.33	77.77	12	25.00	58.33	
ALL	103500	98.70	99.60	101848	98.80	99.70	
<b>By Remote Ground Station (RGS) Ground Earth Station (GES)</b>							
Designator	Type	(only RGS/GES with message counts >100 recorded)					
ALA	VHF	331	96.07	96.37	204	99.01	99.01
ALA1	VHF	1405	99.43	99.78	1375	99.70	99.92
APK1	SAT	26505	99.13	99.8	20860	99.17	99.86
APK2	VHF	3353	98.98	99.61	3800	98.92	99.71
ASB1	VHF	1047	99.04	99.42	533	99.62	99.81
AVK	VHF	300	100	100	540	99.81	99.81
BAV	VHF	517	99.03	100	419	99.28	99.76
BPL	VHF	524	99.61	99.61	483	99.79	99.79
BXH1	VHF	1085	99.07	99.63	939	99.68	99.89
CTU	VHF	189	98.41	98.94	179	99.44	100
DAT	VHF	463	99.35	99.35	466	100	100

FIR		ZWWW					
Criteria		RSP180					
Period		Jan-June 2022			July-December 2022		
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria		Message Counts	95%	99.90%	Message Counts	95%	99.90%
			% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
DOY	VHF	106	99.05	99.05			
DZN1	VHF	774	99.61	99.74	624	99.67	99.83
ESB7	VHF	274	98.90	100	192	95.83	97.91
EUA1	SAT	6084	96.23	99.37	4489	96.10	99.46
EUA2	SAT	1488	98.11	99.73	1651	97.63	99.81
GMP1	VHF	237	100	100	351	99.71	99.71
GOQ	VHF	526	99.04	99.23	879	99.43	99.54
GUW1	VHF	388	99.22	99.48	304	99.01	99.67
GYD1	VHF	1732	99.42	99.88	1174	99.74	99.82
HKG2	VHF	189	98.94	99.47			
HMI	VHF	1760	99.60	99.82	1875	99.78	99.89
HNDv	VHF	150	96.00	99.33	129	99.22	100
HTN	VHF	240	99.58	100	411	99.75	99.75
ICN	VHF	694	98.84	99.27	842	98.93	99.52
IFN1	VHF	118	98.30	99.15			
IG1	SAT	1560	94.61	98.97	1564	94.05	98.59
IGW1	SAT	3330	95.55	98.22	3270	95.19	98.19
IST	VHF				121	99.17	99.17
IST8	VHF	237	100	100	271	98.52	99.63
ISTS	VHF				110	98.18	99.09
IZOV	VHF	116	97.41	98.27	161	98.75	99.37
KCA	VHF	393	99.74	100	459	99.78	99.78
KHG	VHF	128	100	100	364	99.72	99.72
KRL	VHF	731	99.72	99.72	733	99.18	99.31
KRLV	VHF	293	99.65	99.65	599	100	100
KRY	VHF	678	98.82	99.55	795	100	100
KWL	VHF	133	100	100	101	98.01	99.00
LHW	VHF	1195	99.49	99.58	1482	99.52	99.86
MHD1	VHF	106	98.11	99.05			
MUX1	VHF	194	98.45	99.48	141	100	100
SCO1	VHF	632	100	100	595	99.49	99.66
SZF7	VHF	471	100	100	454	99.11	99.77
SZX	VHF	114	99.12	100	140	99.28	99.28
TAS1	VHF	749	99.59	99.59	379	99.73	100
TCG	VHF	1063	99.24	99.71	872	99.88	99.88
TFU	VHF	732	99.18	99.72	552	99.09	99.45
TLQ	VHF	394	100	100	602	99.16	99.66




FIR		ZWWW					
Criteria		RSP180					
Period		Jan-June 2022			July-December 2022		
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria		Message Counts	95%	99.90%	Message Counts	95%	99.90%
			% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
TZX7	VHF	661	99.84	99.84	632	100	100
URC	VHF	1645	99.33	99.69	2254	99.77	99.95
XXA	SAT	3248	96.79	99.59	3419	97.51	99.82
XXF	SAT	2384	97.77	99.7	2873	97.28	99.86
XXI	SAT	706	97.45	99.00	636	97.32	99.68
XXP	SAT	3780	98.30	99.31	2628	97.26	98.63
ZHA	VHF	139	99.28	99.28	116	100	100

**Table 5:** Urumqi FIR ADS-C Downlink Latency per Media Type, RGS and GES

Urumqi FIR ADS-C RSP180 Performance – Aircraft Operator/Type

2.6 **Table 6** summarizes overall ADS-C performance per Aircraft Operator/Type for downlinks sent within the Urumqi FIR during 2022, where performance did not meet the RSP180 performance criteria. The 95% requirement was almost achieved (only 1 operator/type failed in the last half of the year) and overall performance is acceptable.




FIR		ZWWW					
Criteria		RSP180					
Period		Jan-June 2022			July-December 2022		
<b>Colour Key</b> <span style="color: green;">■</span> Meets Criteria <span style="color: yellow;">■</span> 99.0%-99.84% <span style="color: red;">■</span> Under Criteria		Message Counts	95%	99.90%	Message Counts	95%	99.90%
			% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>							
AAR/B744		827	97.58	98.54	685	96.78	97.95
ANA/B789		340	99.11	99.70			
AZG/B744		255	96.47	98.82	316	95.88	97.78
CCA/A333		227	96.91	98.23	128	99.21	100
CLH/A343		380	100	100	384	99.21	99.73
CLX/B744		3080	97.37	99.05	2986	98.19	99.46
CLX/B748		7032	98.76	99.800	5800	98.86	99.89
CPA/A359		291	99.31	99.65	773	100	100
CPA/B744		191	96.85	98.42	1046	98.75	99.61
CPA/B748		1043	98.65	99.32	2128	99.06	99.85
CPA/B77W		2959	98.00	99.45	2895	98.44	99.68
ETD/B773		245	98.36	99.18			
ETD/B789		818	99.02	99.51	752	98.93	99.73
ETH/B777		471	98.30	99.78	235	99.14	99.57
ETH/B788		290	100	100	1236	99.59	99.75

FIR	ZWWW					
Criteria	RSP180					
Period	Jan-June 2022			July-December 2022		
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95%	99.90%	Message Counts	95%	99.90%
		% <= 90sec	% <= 180sec		% <= 90sec	% <= 180sec
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>						
EVA/B77W	1268	99.29	99.76			
FDX/B77L	5196	97.59	99.05	4526	98.18	99.53
GEC/B77L	1198	97.99	99.58	637	97.33	99.68
GTI/B744	796	99.37	99.87	1448	99.30	99.72
ICL/B744	283	99.64	99.64	224	99.55	100
ICV/B744	1706	96.01	98.06	1719	94.41	97.61
KAL/A333	324	98.76	99.69	467	98.71	100
KAL/B744	251	97.60	99.20	300	98.33	98.66
KAL/B748	3252	98.92	99.81	3337	98.98	99.88
KAL/B773	319	99.37	99.68	271	97.04	99.63
KLM/B789	774	98.32	99.48	1908	98.79	99.73
LOT/B788	928	97.84	99.56	730	98.63	99.58
QTR/B77L	2165	98.66	99.76	2093	98.80	99.61
QTR/B77W	5226	97.85	99.23	3905	98.69	99.53
RUN/B744	3289	98.41	98.87	1946	98.09	98.35
SOO/B77L	1133	97.79	99.11	780	98.20	99.35
THY/A332	6404	99.50	99.68	4747	99.91	99.97
THY/A333	1901	99.78	100	2450	99.26	99.75
THY/B77W	9168	99.25	99.93	8443	98.91	99.76
UAE/B772	862	98.02	99.53	767	98.04	99.73
UZB/B763	1949	98.97	100	884	98.64	99.66
VJT/GLEX	309	98.38	99.35	361	98.06	99.16
WGN/MD11	124	100	100	135	97.77	99.25
NCR/B744				308	97.07	99.67
ETH/B772				447	98.43	99.77
SWU/B77W				256	97.26	99.60

**Table 6:** Urumqi FIR ADS-C Downlink Latency per Aircraft Operator/Type

Urumqi FIR CPDLC RCP240 Performance – Media Type, RGS and GES

2.7 **Tables 7A and 7B** summarize overall CPDLC performance per Media Type, RGS and GES for messages sent within the Urumqi FIR during 2022, where performance against the RCP240 performance criteria. The amount of message is low because CPDLC is alternative mean in the Urumqi FIR, and all the media type satisfied the RCP240 requirement.

FIR		ZWWW				
Criteria		RCP240				
Period		Jan - Jun 2022				
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95.00%
		ACP	ACTP	ACP	ACTP	PORT
		% <= 180sec	% <= 120sec	% <= 210sec	% <= 150sec	% <= 60sec
<b>By Media Type</b>						
SAT	31	100	100	100	100	100
ALL	31	100	100	100	100	100
<b>By Remote Ground Station (RGS) Ground Earth Station (GES)</b>						
Designator	Type	(RGS/GES with message counts >100)				
<i>Data counts for all individual station are below 100.</i>						




**Table 7A:** Urumqi FIR CPDLC Performance Latency per Media Type, RGS and GES – Jan-Jun 2022.

FIR		ZWWW				
Criteria		RCP240				
Period		Jul - Dec 2022				
	Message Counts	95% benchmark		99.9% Benchmark		95.00%
		ACP	ACTP	ACP	ACTP	PORT
		% <= 180sec	% <= 120sec	% <= 210sec	% <= 150sec	% <= 60sec
<b>By Media Type</b>						
SAT	4	100	100	100	100	100
ALL	4	100	100	100	100	100
<b>By Remote Ground Station (RGS) Ground Earth Station (GES)</b>						
Designator	Type	(RGS/GES with message counts >100)				
<i>Data counts for all individual station are below 100.</i>						




**Table 7B:** Urumqi FIR CPDLC Performance Latency per Media Type, RGS and GES – Jul-Dec 2022.

Urumqi FIR CPDLC RCP240 Performance – Aircraft Operator/Type

2.8 **Tables 8A and 8B** summarize overall CPDLC performance per Aircraft Operator/Type for messages sent within the Urumqi FIR during 2022. The CPDLC message count was much low from Urumqi FIR, and there was no operator/type had more than 100 messages in 2022.

FIR		ZWWW				
Criteria		RCP240				
Period		Jan - Jun 2022				
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95%
		ACP	ACTP	ACP	ACTP	PORT
		% <= 180sec	% <= 120sec	% <= 210sec	% <= 150sec	% <= 60secs
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>						
<i>Data counts for all individual operator are below 100.</i>						

**Table 8A:** Urumqi FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2022

FIR	ZWWW					
Criteria	RCP240					
Period	Jan - Jun 2022					
<b>Colour Key</b>  Meets Criteria  99.0%-99.84%  Under Criteria	Message Counts	95% benchmark		99.9% Benchmark		95%
		ACP	ACTP	ACP	ACTP	PORT
		% <= 180sec	% <= 120sec	% <= 210sec	% <= 150sec	%<60secs
<b>By Aircraft Operator / Type (only message counts &gt;100 recorded)</b>						
<i>Data counts for all individual operator are below 100.</i>						

**Table 8B:** Urumqi FIR CPDLC Performance Latency per Aircraft Operator/Type – Jan-Jun 2022

General Analysis

2.9 China RMA, an RMA structured within the ATMB of CAAC, with recognition for its service supporting RVSM monitoring program, is assigned with the responsibility on PBCS performance monitoring and analysis.

2.10 In Lanzhou part of the route L888, the CPDLC and ADS-C are primary means of communication and surveillance, but as alternative in its Urumqi part. In Y1 and Y2, the other two routes supporting data link operation, the two applications are used as alternative, while VHF voice and ADS-B are primary. The decrease in CPDLC messages and increase in ADS-C use was recorded between 2021 and 2022 in both ACCs.

2.11 The 95% requirements for RSP180 and RCP240 specifications were met for most of the data counts, some results for the 99.9% performance requirements were not achieved by some stations and operators. The stations, ALA, IG1, and IST7, failed the RSP180 95% requirement (IG1 failed in both assessments in Urumqi and in Lanzhou). The HF performance was lower than the required level, and the total amount of transmitted HF messages has decreased over time.

2.12 Thanks to the wide coverage of VHF voice and ADS-B service, when the data link encounters any real time incompliance, the controller is able to switch to voice communication immediately, as required their procedure, making the issue almost harmless for operation.

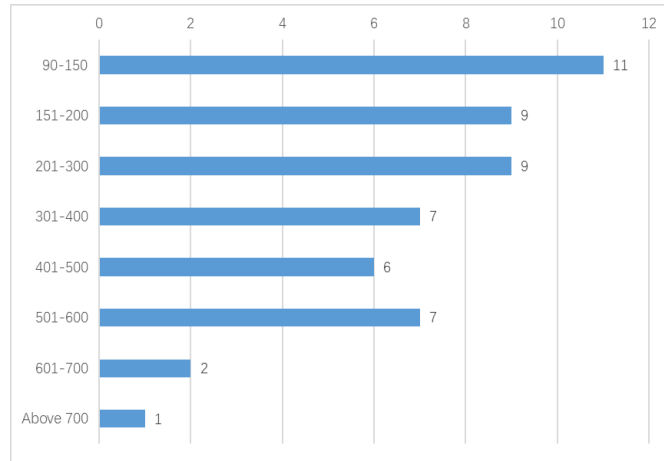
2.13 However, to enhance the data link performance in the region, an early investigation with data analysis (see Figure 1 to Figure 4) was organized by China RMA to identify remedial actions for the in compliance reflected by the two stations, ALA and IST7.

ALA analysis

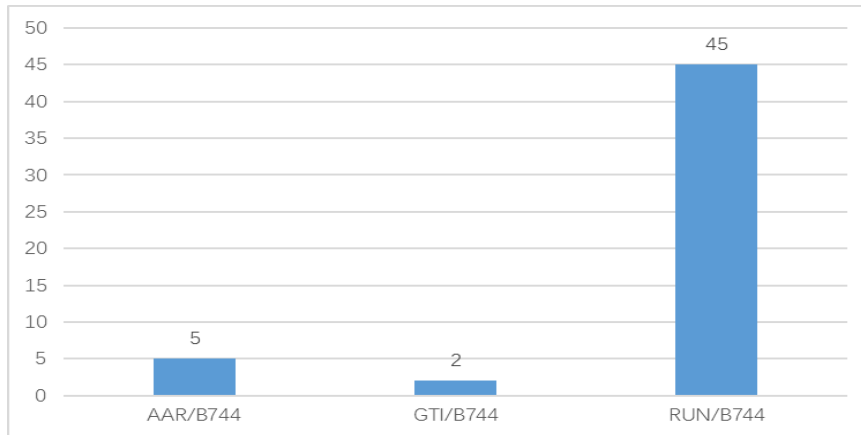
2.14 ALA is a VHF station, from which 613 ADS-C messages were recorded in 2022, in which 52 failed the 95% requirement. It is observed that the late messages were from B744 aircraft from 3 operators in Figure 2, even though the general performance of those types and operators complied with 95% RSP180 requirements.

IST7 analysis

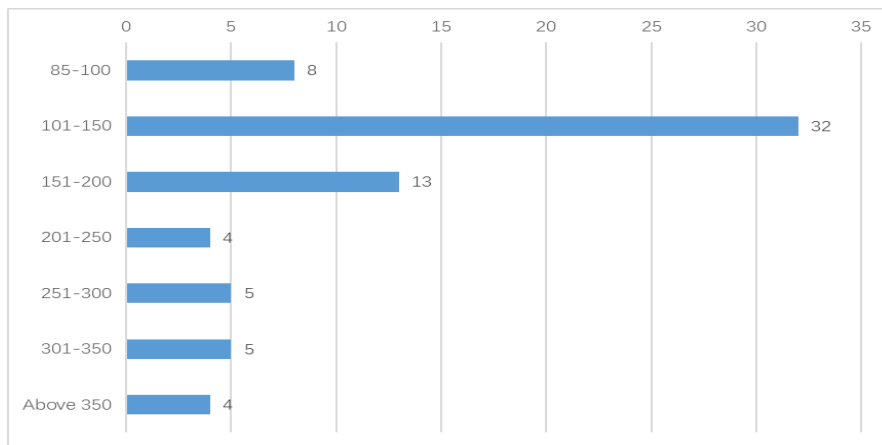
2.15 IST7 is also a VHF station. In the year of 2022, 607 ADS-C transmissions were observed, where 71 messages failed the 95% requirement. All the late messages were identified to be sent from B77W and B77L aircraft of 4 operators, as is demonstrated in Figure4. Again, the 4 operator/types complied with 95% RSP180 specification respectively.



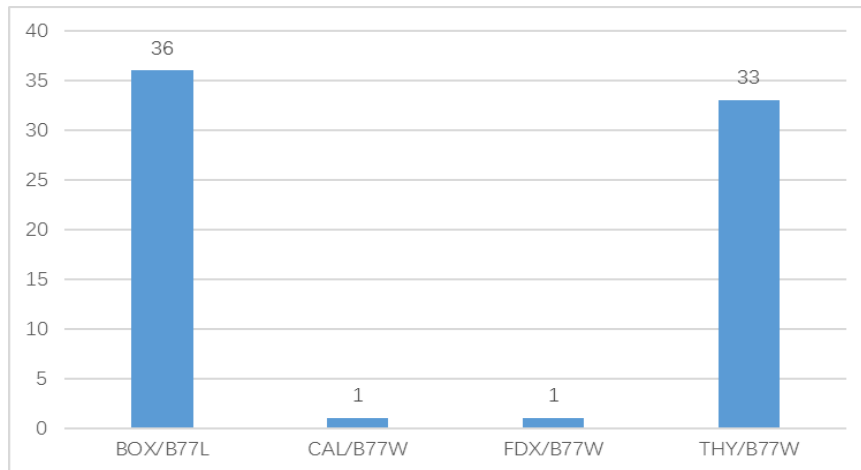
**Figure 1:** Transit time distribution of non-compliant message of ALA



**Figure 2:** Operators of non-compliant message of ALA station



**Figure 3:** Transit time distribution of non-compliant message of IST7



**Figure 4:** Operators of non-compliant message of IST7

Investigation progress

2.16 Together with the issues reported last year, investigation was conducted in recent months to identify potential operational issues.

2.17 After a field visit to Lanzhou and the CSP, China RMA is informed that the VHF station ALA is in Alma-Ata, Kazakhstan, possibly run by COLLINS, while IST7 is possibly a SITA VHF station located in Istanbul, Türkiye.

2.18 China RMA believes information from more perspective is essential for the investigation, thus cooperations between with relevant stakeholders are required to secure a multi-layer analysis. China thus suggests the stakeholders from the involved States pay attention to the above-mentioned stations for each monitoring period, on to discuss the investigation on this issue.

Collective work update

2.19 Since PBCS implemented in China, the progress has been made for China’s long-term PBCS monitoring mechanism to tackle with existing issues. In October 2022, the CAAC published the PBCS regulation to clear responsibility in PBCS monitoring, where China RMA takes up the responsibility of PBCS approval collection, PR managements and performance analysis. This cleared responsibility strengthens the roles of China RMA as the entity for data link service, allowing joint investigations supported by the other stakeholders. A paper discussed in MAWG 10 introduced the PBCS monitoring mechanism, work allocation and the progress of PBCS approval data collection in China, which is attached in the **Attachment A**.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) discuss and agree the proposal in 2.18; and
- c) discuss any relevant matters as appropriate.

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**The 10<sup>th</sup> Meeting of the Regional Airspace Safety Monitoring Advisory Group  
(RASMAG) Monitoring Agency Working Group (MAWG/10)**

Video Teleconference, 6 - 10 February 2023

**Agenda Item 3: Altimetry System Error (ASE) & Height Monitoring Activities**

**PROGRESS ON CHINESE AIRCRAFT PBCS APPROVAL COLLECTION**

(Presented by China RMA)

**SUMMARY**

This paper presents the process of PBCS implementation in China and introduce the progress of Chinese aircraft PBCS approval data collection.

**1. INTRODUCTION**

1.1 PBCS was formally implemented in China on 29 March 2018. In the Chinese mainland airspace, the datalink service, including Automatic Dependent Surveillance – Contract (ADS-C) and Controller-Pilot Data Link Communications (CPDLC), is applied to L888 (SANLI-XKC), Y1 and Y2, operated by Lanzhou and Urumqi Air Control Center (ACC). The relevant ATS units among the routes also support FANS 1/A CPDLC/ADS-C applications meet the prescribed in the RCP 240 and RSP 180 specifications for PBCS operations.

1.2 The upgradation of all relevant ATC systems was completed in March 2018 to identify RCP/RSP specification, and the Published Information Publication (AIP) concerning data link routes in China Mainland was also published. At the same time, the Flight Standard Department of CAAC updated the corresponding Advisory Circular embracing the regulations and requirements for PBCS related operations 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). Guidance material for operators who are intent on applying for the PBCS operation approval are also provided in this revision.

1.3 Since PBCS implemented in China, the development of China's long-term monitoring mechanism for the PBCS monitoring is making progress. In October 2022, the Air Traffic Management Bureau of CAAC (CAAC/ATMB) had published the PBCS regulation to clear responsibility in PBCS monitoring work. And China RMA started the PBCS approval collection work according to the regulation. This paper will introduce the PBCS monitoring mechanism in the regulation and the progress of PBCS approval data collection in China.

**2. DISCUSSION**

**PBCS Regulation**

2.1 According to ICAO Doc.9869 and ICAO Doc.10037, the application of an RCP/RSP specification requires safety oversight of air traffic services and conducting post-implementation monitoring. And the State should ensure that the ANSP establishes local and regional PBCS monitoring programs. In order to enhance the PBCS monitoring mechanism in China, Chinese ATMB

published PBCS regulation in October 2022 to specify PBCS monitoring work in China. The main provisions in the regulation are as follow:

- a) The requirement on data link communication system and relevant equipment to satisfy RCP240 and RSP180 specifications for PBCS operations;
- b) Identify the person in PBCS operational units to contact with other units on PBCS operations.
- c) The responsibility of the Chinese operator on providing aircraft PBCS approval information;
- d) The requirement on PBCS performance monitoring to operational units;
- e) The requirement on data link problem report for operators, ANSP and the other stakeholders;
- f) The responsible of PBCS operational units to identify and resolve data link communication problem and PBCS performance problem.

2.2 The regulation also cleared the responsibility of China RMA on Chinese PBCS performance monitoring as follow:

- a) Maintain the aircraft PBCS approval database and conduct PBCS approval management;
- b) Conduct monthly flight plan checks to find potential non-approved aircraft;
- c) Receive and analysis the data link communication performance result from PBCS operational units;
- d) Receive data link problem reports from Chinese operator and ATC units;
- e) Coordinate PBCS operational units to resolve PBCS performance problem and data link problem.

### **PBCS Approval Data Collection**

2.3 China RMA began to collect the Chinese aircraft PBCS approval information from Chinese operators. In China, PBCS approvals are issued by aircraft type. If one aircraft type of an operator is PBCS approved, all other aircraft of the same type are recognized as approved. From the analysis of the PBCS approval data collected, we found that most PBCS approved aircraft were from 121 operators in China. Since China RMA had maintained Chinese aircraft RVSM database which contained most aircraft basic information of 121 operators, so Chinese operators only need to provide the PBCS approval information of aircraft type to China RMA. The aircraft PBCS approval data collection process is as follow:

- a) Collect PBCS approval data by aircraft type;
- b) Update the single aircraft PBCS approval information with type approval to generate aircraft PBCS approval database;
- c) Combine the PBCS approval database with the international database to complete the Global aircraft PBCS approval database.

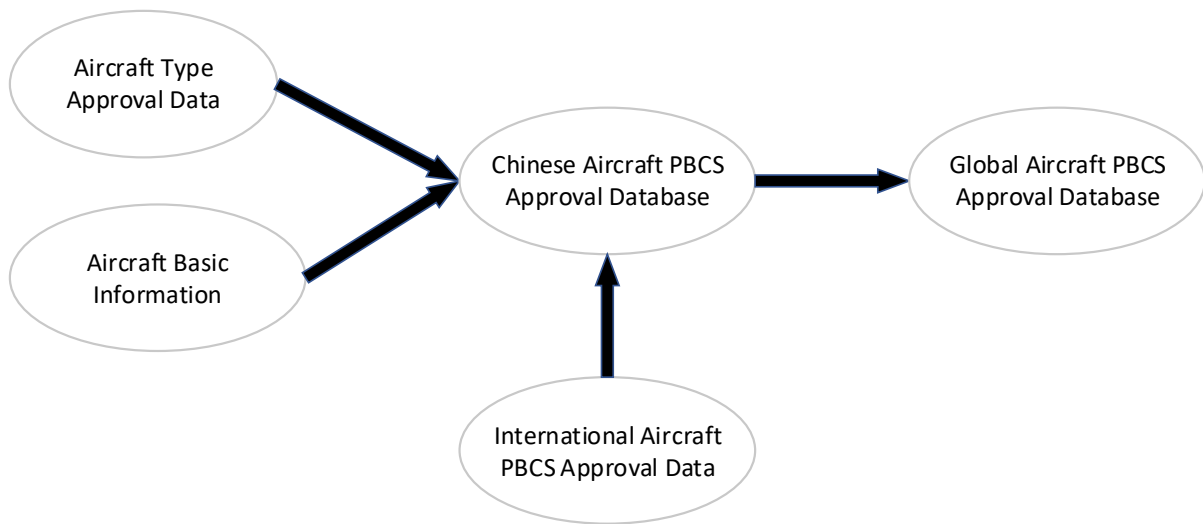


Figure 1 Aircraft PBCS approval data collection process

2.4 By the end of December 2022, 483 aircraft from 10 Chinese operators had registered to China RMA’s database, including 11 aircraft types.

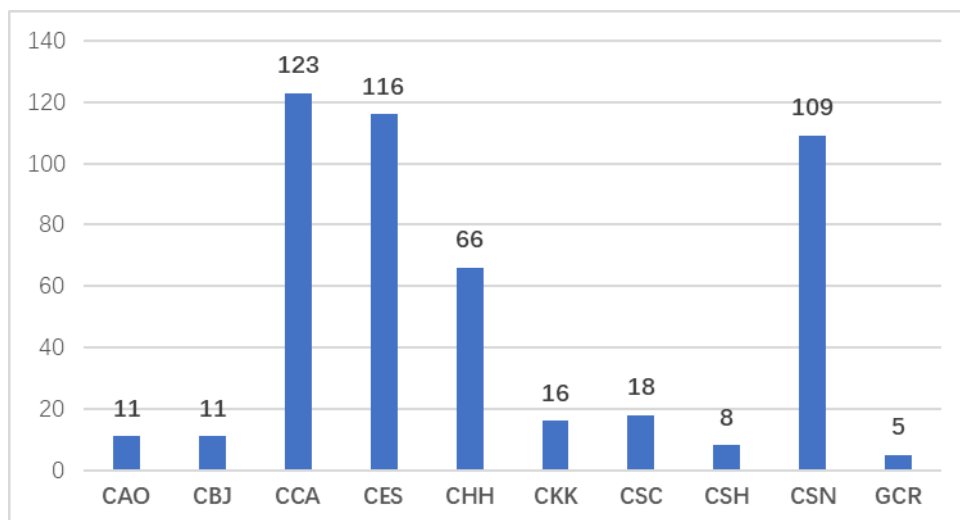


Figure 2 PBCS approved aircraft by operators

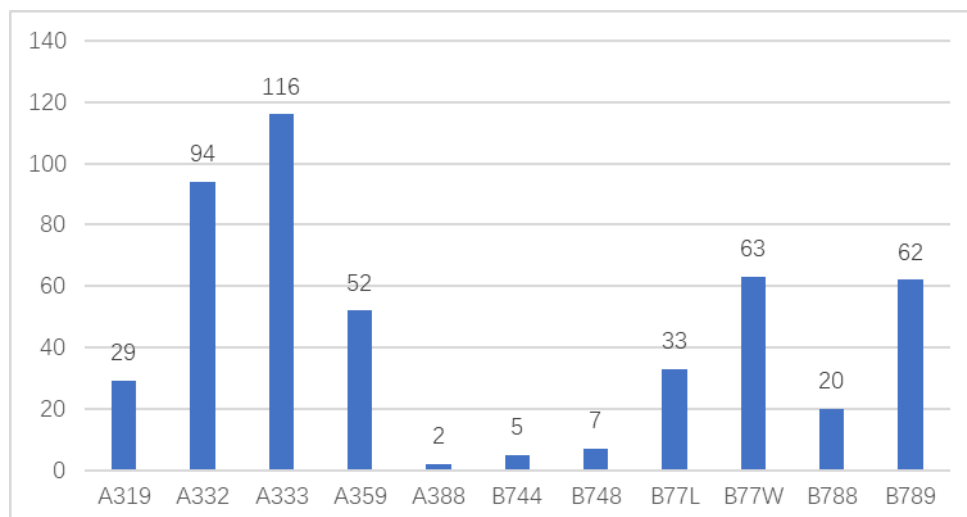


Figure 3 PBCS approved aircraft by ICAO type

2.5 In December 2022, China RMA shared the aircraft PBCS approval on KSN. China RMA will answer to approval request from the RMA community as soon as possible.

### Follow-up Work

2.6 The PBCS data collection is at this beginning stage, so further efforts are still needed to improve the program, such as reminding more operators to provide their information. Extra works are also expected to improve the current PBCS flight plan check procedures, making the PBCS flight plan check available from early 2023.

2.7 No data link PR is received by the end of 2022. China RMA will continue to enhance the reporting mechanism and track any data link performance problem.

### 3. Conclusion

3.1 China has implemented PBCS for over four years for now. All the mechanisms including approval data collection, problem reporting and data link performance monitoring are gradually on the right track. China will continually improve the data link operational performance and improve the related mechanisms. China RMA will continue to fulfill our responsibilities and do our best to conduct the PBCS performance monitoring work. In addition, China RMA also attaches importance to cooperation with other RMAs and wants to learn more from other regions.

### 4. ACTION BY THE MEETING

4.1 The meeting is invited to:

- a) review the information provided in the paper;
- b) discuss any relevant matters as appropriate.

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