ICAO CAPACITY & EFFICIENCY

Data Link ANSP Provisions

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Overview

- Prerequisites for Initial operational implementation
- ATC automated data link functions
- Contractual considerations for communication service provider
- Aeronautical information & notification
- Monitoring and data recording
- Procedure development (Operations Manual – SOP)
- Letters of Agreement
- Controller Training
- Testing, Trials, and Operational Implementation

Prerequisites for Initial Operational Implementation

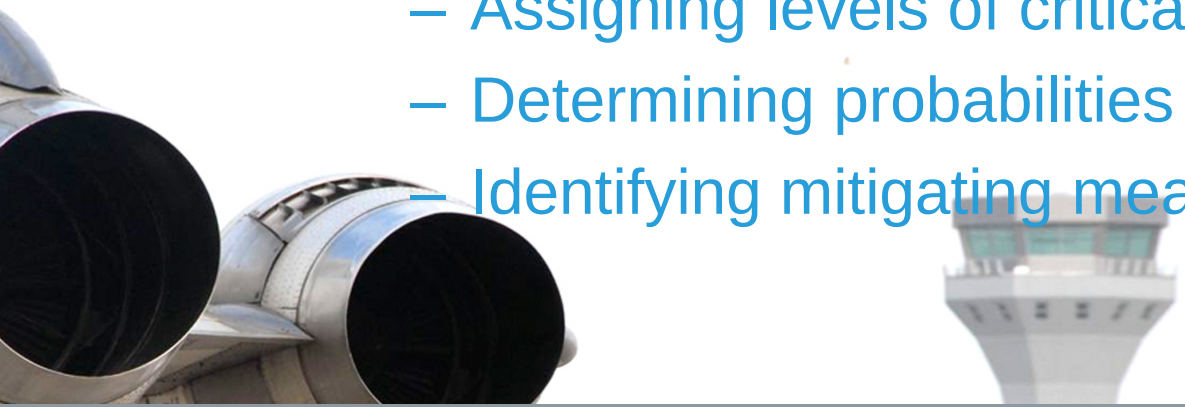
- ANSP should ensure equipment and procedures meet system integrity requirements by conducting:
  - System safety assessment
  - Integration testing
  - Operational trials
  - Identification/mitigation of risks/hazards

System Safety Assessment

- Demonstrate safety objectives are met
  - Functional hazard analysis, or
  - Documented system safety case
  - Completed for Initial implementation or
  - Future enhancements to the system

System Safety Assessments

- Assessments should include:
  - Identifying failure conditions
  - Assigning levels of criticality
  - Determining probabilities for occurrence
  - Identifying mitigating measures



Identified Failure Conditions

- As a result of testing and trials, failure conditions will be identified
- Determine and implement mitigations
- Resolve issues by means of automation and/or procedures

Identified Failure Conditions

- Examples
  - ANSP uses integrated measurement tools to determine separation
    - Mitigation: Publish limitations on tools for establishing and monitoring separation standards
  - ANSP receives ADS-C and CPDLC position reports that differ by 3 minutes or more
    - Mitigation: Controller should confirm the estimate
  - To meet requirements of Annex 10 to ensure ATS unit has active CPDLC connection with aircraft
    - Mitigation: Controller should be provided with automation and/or procedures to ensure the active connection has been established

Testing and Trials

- Integration testing
- Operation trials
  - Ensure interoperability for operational use (Aircraft and Ground systems)
  - ATS operational manuals compatible with adjacent service providers

Testing and Trials

- Testing Plan
  - Parameters of test, non-operation testing, operational testing
  - Document results
- Trials Plan
  - Parameters of trial, coordination, participants
  - Document results
- Problem identification and mitigation process
  - Feedback process (controllers and operators)
  - Mitigation process (automation and/or procedures)

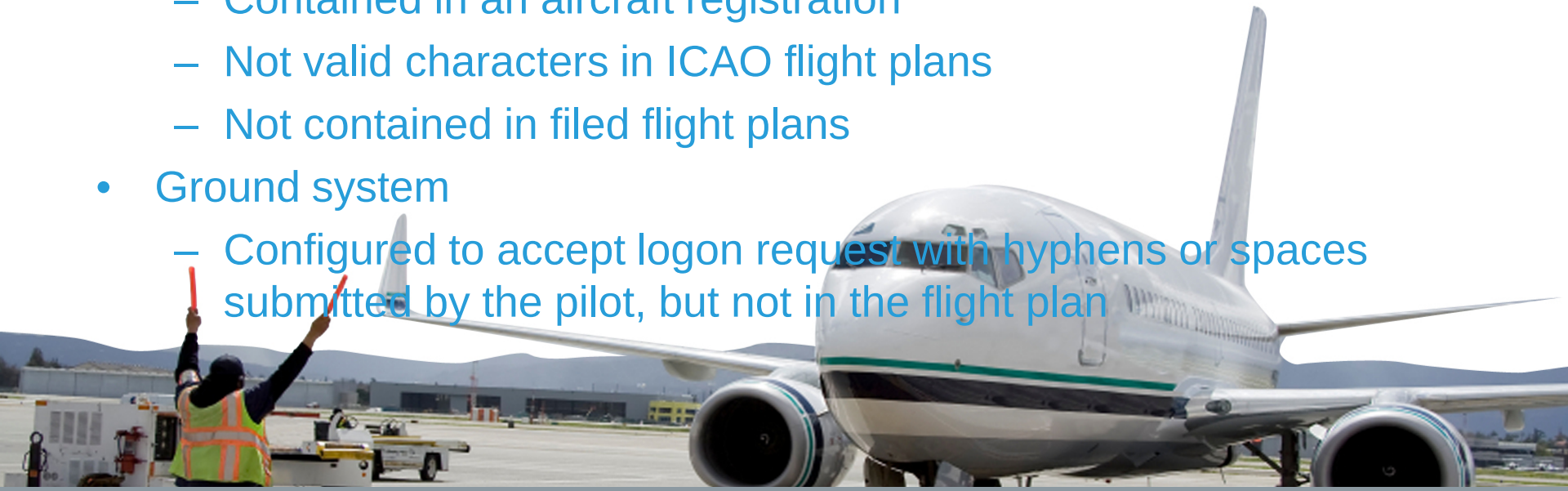
CPDLC Messages

- Use and display “standard” message elements (PANS-ATM Appendix 5)
- The use of free text messages should be avoided, however…
  - If free text message elements are used,
    - An evaluation of the effects should be included in operational and system safety assessments
  - If free text message elements impact seamless operations
    - The ANSP should coordinate with ICAO to define operational contents and format a new standard message element

Considerations for Automated Data Link Functions

Logon

- Hyphens or spaces
  - Contained in an aircraft registration
  - Not valid characters in ICAO flight plans
  - Not contained in filed flight plans
- Ground system
  - Configured to accept logon request with hyphens or spaces submitted by the pilot, but not in the flight plan



CPDLC Connection Management

- Aircraft rejecting CPDLC connection request message from receiving ATS unit
- To avoid interruption of data link service, ATS unit should initiate address forwarding at agreed time prior to boundary of next ATS unit

Emergency Message Handling

- Emergency message elements
  - Ground system should provide clear indication to controller
- Emergency-mode ADS-C report
  - Ground system should present it to controller

Automated Responses

- Downlink message element not supported
  - ATS unit should:
    - Send a MESSAGE NOT SUPPORTED BY THIS ATS UNIT
    - Do this rather than terminating the connection

Automate CPDLC termination request

- ATS units may:
  - Automate sending termination request message
  - Base on estimate time/location aircraft is expected to cross boundary

Contractual considerations - CSP

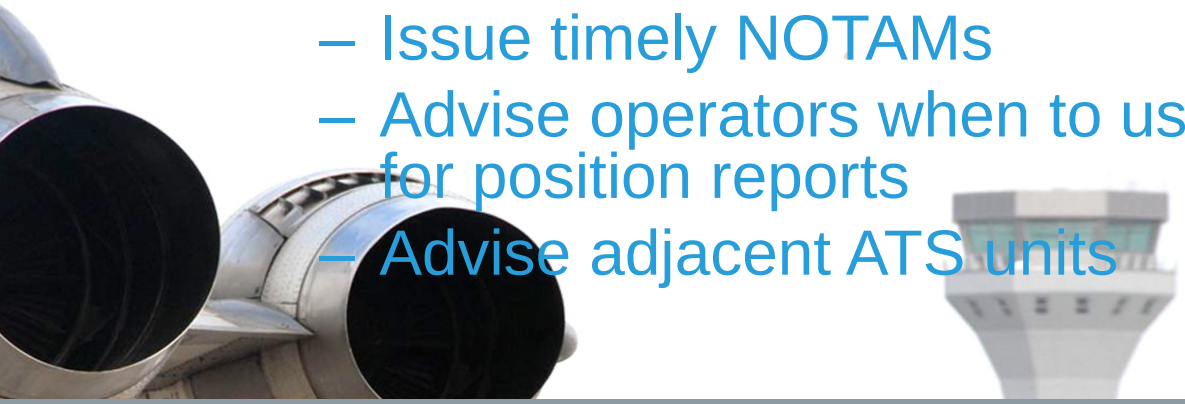
- CSP should meet performance criteria (Doc 9869)
- If CSP cannot continue to provide data communications
  - CSP should inform ANSP and operators
- Centralized ADS-C failure
  - CSP should inform ATS
- Include in agreement with CSP

Aeronautical Information

- ANSP notify operators of data link services
  - AIP
  - ICAO 4-letter location indicator
  - Logon address
  - Applications
  - Significant differences
  - Requirements for use
    - Procedures for initiation
    - ADS-C and CPDLC position report requirements
    - Reduced separations, re-routes, tailored arrival, etc.
    - Required functionality
  - Flight plan requirements

Notification of data link service status

- Notification of data link service status
  - Planned or unexpected outages
    - Outages, Degradation of services, Maintenance, Restoration of services
  - Issue timely NOTAMs
  - Advise operators when to use CPDLC or voice for position reports
  - Advise adjacent ATS units



Monitoring

- ANSP should:
  - Establish end-to-end system monitoring (ICAO Doc 9869)
  - Post-implementation monitoring
    - Identifying
    - Reporting
    - Tracking
    - Problems
    - Corrective actions

Data Recording

- Retain records
  - 30 days
- Accident/incident investigation
- Make records available for air safety investigations
  - Recordings should allow for replay and identification of messages sent/received by ATS unit

Procedure Development

- ANSP should develop appropriate procedures
  - Respond to CPDLC downlink messages
  - Ensure data is correct and accurate
    - Including any changes
    - Security of such data is not compromised
  - Notification process to affected ATS units of:
    - System failures
    - Software updates/modifications
    - Other changes that can have an impact
    - Include notification procedures in Letters of Agreement
  - Ensure ATS units only establish ADS contracts with aircraft under their direct control or monitoring responsibility
  - Document procedures for air traffic controllers in a Standard Operating Procedures (SOP) manual

SOP example

1 In this Chapter

This section describes the Datalink functionality in the OCS. It includes the following major topics:

Letters of Agreement

- CPDLC connection transfers
  - Consideration for aircraft transiting small data link areas
- ADS contract management with neighboring control areas
- Data link services managed by multiple ATS units
  - Include in LOA
    - Timely establishment of ADS contracts
    - Uninterrupted transfer of CPDLC connections
- Voice frequency assignment by CPDLC

Letters of Agreement

LETTER OF AGREEMENT
(LOA)

BETWEEN

AIRWAYS CORPORATION OF
NEW ZEALAND LIMITED
("Airways New Zealand")

AND

FRENCH POLYNESIA
AIR NAVIGATION SERVICES
("French Polynesia ANS")

AIRWAYS NEW ZEALAND	Letter of Agreement	dgac

Data Link Procedures

CPDLC Address Forwarding

Auckland & Tahiti :
Will automatic address forwarded aircraft to the next FIR prior to crossing FIR boundary as stipulated below:

- Next Data Authority message **(NDA)**: 40 minutes prior to FIR Boundary
- AFN Contact Advisory message **(FN-CAD)** : 35 minutes prior to FIR Boundary

Where 50 NM longitudinal separation is being applied between the Auckland and Tahiti Oceanic FIR's, the transferring air traffic control facility shall ensure that address forwarding for both aircraft has been completed prior to the estimate being passed.

CPDLC Connection Transfer

Auckland & Tahiti :
CPDLC End Service message will be normally sent 3 minutes prior to FIR boundary.

Datalink Transfer for short sector boundaries

Following coordination from Auckland of a northbound datalink aircraft that will transit the Tahiti FIR for less than 30 minutes before entering the Oakland FIR, Tahiti may request Auckland OAC to address forward this aircraft direct to Oakland.
When this occurs, Tahiti is responsible for completing the coordination with Oakland.

Auckland OAC will relinquish its responsibilities for the control of the aircraft at the common FIR boundary with Tahiti.

AIRWAYS NEW ZEALAND	Letter of Agreement	dgac

ACI Management

Information Transfers	ATS units shall relay significant details of any flight which is operating or intends to operate within 50NM of the common FIR boundary (Area of Common Interest, ACI).
ACI Only Procedures	In normal situations a CPL message will be sent
Timing	A CPL message shall be sent not less than 30 minutes prior to the 50NM expanded sector boundary
ADS C Surveillance	Datalink connections shall be managed to ensure ADS-C surveillance is effective while a flight is operating within ACI. The use of "address forwarding" to allow an ADS-C connection should be utilised whenever possible in such situations.

Controller Training

- Ensure controllers receive proper training on the new system
  - Training in accordance with Annex 1
  - Draft ICAO Manual on Air Traffic Controller Competency-based Training and Assessment (December 2015)
- Types of controller training
  - Initial training
  - Refresher training
  - **Conversion training**
    - Briefings
    - Classroom – Instructor led training
    - Computer Base Instruction
    - Simulation
    - On-the-job training (hands-on)

Data Link Controller Training

- Training on:
  - Data link basics
  - Data link message elements
  - Data link procedures
  - Data link SOP
  - Data link LOA
  - Data link CSP agreement
  - Data link equipment
  - Fall back procedures

Operational Implementation

- Operational Implementation Plan
  - Transition plan to new system
  - Fallback plan
    - What conditions may required a decision to fallback to old ATM system
    - Decision make

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