



**THE FORTY-EIGHTH MEETING OF THE
INFORMAL PACIFIC ATC COORDINATING GROUP
(IPACG/48)**

**THE THIRTY-FIFTH MEETING OF THE
FANS INTEROPERABILITY TEAM (FIT/35)**

(Des Moines, Washington, USA, 26 September 2023)

Agenda Item 3: Reports on the relevant activities

PBCS Case Study

(Presented by CRA Japan and JASMA)

SUMMARY

This paper presents a case study of the B787-9 aircraft operated by some Japanese airline operator. It was identified that the aircraft did not meet the Performance Based Communications and Surveillance (PBCS) performance in the North Atlantic Ocean airspace.

1. Introduction

1.1. The Central Reporting Agency Japan (CRA Japan), which is established in the Civil Aviation Bureau (JCAB) and has responsibility for the CRA function in the Pacific Ocean Airspace of Fukuoka Flight Information Region (FIR), has started to introduce the Performance Based Communications and Surveillance (PBCS) framework since April 2015.

1.2. The Japan Airspace Safety Monitoring Agency (JASMA) provides the Regional Monitoring Agency (RMA) and the En-route Monitoring Agency (EMA) responsibilities for the Pacific Ocean airspace of Fukuoka FIR.

1.3. The Network Performance Assessment Center (NPAC) in JCAB monitors performance data for the Automatic Dependent Surveillance — Contract (ADS-C) and the Controller Pilot Data Link Communications (CPDLC) in Fukuoka FIR. The data is provided to CRA Japan and shared with JASMA on a monthly basis.

1.4. **Figure 1** shows the framework for operational and performance assessment of PBCS in Japan as of September 2023.

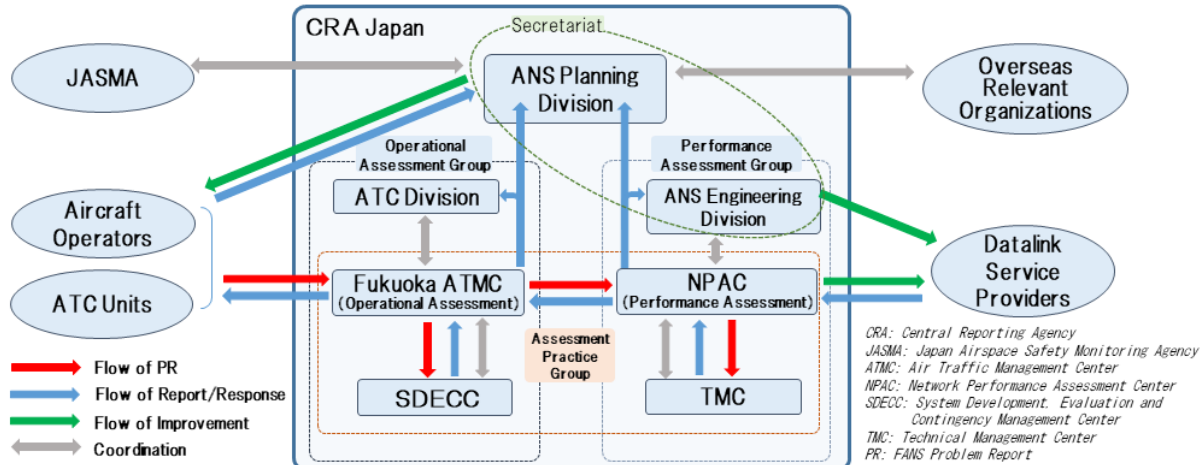


Figure 1: PBCS operational/performance assessment framework in Japan

2. Discussion

PBCS Non-Compliance Report Form

2.1. At the Twenty-Fifth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/25), it was agreed to use the revised PBCS Non-Compliance Report Form Template as Conclusion RASMAG/25-1. **Figure 2** presents a part of the final report of the RASMAG/25 meeting.

<p>2.15 PBCS non-compliance report templates were intended for ANSPs to inform the relevant Regional Monitoring Agency (RMA) of aircraft/aircraft operators where data link performance did not comply with specifications. A revised non-compliance report form template was proposed to FIT-Asia/10 in order to include additional information, to harmonize with the template already adopted in the North Atlantic (NAT) Region, and to use MS Excel format to facilitate data handling by the RMA. RASMAG/25 agreed to the following Conclusion developed by the FIT-Asia/10:</p> <p>Conclusion RASMAG/25-1: Revised PBCS Non-Compliance Report Form Template</p> <p>That, the PBCS Non-Compliance Report Form Template at Appendix C to the Report be uploaded to the Asia/Pacific Regional Office website, to replace the previous template.</p>
--

Figure 2: Excerpt of final report of RASMAG/25

2.2. It was also mentioned at the meeting that the PBCS Non-Compliance Report templates were intended for ANSPs to inform the relevant Monitoring Agency of aircraft/aircraft operators where data link performance did not comply with specifications.

2.3. The North Atlantic Central Monitoring Agency (NAT CMA) provided the PBCS Non-Compliance Report submitted by the Isavia Air Navigation Services (Isavia ANS) that provides air navigation services in the North Atlantic region known as the Reykjavik Control Area to JASMA in February 2023.

2.4. **Table 1** presents the PBCS Non-Compliance Report, and the report showed poor performance of several B787-9 (B789) aircraft operated by some Japanese aircraft airline operator in Reykjavik FIR (BIRD) from November 2022 to January 2023. The reason was “Delayed reports due to Inmarsat satellite to satellite transition (aircraft) or satellite problems (network).”

PBCS ATSP Non-Compliance Report Form							
Report Date			Feb2023				
Period of observed non-compliance:			Nov2022-Jan2023				
Reporting Air Traffic Service Provider (ATSP):			ISAVIA ANS (BIRD)				
Contact email address(es) at Reporting ATSP:			****@*****.**				
Reporting to Regional Monitoring Agency (RMA):			NATCMA				
ICAO CODE:			***				
Airline Operator:							
State of Operator/Registry:							
PBCS Data							
FIR	4-letter ICAO Aircraft Type	Registration	ADS-C downlink Message Counts	95% RSP180 Benchmark	CPDLC Transaction Counts	95% RCP240 benchmark	Issue code
				ASP		ACP	
				<=90 sec		<=180 sec	
BIRD	B789	JA****	157	93.63%	15	100.00%	(*3)
BIRD	B789	JA****	171	90.64%	12	91.67%	(*3)
BIRD	B789	JA****	141	92.91%	12	100.00%	(*3)
BIRD	B789	JA****	114	94.74%	17	100.00%	(*3)

Table 1: PBCS Non-Compliance Report from NAT CMA to JASMA

Action by CRA Japan and JASMA

2.5. JASMA forwarded the PBCS Non-Compliance Report to CRA Japan, then CRA Japan informed the status of PBCS Non-Compliance to the Japanese airline. CRA Japan confirmed that the PBCS performance of the airline operator's airframes was compliant in Fukuoka FIR during the same period.

2.6. JASMA provided above information to NAT CMA. JASMA also requested Isavia ANS to provide detailed data, including time stamps, position (Lat/Long), ground station ID, ASP, media type, FOM, etc., through NAT CMA. Table 2 shows sample of the detailed data provided by Isavia ANS.

elem text				msg text				rcv time				send time	ground station	
80.893879/-90.965939	35000 ft	XX:32:50	TCAS 1	FOM 6	NAVR 1	TYP ACK : Contract 2ACK : Contract 1BASC:	80.893879/-90.965939	35000 ft	XX:32:50	2022-11-01 09:32:59	2022-11-01 09:32:50	AME1		
80.628319/-79.935150	35000 ft	XX:46:42	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.628319/-79.935150	35000 ft	XX:46:42	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 09:46:57	2022-11-01 09:46:42	AME1
80.144920/-91.653099	39000 ft	XX:47:26	TCAS 1	FOM 7	NAVR 1	TYP ACK : Contract 2ACK : Contract 1BASC:	80.144920/-91.653099	39000 ft	XX:47:26	2022-11-01 09:47:36	2022-11-01 09:47:26	AME1		
80.592957/-79.086600	35000 ft	XX:47:49	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.592957/-79.086600	35000 ft	XX:47:49	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 09:48:12	2022-11-01 09:47:49	AME1
80.148010/-90.804920	35000 ft	XX:57:53	TCAS 1	FOM 6	NAVR 1	TYP ACK : Contract 2ACK : Contract 1BASC:	80.148010/-90.804920	35000 ft	XX:57:53	2022-11-01 09:58:00	2022-11-01 09:57:53	AME1		
80.148869/-90.308647	35000 ft	XX:58:32	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.148869/-90.308647	35000 ft	XX:58:32	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 09:58:53	2022-11-01 09:58:32	AME1
80.053425/-69.938107	34996 ft	XX:00:35	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.053425/-69.938107	34996 ft	XX:00:35	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:00:42	2022-11-01 10:00:35	AME1
80.031109/-81.094723	38996 ft	XX:01:18	TCAS 1	FOM 7	NAVR 1	TYP BASC: 80.031109/-81.094723	38996 ft	XX:01:18	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:01:24	2022-11-01 10:01:18	AME1
80.009480/-69.222450	35004 ft	XX:01:37	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.009480/-69.222450	35004 ft	XX:01:37	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:02:25	2022-11-01 10:01:37	AME1
80.003815/-79.959869	39000 ft	XX:02:49	TCAS 1	FOM 7	NAVR 1	TYP BASC: 80.003815/-79.959869	39000 ft	XX:02:49	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:03:09	2022-11-01 10:02:49	AME1
80.236244/-80.182343	34996 ft	XX:11:45	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.236244/-80.182343	34996 ft	XX:11:45	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:15:01	2022-11-01 10:11:45	AME1
80.003471/-59.984665	35004 ft	XX:13:49	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.003471/-59.984665	35004 ft	XX:13:49	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:14:01	2022-11-01 10:13:49	AME1
80.014629/-59.503670	35000 ft	XX:14:27	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.014629/-59.503670	35000 ft	XX:14:27	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:14:33	2022-11-01 10:14:27	AME1
80.018406/-70.563297	39004 ft	XX:15:10	TCAS 1	FOM 7	NAVR 1	TYP BASC: 80.018406/-70.563297	39004 ft	XX:15:10	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:15:24	2022-11-01 10:15:10	AME1
80.002613/-69.211464	38996 ft	XX:16:57	TCAS 1	FOM 7	NAVR 1	TYP BASC: 80.002613/-69.211464	38996 ft	XX:16:57	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:17:17	2022-11-01 10:16:57	AME1
80.014458/-69.629803	35000 ft	XX:25:37	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.014458/-69.629803	35000 ft	XX:25:37	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:25:44	2022-11-01 10:25:37	AME1
80.003986/-69.229317	35000 ft	XX:26:09	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.003986/-69.229317	35000 ft	XX:26:09	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:26:39	2022-11-01 10:26:09	AME1
80.146637/-48.733635	35004 ft	XX:28:19	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.146637/-48.733635	35004 ft	XX:28:19	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:28:26	2022-11-01 10:28:19	AME1
80.004158/-59.982605	38996 ft	XX:28:55	TCAS 1	FOM 7	NAVR 1	TYP BASC: 80.004158/-59.982605	38996 ft	XX:28:55	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:29:01	2022-11-01 10:28:55	AME1
80.005188/-59.891624	38996 ft	XX:29:02	TCAS 1	FOM 7	NAVR 1	TYP BASC: 80.005188/-59.891624	38996 ft	XX:29:02	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:29:15	2022-11-01 10:29:02	AME1
80.071793/-57.214394	39008 ft	XX:32:29	TCAS 1	FOM 7	NAVR 1	TYP BASC: 80.071793/-57.214394	39008 ft	XX:32:29	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:32:35	2022-11-01 10:32:29	AME1
80.105095/-44.555397	35000 ft	XX:33:45	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.105095/-44.555397	35000 ft	XX:33:45	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:33:52	2022-11-01 10:33:45	AME1
80.029392/-63.299103	35000 ft	XX:33:53	TCAS 1	FOM 6	NAVR 1	TYP BASC: 80.029392/-63.299103	35000 ft	XX:33:53	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:34:00	2022-11-01 10:33:53	AME1
79.930172/-60.060892	35000 ft	XX:38:14	TCAS 1	FOM 6	NAVR 1	TYP BASC: 79.930172/-60.060892	35000 ft	XX:38:14	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:38:20	2022-11-01 10:38:14	AME1
79.689257/-41.501884	35000 ft	XX:39:08	TCAS 1	FOM 6	NAVR 1	TYP BASC: 79.689257/-41.501884	35000 ft	XX:39:08	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:39:30	2022-11-01 10:39:08	AME1
79.892750/-59.149532	35000 ft	XX:39:30	TCAS 1	FOM 6	NAVR 1	TYP BASC: 79.892750/-59.149532	35000 ft	XX:39:30	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:39:36	2022-11-01 10:39:30	AME1
79.443340/-39.926376	35000 ft	XX:42:11	TCAS 1	FOM 6	NAVR 1	TYP BASC: 79.443340/-39.926376	35000 ft	XX:42:11	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:42:18	2022-11-01 10:42:11	AME1
79.693794/-49.662495	38992 ft	XX:42:54	TCAS 1	FOM 7	NAVR 1	TYP BASC: 79.693794/-49.662495	38992 ft	XX:42:54	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:43:00	2022-11-01 10:42:54	AME1
79.324722/-49.586105	35000 ft	XX:53:22	TCAS 1	FOM 6	NAVR 1	TYP BASC: 79.324722/-49.586105	35000 ft	XX:53:22	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:53:28	2022-11-01 10:53:22	AME1
79.117184/-42.658539	39000 ft	XX:53:36	TCAS 1	FOM 7	NAVR 1	TYP BASC: 79.117184/-42.658539	39000 ft	XX:53:36	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:53:42	2022-11-01 10:53:36	AME1
78.186951/-33.614902	35000 ft	XX:56:04	TCAS 1	FOM 6	NAVR 1	TYP BASC: 78.186951/-33.614902	35000 ft	XX:56:04	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 10:56:10	2022-11-01 10:56:04	AME1
78.917370/-40.732327	38996 ft	XX:56:46	TCAS 1	FOM 7	NAVR 1	TYP BASC: 78.917370/-40.732327	38996 ft	XX:56:46	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 10:56:52	2022-11-01 10:56:46	AME1
78.796520/-43.815193	35000 ft	XX:02:45	TCAS 1	FOM 6	NAVR 1	TYP BASC: 78.796520/-43.815193	35000 ft	XX:02:45	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:02:58	2022-11-01 11:02:45	AME1
78.508987/-41.265507	35000 ft	XX:07:14	TCAS 1	FOM 6	NAVR 1	TYP BASC: 78.508987/-41.265507	35000 ft	XX:07:14	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:07:21	2022-11-01 11:07:14	AME1
76.781044/-28.429356	35000 ft	XX:09:56	TCAS 1	FOM 6	NAVR 1	TYP BASC: 76.781044/-28.429356	35000 ft	XX:09:56	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:10:03	2022-11-01 11:09:56	AME1
77.904739/-33.062325	39000 ft	XX:10:38	TCAS 1	FOM 7	NAVR 1	TYP BASC: 77.904739/-33.062325	39000 ft	XX:10:38	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 11:10:44	2022-11-01 11:10:38	AME1
77.477818/-34.082336	35000 ft	XX:21:06	TCAS 1	FOM 6	NAVR 1	TYP BASC: 77.477818/-34.082336	35000 ft	XX:21:06	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:21:13	2022-11-01 11:21:06	AME1
75.297375/-24.266567	35000 ft	XX:23:48	TCAS 1	FOM 6	NAVR 1	TYP BASC: 75.297375/-24.266567	35000 ft	XX:23:48	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:23:55	2022-11-01 11:23:48	AO6E
76.723709/-26.690083	38996 ft	XX:24:30	TCAS 1	FOM 7	NAVR 1	TYP BASC: 76.723709/-26.690083	38996 ft	XX:24:30	TCAS 1	FOM 7	NAVR 1	TYP 2022-11-01 11:24:36	2022-11-01 11:24:30	AME1
76.264343/-27.959003	35000 ft	XX:34:59	TCAS 1	FOM 6	NAVR 1	TYP BASC: 76.264343/-27.959003	35000 ft	XX:34:59	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:35:05	2022-11-01 11:34:59	AME1
73.840656/-21.038818	35000 ft	XX:36:54	TCAS 1	FOM 6	NAVR 1	TYP BASC: 73.840656/-21.038818	35000 ft	XX:36:54	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:37:08	2022-11-01 11:36:54	AO6E
73.753452/-20.866642	35000 ft	XX:37:40	TCAS 1	FOM 6	NAVR 1	TYP BASC: 73.753452/-20.866642	35000 ft	XX:37:40	TCAS 1	FOM 6	NAVR 1	TYP 2022-11-01 11:37:47	2022-11-01 11:37:40	AO6E

Table 2: Sample of detailed data provided by Isavia ANS

2.7. After receiving the data from Isavia ANS, JASMA shared the data with CRA Japan, then the CRA Japan secretariat asked NPAC to analyze the data. As a result of plotting and analysis by NPAC, as shown in **Figure 3**, it was identified that the points/locations confirmed poor PBCS performance of the Japanese operator were around 75°N to 82°N where the airline operated some flights, and the areas were the edge of coverage of Inmarsat.

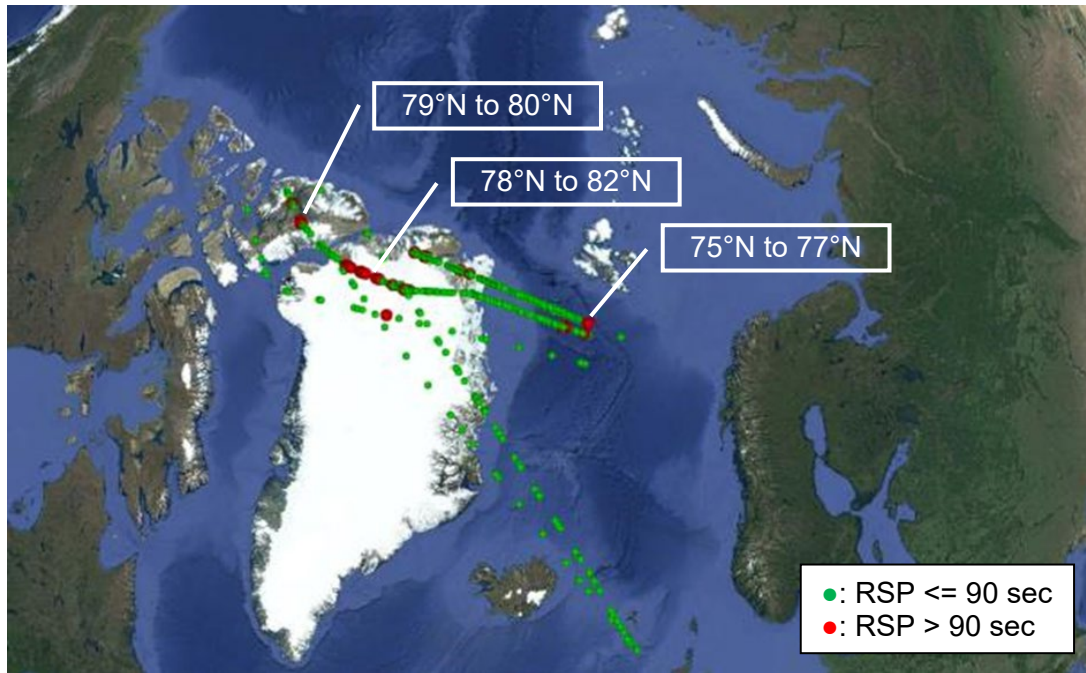


Figure 3: Result of plotting and analysis by NPAC

2.8. **Figure 4** shows an example of a flight route by the Japanese airline in the Cross-Polar route, and **Figure 5** describes the coverage of Inmarsat.

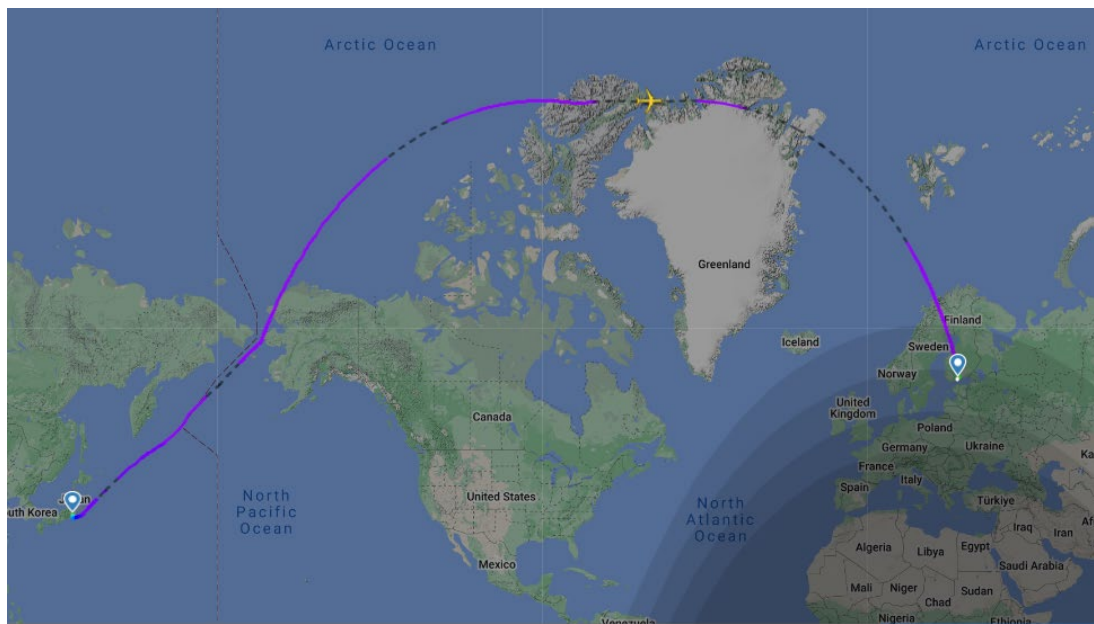


Figure 4: Example of flight route in Cross-Polar route

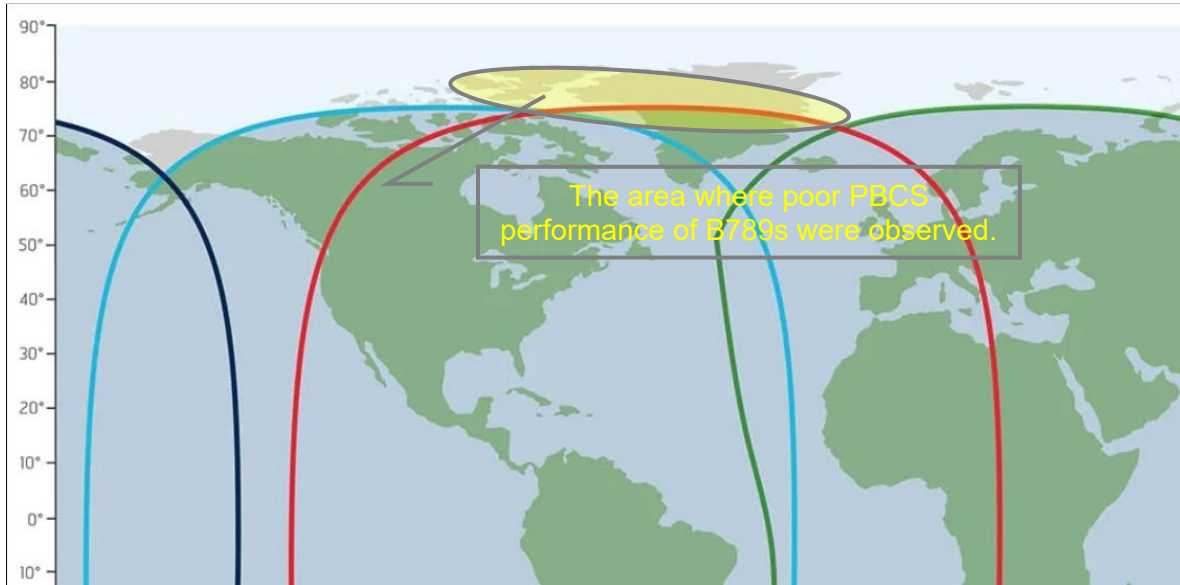


Figure 5: Inmarsat coverage

2.9. CRA Japan explained the result of the analysis to the Japanese operator and asked the operator whether they could file more southern routes. The operator responded that they would prefer to file and fly the current route, as it was the most rational and beneficial route in the current situation where they had to choose the Cross-Polar route.

Consideration

2.10. CRA Japan and JASMA considered the best solution to resolve this issue.

2.11. The airframes only have a satellite capability of Inmarsat. If B789s were upgraded to use other satellite that covers the Cross-Polar route, such as Iridium, the poor performance of B789s would be improved with keeping the Cross-Polar route. However, equipping other satellite capabilities requires the airline to spend additional costs.

2.12. If the Japanese airline selected southern routes fulfilling Inmarsat coverage, additional costs and flight time would be required. Thus, the airline operator might have to consider fatigue management for flight crews.

2.13. CRA Japan and JASMA would like to highlight that in the current situation where airline operators have to choose the Cross-Polar route, whose area is the edge of Inmarsat coverage, additional costs to comply with PBCS compliance would not be acceptable for the operators

Next Action (Not implemented)

2.14. CRA Japan and JASMA planned the following actions to confirm Isavia ANS.

- Whether similar cases of non-Japanese airline operators exist
- Whether seasonal characteristics or airframe differences exist

Conclusion

2.15. Before CRA Japan and JASMA implement the above next actions, it was informed that there was an error in the PBCS under-performance processing for the Reykjavik control area by Isavia ANS. Detailed information on the error follows.

- FANS data link services to Inmarsat-equipped aircraft are applied south of 82N.
- PBCS-dependent separation to Inmarsat-equipped aircraft are applied at or south of 80N.
- PBCS under-performance data collection is being done for the airspace south of 82N, but it should only be done for the airspace at or south of 80N.
- Inmarsat-equipped aircraft do not need to meet PBCS performance requirements north of 80N because this airspace is too close to the limit of the Inmarsat satellite coverage and PBCS separation is not being applied to Inmarsat-equipped aircraft in this airspace.
- The lateral separation minima for Inmarsat-equipped aircraft are as follows:
 - a) North of 80N: 50 NM (RNAV 10 or RNP 4 and HF voice communication).
 - b) South of 80N:
 - i) 15 NM target to target (PBCS, RNP 4 and ADS-B)
 - ii) 23 NM lateral (PBCS and RNP 4)

2.16. This case study shows that the PBCS Non-Compliance Report and sharing it to the designated EMA identify not only poor PBCS performance aircraft but also an error in PBCS monitoring conducted by the Air Navigation Service Providers (ANSPs).

3. Conclusion

3.1 The meeting is invited to note the information provided.