International Civil Aviation Organization

The 2nd Meeting of the Future Air Navigation Systems Interoperability Team-Asia (FIT-Asia/2)

Bangkok, Thailand, 28 – 29 March 2013

Agenda Item 3: Review of ADS-C/CPDLC Operations

USE OF CPDLC AND ADS-C IN AUSTRALIA

(Presented by Airservices Australia)

SUMMARY

This paper presents an overview of how CPDLC and ADS-C are used in the provision of Air Traffic Services in Australia.

This paper relates to –

Strategic Objectives:

*A: **Safety** – Enhance global civil aviation safety*

Global Plan Initiatives:

GPI-17 Data link applications

1. INTRODUCTION

1.1 The transition to the Australian Eurocat (formerly TAAATS) in 1998 provided all Australian air traffic controllers (even those who primarily use radar for surveillance and VHF for communication) with access to CPDLC and ADS-C functionality.

1.2 This information paper provides information on how CPDLC and ADS-C are used in Australian airspace.

2. DISCUSSION

2.1 Controller Pilot Data link Communications (CPDLC)

2.1.1 In Oceanic airspace, outside the range of VHF voice communications, CPDLC is used as the primary means of communication with appropriately equipped aircraft. Limited CPDLC may also be used within VHF coverage, at the discretion of the controller.

2.1.2 CPDLC is used to issue clearances such as weather deviations, altitude clearances, amended route clearances, speed instructions, as well as SSR codes and frequency transfers.

2.1.2 CPDLC functionality is integrated with the Flight Data Record (FDR). When a CPDLC clearance is uplinked to an aircraft, the FDR is updated on receipt of the WILCO response from the flight crew.

2.1.3 The controller accesses CPDLC message elements via the “CPDLC Editor” (see Figure 1). The contents and layout of the CPDLC Editor can be adapted in Eurocat data for each ATC group.

2.1.4 The layout of message elements in the CPDLC Editor is based on an analysis of CPDLC message element usage statistics, with commonly used message element pairs co-located in the CPDLC Editor.

2.1.5 The off line storing of standard free text message elements as described in Global Operational data Link Document (GOLD) is also supported.

2.1.6 Up to 5 message elements can be constructed in a CPDLC message. The default size of the CPDLC Editor contains a single message element. The size of the Editor increases as additional message elements are added.

2.1.7 When a CPDLC downlink request is received and the CPDLC Editor is opened, a list of possible responses that are appropriate to the downlink request are displayed for the controller to select from (See Figure 2). The variable in the downlink is mapped to the corresponding variable in the uplink. This value can be amended by the controller prior to sending if required.

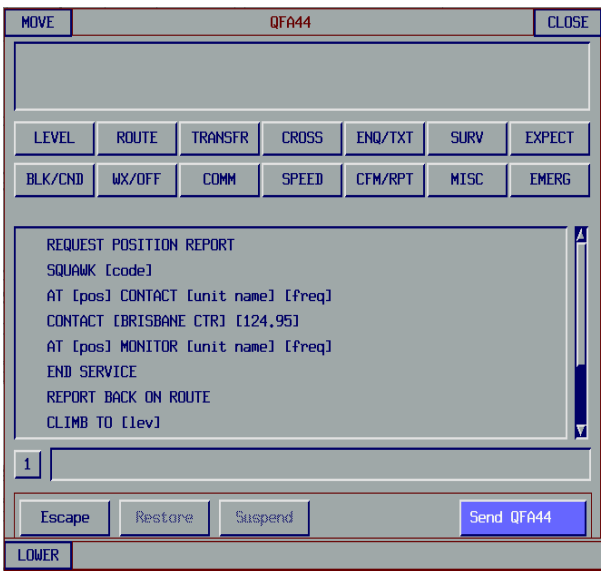


Figure 1. CPDLC Editor

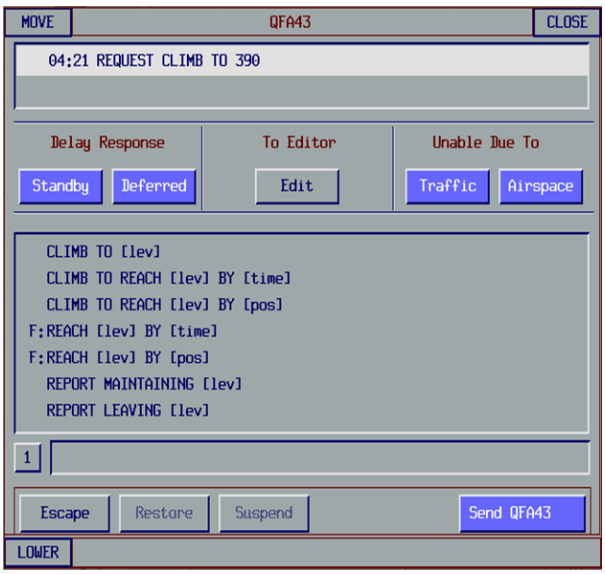


Figure 2. Responding to a downlink request

2.2 Lessons learnt

2.2.1 There are numerous lessons – too many to list in this working paper – that have been learned in the 15 years of using CPDLC in Australia. A short list of the more important lessons includes:

- Ensure controllers have a working knowledge of the CPDLC connection, and CPDLC transfer functionality. This enables many minor problems to be easily solved without flight crew intervention;
- Ensure that controllers have an understanding of the types of CPDLC message elements that are available. This reduces the use of free text;
- Ensure that the most commonly used CPDLC message elements are easily accessible by the controller without having to scroll or search through large numbers of unused message elements;
- Use preformatted CPDLC message elements wherever possible, and free text as a last resort;
- Keep CPDLC messages SHORT. While CPDLC functionality allows a CPDLC message to contain up to 5 message elements, it doesn't mean that they all have to be used! An analysis of YBBB data shows that over 99% of CPDLC message elements contained 2 message elements or less:

No. of message elements	No. of messages	% of total
1	14176	81%
2	3206	18%
3	79	0.5%
4	2	0.01%
5	0	0

- Ensure that CPDLC procedures are in compliance with those contained in GOLD.

2.3 Automatic Dependent Surveillance (ADS-C)

2.3.1 In Australia, ADS-C fulfils all position reporting requirements (by voice or CPDLC). ADS-C is also used as a replacement for level reporting by voice or CPDLC.

2.3.2 ADS-C reports are used to:

- Update the FDR (time over waypoint, level, estimate) as well as updating the extrapolation of the ADS-C position symbol;
- **Generate** altitude conformance alerts (CLAM);
- Generate route conformance alerts (RAM);
- Generate future route conformance alerts (ARCW);
- Emergency alerting.

2.4 ADS-C Periodic reporting rate:

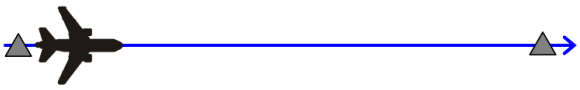
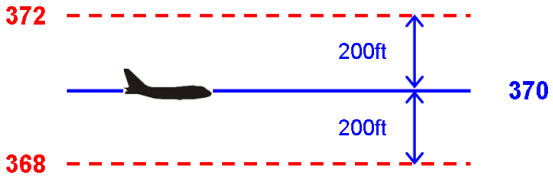
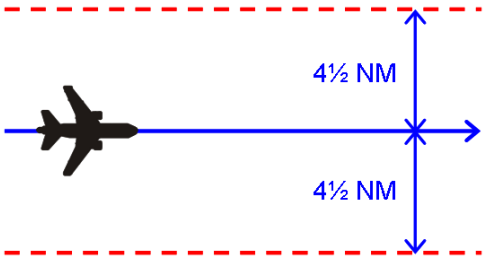
2.4.1 The default ADS-C reporting rate used in Australia is 30 minutes except if:

- a reduced separation requiring an increased reporting rate is being applied;
- the aircraft is off track (e.g. weather deviation);
- the aircraft is subject to an emergency;
- the aircraft is radar/ADS-B-coupled;

2.4.2 With the exception of when the ADS-C reporting is manually amended by the controller to apply reduced separation, Eurocat automatically updates the ADS-C reporting rate.

2.5 ADS-C event contracts

2.5.1 The following table shows the events and the associated parameters that are used in Australia:

Type of Event	Event Parameter
Waypoint change event (WCE)	
Level range deviation event (LRDE)	
Lateral deviation event (LDE)	
The vertical rate change event is not used	

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the use of CPDLC and ADS-C in Australia.