



International Civil Aviation Organization

AIDC Review Task Force Meeting

Brisbane, Australia, 27-28 March 2003

Agenda Item 3: Develop an updated version of the Asia/Pacific ICD for AIDC

CPDLC CONNECTION TRANSFER

SUMMARY

This working paper proposes an amendment to the Asia/Pacific Regional Interface Control Document (ICD) for ATS Inter-facility Data Communications to adopt messages necessary to support the transfer of a FANS-1/A Controller Pilot Data Link Communication (CPDLC) connection from one FIR to another FIR.

(Presented by the FAA)

1 Background.

- 1.1 The APANPIRG developed an ICD to ensure that data exchanged between ATS units providing air traffic services in, and adjacent to, the Asia/Pacific Region are harmonized to a common standard and to ensure that evolutionary development is encouraged and coordinated centrally.
- 1.2 Since the adoption of the ICD, FANS-1/A equipped aircraft have been introduced into the Asia/Pacific region. ATS units throughout the region are offering CPDLC services to take advantage of the reduced communication delays that are inherent in that media. In areas where certain reduced separation minima are in place the ATS units are using CPDLC to meet the direct controller pilot communications requirements of the standards.

2 Discussion.

- 2.1 When aircraft using CPDLC are transiting from one FIR to another FIR their data communication connection must be transferred to the gaining ATS unit. This connection forwarding is currently accomplished using the complex ATS Facilities Notification (AFN) procedure outlined below and illustrated in Figure 1.

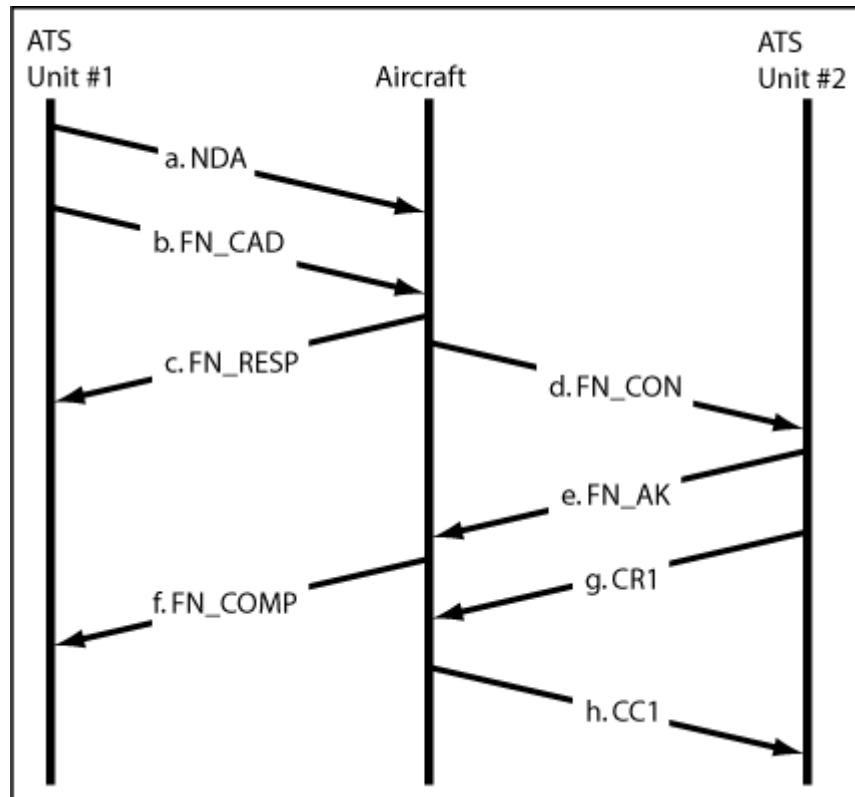


Figure 1 – CPDLC Connection Transfer Using AFN

- a. The controlling ATS unit (ATS Unit #1) uplinks a Next Data Authority (NDA) message which contains the facility designator of the next ATS unit (ATS Unit #2).
- b. ATS Unit #1 then uplinks an AFN Contact Advisory (FN_CAD) message which contains the network address of ATS Unit #2.
- c. The aircraft automatically responds to ATS Unit #1 with a downlink AFN Response (FN_RESP) message indicating intent to perform the AFN logon with ATS Unit #2.
- d. The aircraft then downlinks an AFN Contact (FN_CON) message to ATSU Unit #2 which provides aircraft addressing information, airborne ATS applications addressing information, and ATS application version numbers.
- e. ATS Unit #2 then uplinks a positive AFN Acknowledgement (FN_AK) message indicating that the AFN logon process has been successfully completed.
- f. The aircraft then downlinks an AFN Complete (FN_COMP) message to ATS Unit #1 indicating a successful AFN logon with ATS Unit #2.
- g. ATS Unit #2 uplinks a Connect Request (CR1) message to initiate a CPDLC connection with the aircraft.
- h. Upon receipt of the CR1 message the aircraft downlinks a Connect Confirm (CC1) message to ATS Unit #2 to establish the CPDLC connection (inactive).

- 2.1.1 The use of air-ground communications to accomplish the connection transfer has proven adequate though it does incur some overhead and timing constraints that could be eliminated through the use of ground-ground communications to accomplish the task.
- 2.2 RTCA DO-258 makes provision for use of ground-ground communications to accomplish the connection transfer (section 5.2) however no procedure on the use of this media is presented in the document.
- 2.3 The addition of two messages to the Asia/Pacific AIDC core message set would enable the use of ground-ground communications to facilitate the transfer of a CPDLC connection.
 - 2.3.1 The messages would need to have sufficient fields to provide the information necessary for the next data authority to establish a CPDLC connection with a transferring aircraft and to notify the current data authority regarding the outcome of the connection attempt.
 - 2.3.1.1 The FANS Application Notification (FAN) message would be transmitted by the controlling ATS unit to provide the gaining ATS unit with the following connection establishment information.
 - 2.3.1.1.1 Aircraft Identification Field
 - 2.3.1.1.1.1 Obtained from the current flight profile maintained by the controlling ATS unit.
 - 2.3.1.1.2 Aircraft Registration Number Field
 - 2.3.1.1.2.1 Obtained from the FN_CON message header (AEEC 622 section 3.5.3) if the aircraft initially logged onto the controlling ATS unit using AFN messaging or from the FAN message received from the previous controlling ATS unit if the connection transfer to the current controlling ATS unit utilized AIDC messaging.
 - 2.3.1.1.3 Airborne ATS Applications Addressing Information Field
 - 2.3.1.1.3.1 Obtained from the ACARS network header line 3 of the ground-ground message (AEEC 620 section 3.2.1) that contained the FN_CON message if the aircraft initially logged onto the controlling ATS unit using AFN messaging or from the FAN message received from the previous controlling ATS unit if the connection transfer to the current controlling ATS unit utilized AIDC messaging.
 - 2.3.1.1.4 ATS Application and Version Number Field
 - 2.3.1.1.4.1 Obtained from the FN_CON message (AEEC 622 section 3.5.4) if the aircraft initially logged onto the controlling ATS unit using AFN messaging or from the FAN message received from the previous controlling ATS unit if the connection transfer to the current controlling ATS unit utilized AIDC messaging.
 - 2.3.1.1.4.2 Multiple instances of this field would be permitted
 - 2.3.1.2 The FANS Completion Notification (FCN) message would be transmitted by the gaining ATS unit to provide the controlling ATS unit information regarding the outcome of the connection attempt.

2.3.1.2.1 Aircraft Identification Field

2.3.1.2.1.1 Obtained from the FAN message received from the controlling ATS unit.

2.3.1.2.2 CPDLC Connection Flag Field

2.3.1.2.2.1 The value of the field is set to zero if the ATS unit was unable to establish a CPDLC connection with the aircraft. The value of the field is set to one if the ATS unit established a connection with the aircraft.

2.3.2 The connection forwarding scheme using AIDC messaging is outlined below and illustrated in figure 2.

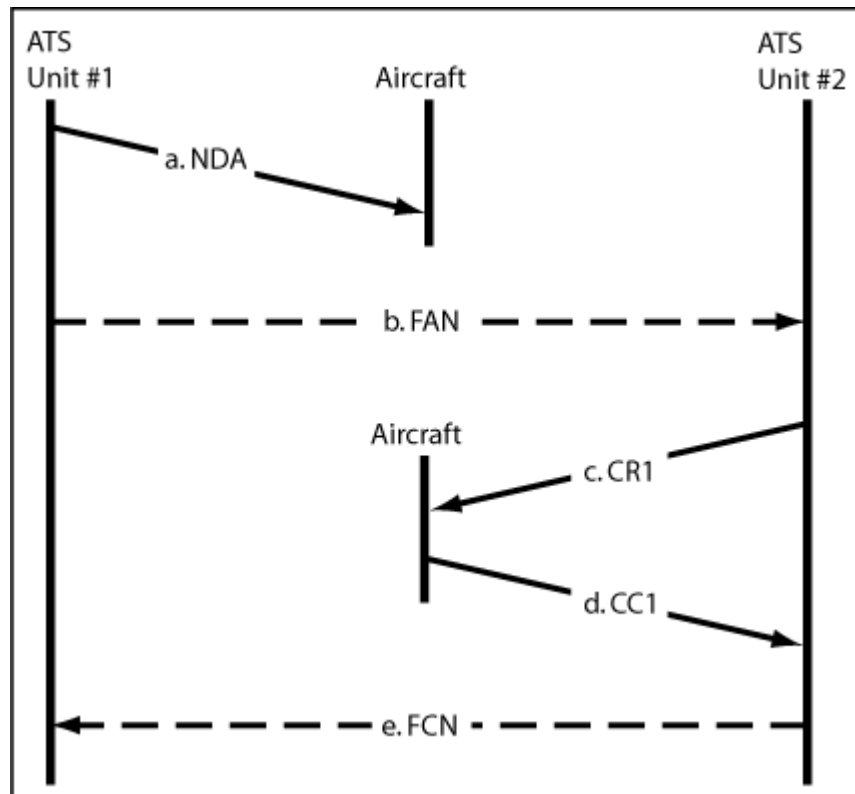


Figure 2 – CPDLC Connection Transfer Using AIDC

- a. The controlling ATS unit (ATS Unit #1) uplinks a NDA message which contains the facility designator of the next ATS unit (ATS Unit #2).
- b. ATS Unit #1 transmits a FAN message to ATSU Unit #2 which provides aircraft addressing information, airborne ATS applications addressing information, and ATS application version numbers.
- c. ATS Unit #2 uplinks a CR1 message to initiate a CPDLC connection with the aircraft.
- d. Upon receipt of the CR1 message the aircraft downlinks a CC1 message to ATS Unit #2 to establish the CPDLC connection (inactive).

- e. ATS Unit #2 transmits a FCN message to ATS Unit #1 indicating the outcome of the connection attempt with the aircraft.

3 Recommendation.

3.1 The meeting is invited to:

3.1.1 consider the contents of the working paper;

3.1.2 review the proposed amendment, and provide modification or enhancement;

3.1.3 consider amending the Asia/Pacific Regional Interface Control Document (ICD) for ATS Inter-facility Data Communications by adding the FANS Application Notification (FAN) and FANS Completion Notification (FCN) messages.