GOLD – Global Operational Data link Document

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GOLD - Introduction

The *Global Operational Data Link Document* (GOLD) is the result of the progressive evolution of two documents:

- The *FANS 1/A Operations Manual*, prepared initially by the Informal South Pacific Air Traffic Services Coordinating Group (ISPACG); and

- The *Guidance Material for ATS Data Link Services in North Atlantic Airspace*, produced by the North Atlantic FANS Implementation Group (NAT FIG), on behalf of the North Atlantic Systems Planning Group (NAT SPG)

GOLD - Introduction

In recognition of the need to provide globally harmonized guidance on data link operations, the GOLD *First Edition* became effective on 14 June 2010

GOLD - Introduction

GOLD is a significant step towards global standard procedures:

- *"intended to maximize operational benefits in data link operations by promoting seamless and interoperable data link operations throughout the world"*

- GOLD is formatted such that it has specific sections for the different operational users

GOLD - Introduction

GOLD is available for free download from the following web sites:

- http://www.ispacg-cra.com
- http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/data_link/

GOLD - Overview

Chapter 2 - Overview of data link operations

- For ANSPs and operators to develop training material for personnel, as appropriate, on the fundamentals of data link operations

Chapter 4 - Guidance on Controller and radio operator procedures

- For ANSPs and CSPs to develop procedures and training material for controllers and other personnel at ATSUs and radio facilities

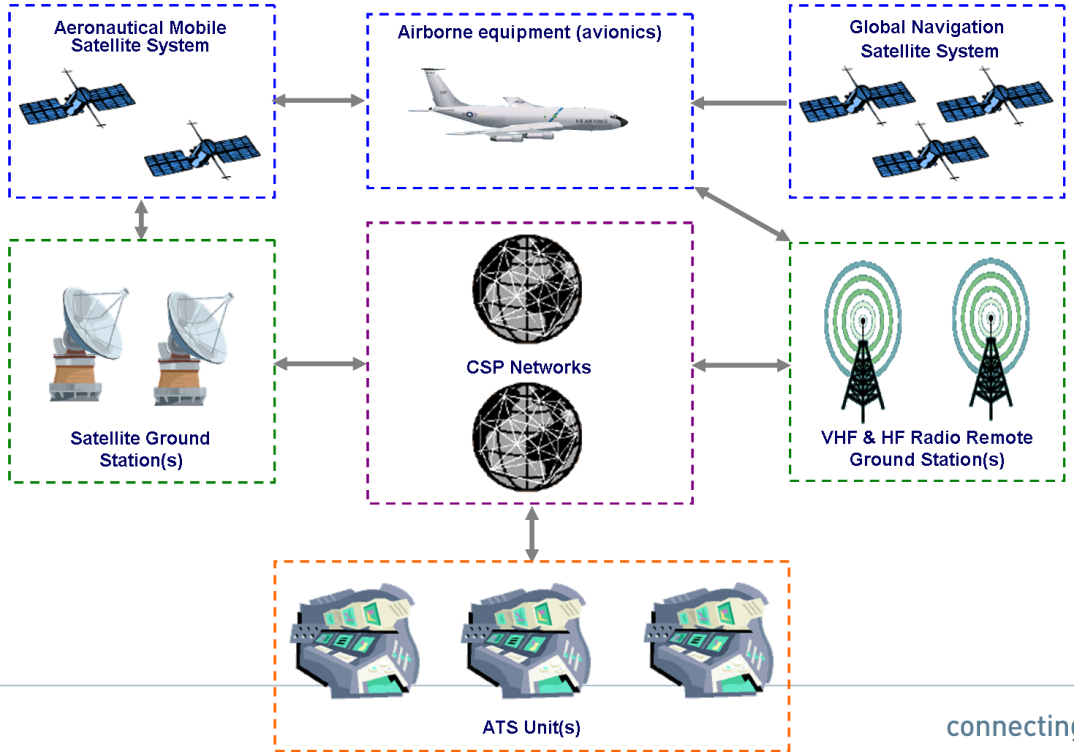
Chapter 5 - Guidance on Flight crew procedures

- For operators to develop procedures and training material for the flight crew and dispatchers

GOLD – Chapter 2

Overview of data link operations

Describes the inter networking of data link systems, including the sub networks



GOLD – Chapter 2

Description of various combinations of aircraft and ATS Unit data link systems

- Applicable interoperability (technical) standard

Description of various RCP and RSP specifications

GOLD – Chapter 2

Description of the FANS-1/A system

- Message Assurance (MAS) messages
- AFN logon
- Timing
- Response
- Address forwarding

GOLD – Chapter 2

Description of the FANS-1/A system

- CPDLC Connection management
  - Establishing CPDLC connections
  - Transferring CPDLC connections
  - Terminating CPDLC connections

GOLD – Chapter 2

Description of the FANS-1/A system

- Overview of CPDLC functionality
  - Open/closed messages
  - Dialogues
  - Message identification/reference numbers

GOLD – Chapter 2

Description of the FANS-1/A system

- Overview of ADS-C functionality
  - Periodic contracts
  - Event contracts
  - Contents of ADS-C reports
  - Contents of ADS-C Groups
  - Using ADS-C reports

GOLD – Chapter 2

Description of FMC WPR

Chapter 4 – Controller procedures

Provides guidance on procedures and recommended practices for the controller and the radio operator in airspace where data link services are available

This information is intended to assist in the development of:

- Local procedures and associated documentation; and
- Appropriate training programs

Chapter 4 – Controller procedures

Controllers should be knowledgeable in the ATC automation associated with CPDLC and ADS-C

- Controllers should be knowledgeable in data link operations

Radio operators should be aware of procedures specific to data link operations

Chapter 4 – Controller procedures

Management of CPDLC connections

- ensure that the ATS Unit with control for the flight holds the active CPDLC connection
- Controller should never issue a clearance or instruction to an aircraft outside their control area
- Controller should take steps to facilitate CPDLC transfer in the event of a failure of the automated process

Chapter 4 – Controller procedures

Management of CPDLC connections

- Ensure CPDLC data authority
- End service – Ensure no open messages

Chapter 4 – Controller procedures

Frequency transfers

- Procedures associated with use of the CPDLC MONITOR and/or CONTACT message elements

Generally only one frequency included in the transfer message

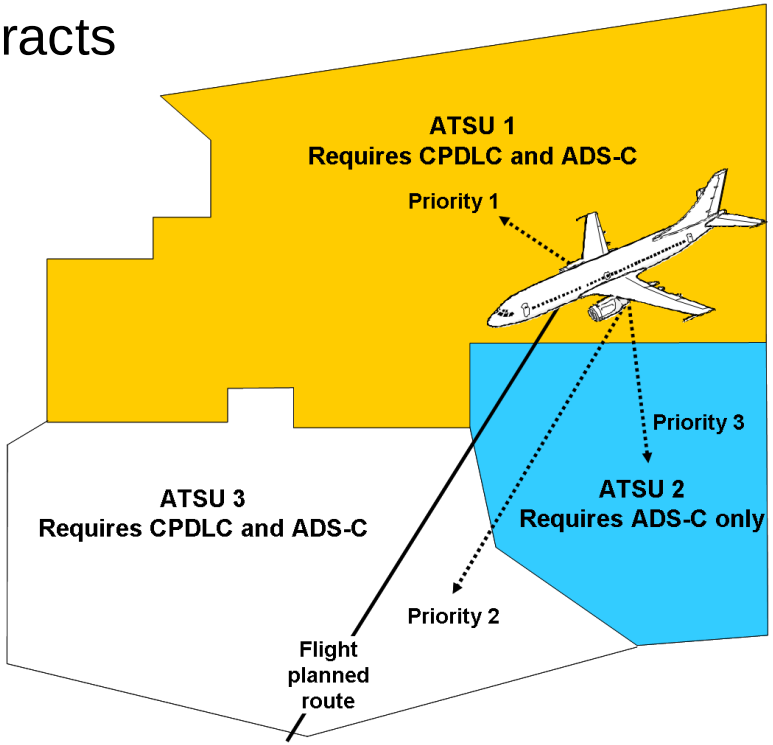
- In areas of poor radio coverage use the (free text) “SECONDARY FREQUENCY [frequency]” element

- Use of CENTRE vs RADIO

Chapter 4 – Controller procedures

Establishing and maintaining ADS contracts

- Priority of ADS contracts
- Terminating ADS contracts
- Use of ADS-C reports
- Loss of ADS-C
  - CONFIRM ADS-C ARMED



Chapter 4 – Controller procedures

Description about the implementation of ADS-C

- Reporting rate for periodic contracts:- Consider

  - requirements for the separation standard in use;
  - conformance monitoring;
  - traffic levels; and
  - alerting service

Avoid arbitrarily selecting short periodic default intervals because of the economic cost to the users and the unnecessary system loading

Chapter 4 – Controller procedures

Description about the implementation of ADS-C

- Reporting rate for periodic contracts:- Consider increasing

  - When the aircraft is cleared to deviate from areas of known significant weather;
  - When the application of a smaller separation standard requires a shorter periodic interval;
  - During periods of turbulence;
  - When an unauthorized deviation from the clearance is detected; etc

Chapter 4 – Controller procedures

Description about the implementation of ADS-C

- Event contracts: - Used for:
  - Level occupancy +/- 200 ft
  - Lateral separation
  - Longitudinal separation time/distance

Chapter 4 – Controller procedures

Sending CPDLC messages

- Use of standard message elements

Use of free text message elements

- only when an appropriate standard message element does not exist
- Use standard ICAO abbreviations

Use of STANDBY

Use of REQUEST DEFERRED

Chapter 4 – Controller procedures

Ensure that CPDLC messages are correct before sending them

- It is very difficult to intervene once a CPDLC message has been transmitted
- Subsequent CPDLC messages may not be read before the initial clearance is acted on.

Chapter 4 – Controller procedures

Ensure uplinks are responded to:

- CHECK AND RESPOND TO OPEN CPDLC MESSAGES

Chapter 4 – Controller procedures

Conditional clearances – a clearance to climb/descend at a future time or position

- Prefix clearance with MAINTAIN [level]

  - MAINTAIN [level]
    AT [time] CLIMB TO AND MAINTAIN [level]

Chapter 4 – Controller procedures

Obtaining reports from aircraft

- Controller must add an instruction to make the required report
  - REPORT LEVEL [level] (not REPORT REACHING [level])
  - REPORT SPEED
  - REPORT BACK ON ROUTE etc

"When UM 129 REPORT LEVEL [level] is appended, the flight crew has access to the standard message element DM 37 ***MAINTAINING [level]*** *or LEVEL [altitude]. If the report request is not appended, the flight crew may not report when they are maintaining the cleared flight level."*

Chapter 4 – Controller procedures

Cancelling a block clearance

- Uplink a new vertical clearance

Use of CPDLC level requirements

- CLIMB TO REACH [level] BY [time/position]

Chapter 4 – Controller procedures

Multi element CPDLC messages

- Should generally be avoided
- Only combine clearance message elements that are related
- Two independent clearances should never be transmitted in a single message because the flight crew has no way individually respond to each clearance
- send all elements of a dependent clearance in a single unambiguous uplink message

Chapter 4 – Controller procedures

Issuing weather deviation clearances

- Append REPORT BACK ON ROUTE

Alternatively

- REJOIN TRACK BY [time/position]
- WHEN ABLE PROCEED DIRECT TO [position]

Chapter 4 – Controller procedures

Latency timer

- Used to mitigate the effects of a delayed CPDLC message that is delivered to the aircraft

If latency timer is NOT in use, ATS Unit may need to:

- Notify the operator to provide procedures to their flight crews to switch off the message latency timer;
- Establish procedures for the ATS Unit to instruct the flight crew to confirm that the message latency timer is off

Chapter 4 – Controller procedures

If latency timer IS in use, ATS Unit may need to:

- Prescribe the use of the message latency timer in appropriate documents (AIP etc);
- Establish interfacility agreements with adjacent ATS Units on the use of the message latency timer;
- Establish procedures for the ATSU to instruct the flight crew to set a value for the latency timer

Chapter 4 – Controller procedures

Use of ROGER and AFFIRM

- Should NOT be used to respond to a clearance request
- clearances should only be issued using an appropriate CPDLC clearance message element

Use of UNABLE

- should be used to deny a clearance
- Do not use NEGATIVE
- Do not restate the aircraft's current clearance

Chapter 4 – Controller procedures

Use of STANDBY

- to provide advice to the flight crew that their requested clearance is being assessed, but is not readily available,
- should not be used simply to acknowledge that a downlink request has been received

Chapter 4 – Controller procedures

Multi element requests

- If ALL elements in the clearance request can be approved:
  - the controller should specifically respond to each clearance request element in the message

- If NO elements in the clearance request can be approved:
  - the controller should respond UNABLE

Chapter 4 – Controller procedures

Multi element requests

- If SOME elements in the clearance request can be approved:
  - the controller should respond UNABLE; and
  - (optionally) uplink a separate CPDLC message containing clearances that can be approved

Chapter 4 – Controller procedures

Alternative clearances

- If the clearance contained in a downlink request is not available:
  - Uplink UNABLE to deny the request prior to issuing any subsequent clearances
  - Do not simply respond to the downlink request with the alternative clearance

- If an alternative clearance is available
  - Uplink the clearance in a separate CPDLC message

Chapter 4 – Controller procedures

Description of FMC WPR

Description of CPDLC/ADS-C emergency alerting

- ROGER PAN
- ROGER MAYDAY
- CONFIRM ADS-C EMERGENCY

Chapter 4 – Controller procedures

A number of voice phraseologies specifically associated with data link have been introduced

Condition	Voice phraseology
To instruct the flight crew to manually initiate an AFN logon to the subsequent ATSU	SELECT ATC COMM OFF THEN LOGON TO [facility designation]
To advise the flight crew that the data link has failed and instruct them to continue on voice.	ATC DATA LINK FAILED. SELECT ATC COMM OFF. CONTINUE ON VOICE
To advise the flight crew prior to the commencement of a FANS 1/A data link shutdown and instruct them to continue on voice.	ATC DATA LINK WILL BE SHUT DOWN. SELECT ATC COMM OFF. CONTINUE ON VOICE.

Chapter 4 – Controller procedures

A number of voice phraseologies specifically associated with data link have been introduced

Condition	Voice phraseology
To advise the flight crew that the transmission is being made due to a CPDLC failure	CPDLC FAILURE. *Note.— This phraseology should only be included with the first transmission made for this reason.*
To advise the flight crew of a complete ground system failure	ALL STATIONS CPDLC FAILURE [identification of station calling].
To advise the flight crew that the data link system has resumed operations	ATC DATA LINK OPERATIONAL. LOGON TO [facility designation]

Chapter 4 – Controller procedures

Data link service failure

- Various procedures for dealing with outages, planned failures etc

Chapter 4 – Controller procedures

Using CPDLC to relay messages to a non-CPDLC aircraft

- Use free text to relay, not preformatted message elements

Chapter 5 – Flight crew procedures

Provides guidance on procedures and recommended practices for the flight crew in airspace where data link services are available

This information is intended to assist in the development of:

- Airline procedures and associated documentation; and
- Appropriate flight crew training programs

Chapter 5 – Flight crew procedures

Development, testing, and operational experience have highlighted fundamental differences between CPDLC and voice communications

- Need to consider this when developing or approving flight crew procedures involving the use of CPDLC

Develop flight crew procedures to ensure that each flight crew member independently reviews:

- each CPDLC uplink prior to responding and/or executing a clearance
- each CPDLC downlink message prior to transmission

Chapter 5 – Flight crew procedures

Many of the following flight crew procedures are simply a re-statement of the corresponding controller procedures, from the perspective of the flight crew

Chapter 5 – Flight crew procedures

Logon procedures

- Cross check that information in logon matches the flight plan
  - Aircraft identification
  - Aircraft registration
  - Aircraft address
  - Logon address
- When to logon

Chapter 5 – Flight crew procedures

Unsuccessful logon procedures

- Don’t just logon with the same information!
  - Cross-check FMS information with flight plan
  - Correct error or advise ATC of discrepancy

Chapter 5 – Flight crew procedures

Latency timer

- Procedures associated with enabling or disabling the latency timer
- Processing delayed CPDLC messages

Chapter 5 – Flight crew procedures

CPDLC transfers

- Minimal effect on flight crews
- Be aware of CPDLC transfer failure procedures

Chapter 5 – Flight crew procedures

Uplinks

- Flight crew should read CPDLC messages using the flight deck displays;

- When processing an uplink multi-element message, the flight crew should carefully refer to screen page numbers to ensure that the entire uplink has been read and understood in the correct sequence prior to responding;

Chapter 5 – Flight crew procedures

Uplinks

- To ensure situational awareness is maintained, each flight crew member should read uplink messages independently.
  - ➢ the flight crew should then discuss whether to accept or reject the message

Chapter 5 – Flight crew procedures

Uplinks

- If the flight crew cannot comply with any portion of a multi-element message, the flight crew will need to reject (UNABLE) the entire message, and should not execute any clearance portion of the message

- Should be responded to as soon as practical after they are received (or send STANDBY)

Chapter 5 – Flight crew procedures

Conditional clearances

- An operator should ensure that flight crew training clearly addresses the use of words “AT” or “BY” as used in conditional clearances, particularly for a non-native English speaking flight crew.

  - *AT [time] CLIMB TO AND MAINTAIN [altitude]*
  - CLIMB TO REACH [level] BY [time]

Chapter 5 – Flight crew procedures

EXPECT uplinks

- EXPECT CLIMB AT [time]
- EXPECT [level] AT [position]; etc

  - Are a notification of when a clearance can be expected to be available

  - Are NOT a clearance!

Chapter 5 – Flight crew procedures

FMS-loadable data

- If a clearance is received that can be automatically loaded into the FMS, the flight crew should:
  - Load the clearance into the FMS; and
  - Review it before accepting (WILCO) the clearance

Chapter 5 – Flight crew procedures

Downlinks

- To maintain situational awareness, flight crew procedures should ensure that

  - each flight crew member has read each downlink message before it is sent;
  - flight crew only downlinks a clearance request if the flight is in the current data authority's airspace;
  - avoid sending multiple clearance requests in a single downlink message

Chapter 5 – Flight crew procedures

Free text

- Free text messages should be used only when an appropriate standard message element does not exist.

Unsupported message elements

- Ensure that flight crews are aware that in some airspace limited CPDLC message elements are supported

Chapter 5 – Flight crew procedures

CPDLC reports

- The flight crew should ensure that they respond to CPDLC reports when instructed to do so

Chapter 5 – Flight crew procedures

ADS-C reporting

- In ADS-C airspace:
  - Flight crews need to be aware that position reports (voice or CPDLC) are not required
  - the flight crew should check to ensure ADS-C is enabled prior to initiating a logon with an ATSU

Chapter 5 – Flight crew procedures

Weather deviation procedures

- Offsets vs weather deviations;
- Subsequent weather deviation;
- Deviations either side of route;
- Sequencing waypoints;
- “Back on Route”

Chapter 5 – Flight crew procedures

Emergency procedures

Chapter 6 - Advanced data link operations

- CPDLC re-routes and DARPs (Dynamic Re-route Procedures)
- Tailored Arrivals
- State aircraft operations:
  - refueling;
  - MARSA;
  - formation flights

More information

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