International Civil Aviation Organization

Eleventh Meeting of the Air Traffic Management Sub-Group (ATM/SG/11) of APANPIRG

Singapore, 2 – 6 October 2023

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

THE PROGRESS OF DOMESTIC CPDLC OPERATION IN JAPAN

(Presented by Japan)

SUMMARY

This paper presents the progress of domestic Controller Pilot Data Link Communications (CPDLC) operation in Japan. Japan Civil Aviation Bureau (JCAB) shifted to official operation in March 2023 after a one-year trial operation started in March 2022.

1. INTRODUCTION

1.1 JCAB started the trial operation of domestic CPDLC in the airspace at or above FL335 on March 1, 2022, as presented at ATM/SG/10 meeting. Aircraft can maintain CPDLC connection with Fukuoka FIR (RJJJ) and continue to receive ATS data link services seamlessly between the domestic airspace and oceanic airspace.

1.2 Domestic CPDLC utilizes VHF datalink or Satellite-based datalink only. Data Link Systems are Future Air Navigation System (FANS) 1/A, and/or FANS 1/A+ and Data Link Subnetworks: VDL Mode A, VDL Mode 2, and/or Satellites. JCAB started operation from the non-time-critical messages. During the trial operation, the applicable altitude was at or above FL335 in Sapporo, Tokyo, and Fukuoka Area Control Centers.

1.3 Transitioning to official operation after a one-year evaluation, JCAB removed the altitude limitation of FL335 and expanded the applicable area to lower-altitude airspace (See. **Figure 1**). Operational procedures of the domestic CPDLC in the Fukuoka FIR are published by AIP GEN3.3 ATS 3.7 (Air Traffic Service data link operation in Fukuoka FIR)

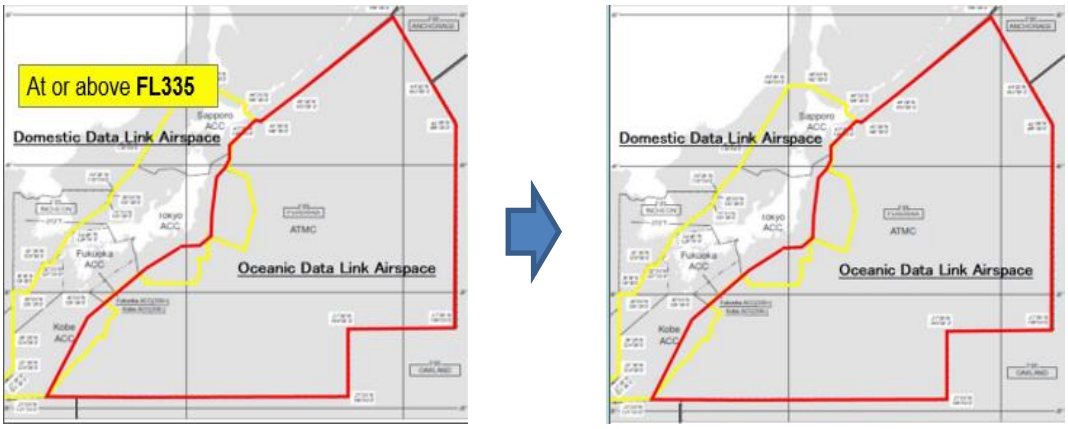

Figure 1. Domestic datalink airspace (Trial opeartion (L) Official operation (R))

2. DISCUSSION

2.1 **Figure 2** shows the monthly number of aircraft that use domestic CPDLC, categorizing three types: domestic, international (not entering oceanic area), and international (entering oceanic area). It shows that the number of domestic flights using CPDLC increased in March, 2023. This is because of expanding the applicable area for domestic CPDLC services.

Figure 2. The number of CPDLC flights (monthly)

2.2 **Figure 3** shows the number of messages categorized by message type. JCAB applies several non-time-critical messages in the current operation, as shown in **Figure 4**. The graph shows that "contact (CTC)" messages and messages with multiple elements make up the majority of entire messages. It is also observed that messages related to system interactions (gray dot) occupy 40~50% of all messages.

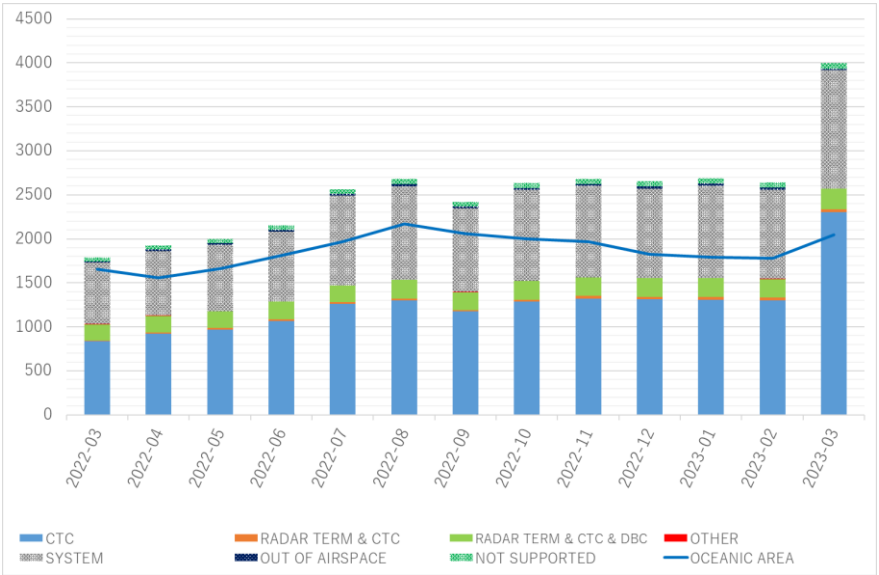

Figure 3. The number of message by message type

Message	Element	Message text	Remarks
CTC	117	CONTACT [icao unit name] [frequency]	Communications transfer with radar handoff.
RADAR TERM & CTC	154+117 / 154+117+ 169	RADAR SERVICES TERMINATED + CONTACT [icao unit name] [frequency] (+ SECONDARY FREQUENCY [frequency] (free text))	Communications transfer without radar handoff.
RADAR TERM & CTC & DBC	154+123+ 117+169	RADAR SERVICES TERMINATED + SQUAWK [beacon code] + CONTACT [icao unit name] [frequency] + SECONDARY FREQUENCY [frequency] (free text))	Communication transfer without radar handoff. (When changing to DBC2000) Used for aircraft departing from the offshore sector.
OTHER	157 / 169	CHECK STUCK MICROPHONE [frequency] / [free text]	Stack microphone reminders or free text messages manually edited by air traffic controllers.
OUT OF AIRSPACE	169	OUT OF CPDLC AIRSPACE (free text)	TEPS automatic response to downlink messages outside the domestic CPDLC operational airspace.
NOT SUPPORTED	169	MESSAGE NOT SUPPORTED BY THIS ATS UNIT (free text)	TEPS automatic response to downlink message elements not covered by domestic CPDLC.
SYSTEM	163 / 161 / 160 / 159	[icao facility designation] [tp4 table] / END SERVICE / NEXT DATA AUTHORITY [icao facility designation] / ERROR [error information]	CPDLC connection/disconnection/ transfer/error response.

Figure 4. Message explanation

2.3 JCAB has contracts with three DSPs, AVICOM JAPAN, Collins Aerospace (ARINC), and SITA. AVICOM JAPAN only provides the VHF-data link (VDL) services, and **Figure 5** shows that AVICOM JAPAN occupies 71% of DSP used in domestic CPDLC in March 2023.

2.4 JCAB plans to incrementally expand the types of messages, such as altitude change and route change, from 2027.

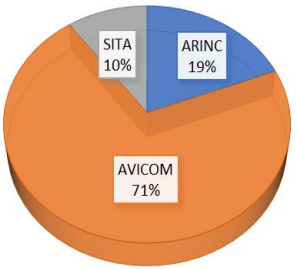

Figure 5. The ratio of CPDLC uplink message per DSP in domestic airspace

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information contained in this paper.

…….