Global Operational Data Link Document (GOLD)

Working Draft (for internal use only)
Version 0.4 — 6 Feb 09

Prepared by the GOLD Ad Hoc Working Group

Sponsored by the North Atlantic Systems Planning Group (NAT SPG) and Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG)

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Amendments to the GOLD

The following table will be used to track updates to the GOLD by the Ad Hoc Working Group. Conventions for tracking changes will be discussed at the first meeting.

Editor's note 1. — ND/GS - This document contains procedures material in Chapter 4 from the FOM and NAT GM as ported in by N. Dimock and G. Sandell from "Procedures" and other procedures material from the FOM and NAT GM marked as follows.
Green material is practically straight from the FOM v6.0.
Blue is practically straight from the NAT GM v18

The working method was this:
a) Because the FOM material tended to be much more voluminous than the NAT material, the procedure was to port any pertinent FOM material into the GOLD outline first, highlighting it as green in both the FOM copy and the GOLD, and then to port in any pertinent NAT material by inserting it amongst the FOM material as deemed appropriate, highlighting it as blue in both the NAT GM copy and the GOLD. In a few places the NAT material was deemed a-priory to have been well covered by equivalent FOM material. In such places a margin comment to that effect was inserted in the NAT GM copy and it was not ported. FOM and NAT material was included without comment unless it conflicted.
b) Changes subsequent to that porting were tracked.
c) Such changes were firstly to remove any redundant NAT or FOM material and to resolve any NAT versus PAC differences in the actual material. In general potentially conflicting material was not changed but merely commented.

Chapter 3 was completed by Tom Kraft similar to above, except all the text from the NAT GM and FOM related to the intent of admin provisions for data link services was ported to Chapter 3 to ensure complete coverage in the GOLD. Changes were made as indicated with track changes. Highlighting is the same as above.

The GOLD Ad Hoc Working Group needs to review document for proper placement of text, fusion of text, editorial, and organization.

Amendment	Source	Subject(s)	Date
0.1		Not used	
0.2	Pre-GOLD/1	Annotated outline incorporated into document structure	12-Nov-08
0.3	Post-GOLD/1	The draft document at this stage is focused on populating the outline with relevant material. Document style, formatting, and presentation of material is still being worked. This version incorporated the following: a) Introductory material from Chris (FOREWORD) b) Procedures from Norm and Gordon based on review of FOM and NAT GM (Chapter 4) c) CPDLC message elements and standardized free text based on PANS/ATM, FOM, NAT GM, and	25-Nov-08

		RTCA/EUROCAE Standards (Appendix A) d) Performance-based specifications for RCP 240/D and RCP 400/D based on NAT FIG Flimsy 4 and IPACG FIT/16 WP/3, Apx D (Appendix B) e) Regional/State-specific information (Appendix D) f) Aircraft/operator specific information from paragraph 8.6 of FOM (Appendix E)	
0.3.1	T.Kraft	Baseline for subsequent work. a) Accepted all tracked changes on previous version. b) Not tracked. Inserted FOM trace notes, NAT GM trace notes, and Editor's notes in lieu of comments. c) Not tracked. Split Appendix B, Performance-based specifications, into two appendices, Appendix B, RCP specifications, and Appendix C, Surveillance performance specifications. Re-lettered subsequent appendices. d) Not tracked. Eliminated "error! …" in cross-references. Checked all cross references and corrected/clarified where necessary. Added hyperlinks for cross-referencing. e) Not tracked. Consistent use of notes. f) Not tracked. Cleaned up some of the Editor's notes. g) Not tracked. Capitalization – mainly selected UPPER CASE for message element text. Changed some UPPER CASE to lower case. h) Not tracked. Cleaned up table formats. i) Not tracked. Included Chapter 1 definitions from FOM, NAT GM, and performance specifications in Appendix B and C. j) Not tracked. Included Chapter 3, based on text from FOM and NAT GM. Changes from source documents are tracked. Text not highlighted is new text. k) Not tracked. Included Appendix C, based on text from FOM, NAT, DO-306/ED-122 and other source material. Tracked changes indicate differences from DO-306/ED-122 when applied to surveillance performance criteria. l) Tracked. Cleaned up Appendix B. m) Not tracked. Included input from Paul Radford on Appendix D.	6-Feb-09
0.4	T. Kraft Post-GOLD/1	Accepted all tracked changes in 0.3.1. New baseline for internal GOLD Ad Hoc Working Group review.	6-Feb-09

Editor's note 2. — AW - A few other chapters/topics/sections to consider (From Adam Watkin):
1. One of the advantages that has been stated for a new CPDLC-user to use an existing CRA is the benefits of "lessons learned". Yet we don't actually have any of those lessons in the FOM! I can recall a few (like "training training training"), but that is about it. Suggest a section in GOLD to retain this information before Paul and my brains turn to mush... (TK - See Editor's note 3. —.)
2. There is a "DARPs (or re-route) document" being (slowly) put together by ISPACG. There was talk of it possibly being put into the FOM - does it belong in GOLD? If so where? (TK – Procedures? See Chapter 4)
3. Aircraft limitations. E.g. Airbus does not support a <space> within a [unitname]. Not many people know this - I think this type of information could belong in an Appendix (TK - See Appendix F maybe?)

How often do the Appendices get updated and what is the process? For example do we include information about FIRs that are trialing CPDLC/ADS-C, given that these trial statuses may change throughout the year. (TK - Good question. See FOREWORD, section 8, for changes to the document. I would propose we might include general guidelines for the conduct of trials, but specifics would be addressed in specific regional/State project information for the trial.)

What process is to be used to provide comments on any draft document? Will it be uploaded to the website, and we each individually download, track changes, and upload the response? Gets messy...(TK - Yes it does, I'm hoping you will use the comment matrix I will provide with each draft as it is developed. A tracked change document with the comments you give me will help in some cases, to integrate changes to the document).

I had more comments on the NAT GM, but I'll refrain from comment until you folks have completed your London work. You will probably pick up some of the errors as you go :<)

Editor's note 3. — AW - Things still to consider from lessons learned (From Adam Watkin) (TK - mostly propose text for Chapter 4 or Appendix A.)
- Use of REPORT REACHING [level] (TK - Propose for Chapter 4 or Appendix A)
- Use of CRUISE [level] (TK - Propose for Chapter 4 or Appendix A)
- Use of Cruise climbs (TK - Propose for Chapter 4 or Appendix A)
- Use of At Pilot Discretion may have different meanings for some crews (TK - Propose for Chapter 4 or Appendix A)
- Display of CPDLC route clearances in certain aircraft types (TK - Appendix F, maybe?)
- Don't use free text (TK - Propose for Chapter 4)
- Conditional clearance issue (TK - Propose for Chapter 4 or Appendix A)
- Issues associated with Duplicate waypoints (TK - Propose for Chapter 4)
- Issues associated with co-located NDBs/waypoints (TK - Propose for Chapter 4)
- Supposed issues with EXPECT messages (TK - Propose for Chapter 4 or Appendix A)
- Avoid long multi-element uplinks (TK - Propose for Chapter 4)
- Avoid multiple clearances in one uplink, unless they are dependent clearances (TK - Propose for Chapter 4)
- Avoid multiple clearance requests in the one downlink (TK - Propose for Chapter 4)
- If ATC wants a report, they need to ask for it (i.e. pilot can't initiate level reports etc)
- Weather deviations - off track distances are ALL based on the nominal route

- If free text is required, try to use standard free text message elements
- NDA before Address Forward
- Make sure ground system clocks are synchronised with UTC when using ADS-C (TK - Propose for Chapter 3)
- Don't send unacceptable combinations of messages (e.g. "CAN YOU ACCEPT 370 AT 2200. CAN YOU ACCEPT 380 AT 2230")

Re: "3 Aircraft limitations"
This type of information is needed for ATSUs (in their data adaptation). You can't (for example) uplink "CONTACT [SAN FRANCISCO CENTRE]" to an Airbus - it needs to be sent without any spaces ("CONTACT [SANFRANCISCO CENTRE]" (TK - Appendix F, maybe?)

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FOREWORD (Chris)

1. Historical background

1.1 The Global Operational Data Link Document (GOLD) is the result of the progressive evolution of 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).

1.2 Each of the two founding documents provided guidance on a regional basis. However, in recognition of the need to provide globally harmonized guidance on data link operations, the GOLD became effective on [date].

1.3 This edition, re-titled Global Operational Data Link Document (GOLD), provides for a comprehensive update of the guidance as well as a major reorganization of the contents of the founding documents. This includes the incorporation of performance-based specifications and associated guidance on data collection, monitoring, and analysis.

2. Scope and Purpose

2.1 The GOLD provides guidance and information concerning data link aspects of aeronautical activity and is intended to facilitate the uniform application of Standards and Recommended Practices contained in Annex 2 — Rules of the Air and in Annex 11 — Air Traffic Services, the provisions in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444) and, when necessary, the Regional Supplementary Procedures (Doc 7030).

2.2 This guidance material is intended to maximize operational benefits in data link operations by promoting seamless and interoperable data link operations throughout the world. This edition limits itself to those data link operations that apply to the use of FANS 1/A and its applications: automatic dependent surveillance — contract (ADS-C), controller-pilot data link communications (CPDLC) and the flight management computer waypoint position reporting (FMC WPR). It also addresses the performance of the data link applications taking into consideration the transmission media used by those applications. Future editions are expected to incorporate guidance that applies to the planned expansion of ATN CPDLC in core Europe as well as the use of FANS-1/A in continental Europe.

2.3 While directed primarily at air traffic services personnel and flight crews, the following personnel should be familiar with various aspects of its contents: regulators, airspace planners, aircraft operators, dispatchers, communication service providers and radio operators, training organizations, central monitoring and reporting agencies, automation specialists at centers and radio facilities, and aircraft manufacturers and equipment suppliers.

2.4 The guidance will support the following activities:

a) the States' roles and responsibilities in relation to the following:

   1) safety regulatory oversight of air navigation services;

   2) operational authorizations, flight crew training and qualification;

   3) design approval of aircraft data link systems

b) the development of agreements and/or contractual arrangements between air navigation service providers and aircraft operators and their respective communication service providers;

c) development of operational procedures; and

d) operational monitoring, analysis, and exchange of operational data among regions, States, and communication service providers.

3. Status

While this guidance may contain material which may eventually become Standards and Recommended Practices (SARPs), or PANS provisions when it has reached the maturity and stability necessary for adoption or approval as such, it may also comprise material prepared as an amplification of the basic principles in the corresponding SARPs, and designed particularly to assist the user in the application of the SARPs and PANS.

4. Implementation

The implementation of procedures is the responsibility of Contracting States; they are applied in actual operations only after, and in so far as, States have enforced them. However, with a view to facilitating their processing towards implementation by States, this complementary guidance material has been prepared in language which will permit direct use by air traffic services personnel and others associated with the provision of air traffic services to international air navigation.

5. Promulgation of information

Information relating to the establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations should be notified and take effect in accordance with Annex 15 — Aeronautical Information Services .

6. References

6.1 The following references are cited in this document:

a) Annex 2 — Rules of the Air

b) Annex 6 — Operation of Aircraft and Part I — International Commercial Air Transport — Aeroplanes

c) Annex 10 — Aeronautical Telecommunications and Volume II — Communication Procedures including those with PANS status

d) Annex 10 — Aeronautical Telecommunications and Volume III — Communication Systems

e) Annex 11 — Air Traffic Services

f) Annex 15 — Aeronautical Information Services

g) Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444)

h) Regional Supplementary Procedures (Doc 7030)

i) Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400)

j) Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689)

k) Manual on Required Communication Performance (RCP) (Doc 9869)

l) Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard, RTCA DO-306/EUROCAE ED-122).

m) Safety and Performance Standard for Air Traffic Data Link Services in Continental Airspace (Continental SPR Standard, RTCA DO-290/EUROCAE ED-120, Change 1 and Change 2).

n) Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications (FANS 1/A INTEROP Standard, RTCA DO-258A/EUROCAE ED-100A).

o) Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1 (ATN B1 INTEROP Standard, RTCA DO-280B/EUROCAE ED-110B).

p) Future Air Navigation System 1/A — Aeronautical Telecommunication Network Interoperability Standard (FANS 1/A — ATN B1 INTEROP Standard, RTCA DO-305/EUROCAE ED-154).

8. Changes to the document

Editor's note 4. — TK - This section will provide a statement on the procedures for changing the document. It is envisaged that this document will be changed via formal change procedures under the auspices of ICAO in some form to be determined. GOLD AD Hoc Working Group needs to provide text.

Chapter 1. Definitions (Tom)

When the following terms are used in the present document they have the following meanings. Where the term has "(ICAO)" annotated, the term has already been defined as such in SARPs and/or PANS.

Editor's note 5. — TK - This section will ultimately include terms and acronyms used in the document and will be completed on finalization of first edition. During the development of the GOLD, it will include terms collected from the NAT GM and FOM, and added from new text. The Used in column indicates where the term is used and indicates if a correction was made to the definition. When the NAT GM or FOM use terms that are defined by ICAO, the ICAO definitions (or derivatives of the term) were included. GOLD Ad Hoc Working Group needs to review for consistency with GOLD prior to completion and remove the Used in column.

NAT-1.— TK – This chapter provides definitions from NAT title pages, Acronyms, and NAT para 5.1.

FOM 1.— TK – This chapter provides the definitions from FOM, chapter 2.

Term	Used in
AAR. The symbol used to designate air-to-air refueling.	FOM
ACAC. The symbol used to designate Arab Civil Aviation Commission.	FOM
ACARS. The symbol used to designate the aircraft communications addressing and reporting system.	NAT FOM
ACAS. The symbol used to designate aircraft collision avoidance system. (ICAO)	FOM
ACC. The symbol used to designate area control centre. (ICAO)	NAT
ADS. The symbol used to designate automatic dependent surveillance (retained for reference with non-updated documents. This term would normally be used to refer to ADS-C).	NAT FOM
ADS-B. The symbol used to designate automatic dependent surveillance – broadcast. (ICAO)	FOM

Term	Used in
ADS-C service. A term used to indicate an ATS service that provides surveillance information by means of the ADS-C application. *Note.— ICAO Doc 4444 does not include ADS-C in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the ADS-C application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.*	GOLD, Apx C
ADS-C. The symbol used to designate automatic dependent surveillance – contract. (ICAO)	FOM (Removed e.g.)
AEEC. The symbol used to designate Airline Electronic Engineering Committee.	FOM
Aeronautical fixed telecommunication network (AFTN). A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics. (ICAO)	ICAO
Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation. (ICAO)	ICAO
Aeronautical operational control (AOC). Communication required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons. (ICAO)	ICAO
Aeronautical telecommunication network (ATN). Application entities and communication services which allow ground, air-to-ground and avionics data sub-networks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) open systems interconnection (OSI) reference model. (ICAO Doc 9705, sub-volume 1 note)	ICAO
AFN. The symbol used to designate ATS facilities notification.	NAT FOM
AFTN. The symbol used to designate aeronautical fixed telecommunication network. (ICAO)	NAT
AIDC. The symbol used to designate ATC interfacility data communication. (ICAO)	FOM (Corrected per ICAO)
AIP. The symbol used to designate Aeronautical Information Publication. (ICAO)	NAT FOM

Term	Used in
Air traffic control (ATC) service. A service provided for the purpose of: a) preventing collisions: 1) between aircraft, and 2) on the manoeuvring area between aircraft and obstructions; and b) expediting and maintaining an orderly flow of air traffic. (ICAO)	ICAO
Air traffic management (ATM). The dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions. (ICAO)	ICAO
Air traffic service (ATS). A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service). (ICAO)	ICAO
Air traffic services unit (ATSU). A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office. (ICAO)	ICAO
Airborne collision avoidance system (ACAS). An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders. (ICAO)	ICAO
Aircraft system availability ($A_{AIRCRAFT}$). Aircraft equipage availability is the probability of available capability on an aircraft with an average flight of 6 hours.	GOLD, Apx B, Apx C
AIREP. The symbol used to designate an air-report. (ICAO)	ICAO
Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting. (ICAO)	NAT
ALTRV. The symbol used to designate altitude reservation. (ICAO abbreviation?)	FOM
AOC. The symbol used to designate aeronautical operational control. (ICAO)	NAT FOM (Corrected per ICAO)
APANPIRG. The symbol used to designate Asia/Pacific Air Navigation Planning and Implementation Regional Group.	FOM
Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned. (ICAO)	ICAO

Term	Used in
Appropriate authority. a) Regarding flight over the high seas: The relevant authority of the State of Registry. b) Regarding flight other than over the high seas: The relevant authority of the State having sovereignty over the territory being overflown. (ICAO)	ICAO
AR. The symbol used to designate aerial refueling. (Not an ICAO abbreviation. See ICAO Doc 8400, WF)	FOM
ARCP. The symbol used to designate air refueling control point. (ICAO abbreviation?)	FOM
Area control centre (ACC). A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction. (ICAO)	NAT
AREX. The symbol used to designate air refueling exit point. (ICAO abbreviation?)	FOM
ARINC. The symbol used to designate Aeronautical Radio Incorporated.	FOM
ARIP. The symbol used to designate air refueling initial point. (ICAO abbreviation?)	FOM
ARP. The symbol used to designate an air-report message. (See AIREP)	NAT
ASECNA. The symbol used to designate Agence Pour la Securite de la Navigation Aerienne en Afrique et a Madagascar.	FOM
ATC. The symbol used to designate air traffic control. (ICAO)	NAT FOM
ATM. The symbol used to designate air traffic management. (ICAO)	FOM
ATN. The symbol used to designate aeronautical telecommunication network. (ICAO)	NAT (Corrected per ICAO)
ATNS. The symbol used to designate Air Traffic and Navigation Services (Africa).	FOM
ATS interfacility data communication (AIDC). Automated data exchange between air traffic services units, particularly in regard to co-ordination and transfer of flights. (ICAO)	ICAO
ATS surveillance service. A term used to indicate a service provided directly by means of an ATS surveillance system. (ICAO)	GOLD, Apx C

Term	Used in
ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft. *Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.* (ICAO)	GOLD, Apx C
ATS. The symbol used to designate air traffic service. (ICAO)	NAT FOM (Corrected per ICAO)
ATSU. The symbol used to designate ATS unit. (ICAO, sort of)	NAT FOM
Automatic dependent surveillance — broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link. (ICAO)	ICAO GOLD Apx C
Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports. (ICAO) *Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.*	ICAO GOLD, Apx C
AVICOM. The symbol used to designate AVICOM Japan Co. LTD.	FOM
C for RCTP. The proportion of intervention messages and responses that can be delivered within the specified RCTP for intervention.	GOLD, Apx B
C for $RCTP_{AIR}$. The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{AIR}$ for Intervention.	GOLD, Apx B
C for $RCTP_{ATSU}$. The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{ATSU}$ for Intervention.	GOLD, Apx B
C for $RCTP_{CSP}$. The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{CSP}$ for Intervention.	GOLD, Apx B
C for $RSTP_{AIR}$. The proportion of surveillance messages that can be delivered within the specified $RSTP_{AIR}$.	GOLD, Apx C

Term	Used in
C for RSTP$_{ATSU}$. The proportion of surveillance messages that can be delivered within the specified RSTP$_{ATSU}$.	GOLD, Apx C
C for RSTP$_{CSP}$. The proportion of surveillance messages that can be delivered within the specified RSTP$_{CSP}$.	GOLD, Apx C
C for TRN. The proportion of intervention messages and responses that can be delivered within the specified TRN for intervention.	GOLD, Apx B
CAA. The symbol used to designate civil aviation authority. (See ICAO, "Appropriate authority" and "Appropriate ATS authority."	FOM
CADS. The symbol used to designate centralized ADS system.	NAT (Corrected per CADS spec)
CDA. The symbol used to designate current data authority. (See ICAO definition for current data authority)	NAT
CFRS. The symbol used to designate centralized FMC waypoint reporting system.	NAT
Closed message. A message that: a) contains no message elements that require a response; or b) has received a closure response.	NAT
Closure response. A message containing a message element that has the ability to close another message.	NAT
CMU. The symbol used to designate communications management unit.	NAT
CNS. The symbol used to designate communications, navigation, surveillance. (ICAO)	FOM
CNS/ATM. The symbol used to designate communications, navigation and surveillance/air traffic management. (ICAO)	NAT
Control area (CTA). A controlled airspace extending upwards from a specified limit above the earth. (ICAO)	ICAO
Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications. (ICAO)	ICAO

Term	Used in
CPDLC dialogue. (See ICAO definition for "dialogue.") a) a single message that is a closed message; or b) a series of messages beginning with an open message, consisting of any messages related to the original open message and each other through the use of Message Reference Numbers (MRNs) and ending when all of these messages are closed.	NAT
CPDLC. The symbol used to designate controller pilot data link communications. (ICAO)	FOM
CRA. The symbol used to designate Central Reporting Agency.	FOM
CRASA. The symbol used to designate CRA Support Agency.	FOM
CRC. The symbol used to designate cyclic redundancy check.	FOM
CSP. The symbol used to designate communication service provider.	GOLD Apx B
CTA. The symbol used to designate control area. (ICAO)	NAT
Current data authority. The designated ground system through which a CPDLC dialogue between a pilot and a controller currently responsible for the flight is permitted to take place. (ICAO)	ICAO
DARP. The symbol used to designate planned airborne reroute procedure.	GOLD
Defined message element. A message element whose content and format are pre-determined. A defined message element may require specified information to be inserted, but the rest of the content is not variable. Because of this, defined message elements make automatic processing possible.	NAT
Dialogue. A co-operative relationship between elements which enables communication and joint operation. (ICAO)	ICAO
DM. The symbol used to designate downlink message.	NAT FOM
Downlink message (DM). A CPDLC message sent from an aircraft.	NAT
EMERG. The symbol used to designate emergency. (ICAO)	ICAO
EMG. The symbol used to designate emergency message.	NAT
EUROCAE. The symbol used to designate European Organisation for Civil Aviation Equipment.	FOM

Term	Used in
FAA. The symbol used to designate Federal Aviation Administration.	FOM
FANS 1/A. The symbol used to designate FANS 1/A, as defined by DO-258A/ED-100A.	NAT
FANS. The symbol used to designate future air navigation system.	NAT FOM
FCMA. The symbol used to designate FANS Central Monitoring Agency.	NAT
FDPS. The symbol used to designate flight data processing system. (ICAO)	NAT
FFE. The symbol used to designate FANS front end.	NAT
FIR. The symbol used to designate flight information region. (ICAO)	NAT FOM
FIT. The symbol used to designate FANS Interoperability Team.	FOM
FL. The symbol used to designate flight level.	NAT
Flight information region (FIR). An airspace of defined dimensions within which flight information service and alerting service are provided. (ICAO)	ICAO
Flight level (FL). A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals. (ICAO) *Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:* *a) when set to a QNH altimeter setting, will indicate altitude;* *b) when set to QFE altimeter setting, will indicate height above the QFE reference datum;* *c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.* *Note 2.— The terms "height" and "altitude", used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.*	ICAO
FMC WPR service. A term used to indicate an ATS service that provides surveillance information by means of the FMC WPR application. *Note.— ICAO Doc 4444 does not include FMC WPR in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the FMC WPR application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.*	GOLD, Apx C

Term	Used in
FMC WPR. The symbol used to designate flight management computer waypoint position reporting.	NAT
FMC. The symbol used to designate flight management computer.	NAT FOM
FMS. The symbol used to designate flight management system.	NAT FOM
Free text message element. (usually referred to as a free text message) A message element whose content is variable, i.e. composed by the sender. ATS providers may construct a set of preformatted free text messages to relieve controllers of the burden of repeatedly composing commonly used messages. Such a set should include an explanation as to the intended meaning of each message.	NAT
GES. The symbol used to designate ground earth station (satellite).	FOM
GPS. The symbol used to designate global positioning system (USA).	NAT FOM
HF. The symbol used to designate high frequency (3-30 Mhz). (ICAO)	NAT FOM
IATA. The symbol used to designate International Air Transport Association.	FOM
ICAO. The symbol used to designate International Civil Aviation Organization. (ICAO)	NAT FOM (Corrected per ICAO)
ICD. The symbol used to designate interface control document.	NAT
IFALPA. The symbol used to designate International Federation of Air Line Pilots' Associations.	FOM
IFATCA. The symbol used to designate International Federation of Air Traffic Controllers Associations.	FOM
IIOACG. The symbol used to designate Informal Indian Ocean ATS Coordination Group.	FOM
IOOM. The symbol used to designate Indian Ocean Operations Manual.	FOM
IPACG. The symbol used to designate Informal Pacific ATC Coordinating Group.	FOM
ISPACG. The symbol used to designate Informal South Pacific ATS Coordinating Group.	FOM
JCAB. The symbol used to designate Civil Aviation Bureau Japan.	FOM

Term	Used in
MAS. The symbol used to designate message assurance.	NAT
Maximum accumulated unplanned outage time (min/yr). Measured by accumulating ***only*** the duration times for unplanned outages greater than the unplanned outage duration limit during any 12-month period.	GOLD, Apx B, Apx C
Maximum number of unplanned outages. Measured for any 12-month period. Failures causing unplanned outages for multiple ATS units are only counted once.	GOLD, Apx B, Apx C
MCDU. The symbol used to designate multipurpose control display unit (ACARS & FMC).	FOM
MEL. The symbol used to designate minimum equipment list. (ICAO)	NAT
Message closure. Providing the closure response. Irrespective of the number of elements that require a response contained in an open message, each open message will be closed by a single message element, determined by the particular mix of attributes assigned to the elements contained in the open message.	NAT
Message element identifier. The ASN.1 tag of the ATCUplinkMsgElementId or the ATCDownlinkMsgElementId. (ICAO)	ICAO
Message element. A component of a message used to define the context of the information exchanged. (ICAO)	ICAO
Message element. A portion of a message. Each message element is assigned a particular set of attributes that determine: a) its priority; b) whether it will close other message elements; c) which other message elements are suitable responses; and d) whether it requires a closure response and, if so, which other message elements are able to close it.	NAT
Message. An individual uplink or downlink CPDLC communication, made up of one or more message elements (maximum of five).	NAT
Message. Basic unit of user information exchanged between an airborne application and its ground counterpart or between two ground applications. Messages are passed in one or more data blocks from one end user to another through different subnetworks. (ICAO)	ICAO
MET. The symbol used to designate meteorological or meteorology. (ICAO)	NAT (Corrected per ICAO)

Term	Used in
MIN. The symbol used to designate message identification number. (See ICAO definition for message element identifier.)	NAT
Minimum equipment list (MEL). A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type. (ICAO)	ICAO
MNPS. The symbol used to designate minimum navigation performance standards.	NAT
Monitored operational performance (TRN). The portion of the transaction time (used for intervention) that does not include the times for message composition or recognition of the operational response.	GOLD, Apx B
MRN. The symbol used to designate message reference number.	NAT
MTBF. The symbol used to designate mean time between failures.	FOM
MTTR. The symbol used to designate mean time to repair.	FOM
MU. The symbol used to designate management unit (ACARS).	NAT FOM
NAT FIG. The symbol used to designate North Atlantic Future Air Navigation Systems Implementation Group.	NAT
NAT IMG. The symbol used to designate North Atlantic Implementation Management Group.	NAT
NAT SPG. The symbol used to designate North Atlantic Systems Planning Group.	NAT
NAT. The symbol used to designate North Atlantic.	NAT
NDA. The symbol used to designate next data authority. (See ICAO definition for next data authority.)	NAT FOM
Next data authority. The ground system so designated by the current data authority through which an onward transfer of communications and control can take place. (ICAO)	ICAO
NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations. (ICAO)	FOM (Corrected per ICAO)
OCA. The symbol used to designate oceanic control area. (See ICAO definition for control area.)	NAT

Term	Used in
OCS. The symbol used to designate oceanic control system (data link system for the Auckland FIR).	FOM
ODP. The symbol used to designate oceanic air traffic control data processing system (Data link system for the Fukuoka FIR).	FOM
Open message. A message that contains at least one message element that requires a response. An open message remains open until the required response is received.	NAT
Operational communication transaction. The process a human uses to initiate the transmission of an instruction, clearance, flight information, and/or request, and is completed when that human is confident that the transaction is complete.	GOLD, Apx B
ORD. The symbol used to designate operational requirements document.	NAT
OTS. The symbol used to designate organized track system.	NAT
PANS-ATM. The symbol used to designate Procedures for Air Navigation Services — Air Traffic Management (ICAO Doc 4444). (ICAO)	NAT
POS. The term used to designate ICAO position report message.	NAT
Preformatted free text message. A free text message that is "pre-composed."	NAT
RCP availability (A). Probability that an operational communication transaction can be initiated when needed.	GOLD, Apx B
RCP continuity (C). Probability that an operational communication transaction can be completed within the communication transaction time, ET or TT 95%.	GOLD, Apx B
RCP expiration time (ET). The maximum time for the completion of the operational communication transaction after which the initiator should revert to an alternative procedure.	GOLD, Apx B
RCP integrity (I). Acceptable rate of one or more undetected errors in a completed communication transaction.	GOLD, Apx B
RCP nominal transaction time (TT 95%). The nominal time for the completion of the operational communication transaction at 95%.	GOLD, Apx B
$RCTP_{AIR}$. The summed critical transit times for an ATC intervention message and a response message, allocated to the aircraft system.	GOLD, Apx B
$RCTP_{ATSU}$. The summed critical transit times for an ATC intervention message and a response message, allocated to the ATS unit system.	GOLD, Apx B

Term	Used in
RCTP$_{CSP}$. The summed critical transit times for an ATC intervention message and a response message, allocated to the communication service provider system.	GOLD, Apx B
Required communication performance (RCP). A statement of the performance requirements for operational communication in support of specific ATM functions. (ICAO)	ICAO
Required Communication Technical Performance (RCTP). The technical portion of the transaction time (used for intervention) that does not include the times for message composition, operational response, and recognition of the operational response.	GOLD, Apx B
Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace. (ICAO) *Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.*	ICAO
Responder performance. The operational portion of the transaction time to prepare the operational response, and includes the recognition of the instruction, and message composition, e.g., flight crew/HMI for intervention transactions.	GOLD, Apx B
RNP. The symbol used to designate required navigation performance.	FOM
RSP availability (A). Probability that surveillance data can be provided when needed.	GOLD, Apx C
RSP continuity (C). Probability that surveillance data can be delivered within the position RSP time parameter, ET or TT 95%.	GOLD, Apx C
RSP data latency. The required time for surveillance data delivery.	GOLD, Apx C
RSP integrity (I). Acceptable level of confidence that the surveillance data is within specified tolerances. RSP integrity includes such factors as rate of one or more undetected errors in the transmission of the surveillance data, the accuracy of aircraft position and time data, data latency, update rate (i.e., reporting interval), extrapolation and/or estimation of the data.	GOLD, Apx C
RSP nominal delivery time (DT 95%). The nominal time for the successful delivery of surveillance data at 95%.	GOLD, Apx C
RSP overdue delivery time (OT). The maximum time for the successful delivery of surveillance data after which the initiator should revert to an alternative procedure.	GOLD, Apx C
RSTP$_{AIR}$. The overdue (OD) or nominal (DT) transit time for surveillance data from the aircraft's avionics to the antenna.	GOLD, Apx C

Term	Used in
RSTP$_{ATSU}$. The overdue (OD) or nominal (DT) transit time for surveillance data from the CSP interface to the ATS unit's flight data processing system.	GOLD, Apx C
RSTP$_{CSP}$. The overdue (OD) or nominal (DT) transit time for surveillance data allocated to the CSP.	GOLD, Apx C
RVSM. The symbol used to designate reduced vertical separation minima (300 m (1000 ft)) between FL 290 and FL 410. (ICAO)	FOM (Corrected per ICAO)
SARPs. The symbol used to designate Standards and Recommended Practices. (ICAO)	NAT (Corrected per ICAO)
SATCOM. The symbol used to designate satellite communication. (ICAO)	FOM
SATVOICE. The symbol used to designate satellite voice communication.	FOM
SEAC. The symbol used to designate Service d'Etat de l'Aviation Civile (French Polynésie).	FOM
SELCAL. The symbol used to designate selective calling system. (ICAO)	NAT
Service availability (A_{CSP}). Probability of available service on 24/7 operation.	GOLD, Apx B, Apx C
SITA. The symbol used to designate Société Internationale de Télécommunications Aéronautiques.	NAT FOM
SR&O. The symbol used to designate System Requirements and Objectives (FANS-1 document).	FOM
Surveillance data delivery. The process for obtaining surveillance data. *Note.— For ADS-C, the delivery is defined for the following surveillance data:* *a) Periodic report, from the start of the periodic interval. The start of the periodic interval occurs when the periodic report is sent by the aircraft/flight crew;* *b) Waypoint change event report, from the actual time the aircraft crosses the waypoint or is abeam the waypoint;* *c) Lateral deviation event report, from the time the aircraft system detects that the event has occurred; and* *d) Vertical deviation event report, from the time the aircraft system detects that the event has occurred.*	GOLD, Apx C

Term	Used in
Surveillance data. Data pertaining to the identification of aircraft and/or obstructions for route conformance monitoring and safe and efficient conduct of flight. *Note.— For ADS-C, surveillance data applies to periodic, waypoint change event, lateral deviation event, vertical deviation event reports, and CPDLC position reports. For FMC WPR, surveillance data applies to waypoint position report.*	GOLD, Apx C
TCAS. The symbol used to designate traffic alert and collision avoidance system (USA)	FOM
TMU. The symbol used to designate traffic management unit.	FOM
UM. The symbol used to designate uplink message.	NAT FOM
Unplanned outage duration limit (minutes). Time after the unplanned outage begins at which there is an operational impact. Measured from when an unplanned outage begins to when the ATS unit receives notification that the service has been restored.	GOLD, Apx B, Apx C
Unplanned outage notification delay (min). Notification to the ATS unit of an unplanned outage. Measured from when the unplanned outage begins to when the ATS unit receives notification.	GOLD, Apx B, Apx C
Uplink message (UM). A CPDLC message sent from a ground system.	NAT
UPR. The symbol used to designate user preferred route.	GOLD
VHF. The symbol used to designate very high frequency (30-300 Mhz). (ICAO)	NAT FOM
VIVO. The symbol used to designate Visualisation des Vols Océaniques (Situation display & data link system for the Tahiti FIR).	FOM
WPR. The symbol used to designate waypoint position reporting.	NAT

Chapter 2. Overview of data link operations (Adam)

Editor's note 6. — TK - This section will include a general system overview including a description of the data link applications to operational capabilities, e.g., reduced separations, reroute, weather deviations, position reporting, etc. to provide general familiarization to users of the document of data link operations.

Some of the material currently in Chapter 4 may be considered to be moved to this Chapter.

2.1 Data link connection management

2.2 Controller-pilot data link communications (CPDLC)

2.3 Automatic dependent surveillance – contract (ADS-C)

2.4 Flight management computer waypoint position reporting (FMC WPR)

Chapter 3. Administrative provisions related to data link operations (Tom)

This chapter includes the prerequisites for data link operations, including service provision, operator eligibility, and flight planning.

3.1 Service provision

FOM 2.— TK – Next paragraph, FOM para 3.5.

3.1.1 ATC system validation

3.1.1.1 To meet system integrity requirements, States shall consider a validation process that confirms the integrity of their equipment and procedures. The processes shall include:

a) A system safety assessment which demonstrates that the ATS provider's system will meet the safety objectives;

b) Integration test results confirming interoperability for operational use of airborne and ground systems; and

c) Confirmation that the ATS operation manuals are compatible with those of adjacent providers.

3.1.1.2 The system safety assessment can be achieved through a functional hazard analysis or a documented system safety case. This should be conducted for initial implementation as well as for future enhancements and should include:

a) Identifying failure conditions;

b) Assigning levels of criticality;

c) Determining probabilities for occurrence; and

d) Identifying mitigating measures.

3.1.1.3 Following on from the safety assessment, States should institute measures to offset the identified failure conditions, or reduce the probability of their occurrence to an acceptable level. This could be accomplished through automation or procedures.

3.1.1.4 Each State should ensure that the ANSPs provide communication services that meet the performance specifications provided at Appendix B and Appendix C, and that contracted CSPs meet their performance allocations for each oceanic area control centre (OACC) and the flights it serves. The risks represented by the requirements are regarded as being minimum for the specified ATS function to maintain operational efficiency and meets the safety needs.

3.1.1.5 States should conduct trials with aircraft to ensure that they meet the technical requirements for interoperability such as is defined for FANS 1/A in RTCA DO-258A/EUROCAE ED-100A.

3.1.1.6 States should coordinate with adjacent States to confirm that their ATS operation manuals contain standard operating procedures.

NAT-2.— TK – Next paragraph, NAT 2.5.2.1, (second sentence only)

3.1.1.7 ANSPs shall develop appropriate procedures to respond to CPDLC downlink message elements defined in Appendix A. (See paragraph 3.1.6.1 for publication of unsupported downlink messages.)

FOM 3.— TK – Next paragraph, FOM 3.5.4.

3.1.1.8 With the implementation of automated ATS control systems, data changes, software upgrades, and system failures can impact on adjacent units.

a) ATSUs shall ensure that suitable procedures are in place to ensure that data is correct and accurate, including any changes thereto, and that security of such data is not compromised.

b) ATSUs shall also formalize procedures for timely notification to adjacent units of system failures, software upgrades (or downgrades) or other changes, which may impact on surrounding ATS units. Such notification procedures will normally be detailed in letters of agreement between adjacent units.

NAT-3.— TK – Next paragraph, NAT 2.8.2.

3.1.1.9 ANSPs shall establish means to ensure an ATSU will only establish an ADS contract with aircraft for which that ATSU has direct control or monitoring responsibility. An ATSU that establishes an ADS contract for any other purpose (e.g. a ground facility requesting an ADS connection for test purposes) must obtain approval from both the appropriate controlling authority and the operator, prior to the departure of the flight.

NAT-4.— TK – Next paragraph, NAT para 6, 6.1 through 6.6.

Editor's note 7. — TK - Not included, NAT 6.1.3, 6.1.4 are Region/State Specific (candidate for Apx E), 6.3.2 is Aircraft-specific (candidate for Apx F).

3.1.2 ATC automation

3.1.2.1 AFN logon

3.1.2.1.1 To ensure that CPDLC messages are sent only to aircraft for which the ATSU has a complete flight plan, an AFN logon should be rejected if:

a) the aircraft registration in the AFN CONTACT message does not match the aircraft registration in the flight plan;

b) the flight plan does not contain the aircraft registration; or

c) there is no flight plan in the FDPS for the flight.

3.1.2.1.2 Hyphens contained in an aircraft registration should not be entered into the ICAO flight plan form. Ground systems should be configured so as to prevent the AFN Logon being rejected due to hyphens being included in the aircraft registration sent in the AFN CONTACT message, but not in the flight plan.

3.1.2.2 AFN COMPLETE

3.1.2.2.1 It is recommended that ATSUs implement a time parameter of 20 minutes maximum between the sending of the AFN CONTACT ADVISORY message and the receipt of the AFN COMPLETE message.

3.1.2.2.2 If the AFN COMPLETE message is not received within the time parameter, the controller should be alerted (see paragraph 4.2.2.3.4 for information regarding related ATS requirements).

3.1.2.3 Emergency message element handling

3.1.2.3.1 Ground systems should be configured so as to provide a clear indication to controllers of downlinked messages that contain any of the message elements from the emergency message elements (see Appendix A, paragraph A.3, for the list of emergency message elements.)

NAT-5.— TK – Next paragraph, NAT 2.3.3.

3.1.2.3.2 When the front-end processor receives an emergency-mode ADS report, it will convert the report to an EMG message and transmit it immediately to the ACC for presentation to a controller. If a periodic contract is active, the emergency reports will be transmitted at the existing periodic rate. Otherwise, the rate will default to 304 seconds for Boeing aircraft or 64 seconds for Airbus aircraft. Only the pilot can cancel the emergency mode (see paragraph 4.4.1.2 for associated ATC procedures).

NAT-6.— TK – Next paragraph, 6.4, 6.5, 6.6.

3.1.2.4 Automated responses

Editor's note 8. — TK – Next paragraph includes NAT specific free text that requires resolution.

3.1.2.4.1 Ground systems should be configured so as to automatically respond to requests for re-clearance with preformatted free text message REQUEST RECEIVED RESPONSE WILL BE VIA GANDER RADIO or REQUEST RECEIVED RESPONSE WILL BE VIA VOICE COMMUNICATION, as appropriate.

3.1.2.4.2 Any downlink message that contains at least one message element that technically requires a response is a message that technically requires a response.

3.1.2.4.3 With the exception of UM 1 STANDBY, only one uplink message in response to a particular downlink message should have a MRN. If two uplink messages are sent with the same MRN, and neither of those messages is UM 1 STANDBY, the second message will be discarded by the avionics and not displayed to the flight crew.

3.1.2.4.4 If an uplink message is sent with a MRN and the downlink message with the associated MIN did not technically require a response, the uplink message will be discarded by the avionics and not displayed to the flight crew.

3.1.2.4.5 If an uplink message is discarded for the reasons described in paragraph 3.1.2.4.3 or paragraph 3.1.2.4.4, an error message will be sent to the ground system advising that the MRN was not recognised.

3.1.2.4.6 Ground systems should be configured such that uplink messages will have MRNs only if the uplink message is responding to a downlink message that technically requires a response.

3.1.2.4.7 Ground systems should be configured such that only one uplink message, other than UM 1 STANDBY, will have the MRN that associates it with a particular downlink message.

3.1.2.5 Sending the END SERVICE message

3.1.2.5.1 ATSUs may automate the sending of the END SERVICE message, based upon the estimated time aircraft are expected to cross OCA/FIR boundaries.

3.1.2.5.2 The parameters for this operation should be detailed in interfacility agreements (see paragraph 3.1.6.7 for related ATS provider responsibilities).

3.1.2.6 Message variables

3.1.2.6.1 Different standards have been applied to the encoding and display of satellite telephone numbers, which could result in the incorrect number being displayed in the cockpit. For this reason, ground systems should not allow the [Frequencysatchannel] data element to be used for uplinking satellite telephone numbers in MONITOR and CONTACT messages (UM 117 to UM 122).

NAT-7.— TK – Next paragraph, 2.3.2.

3.1.2.7 Abnormal cases with ADS-C

3.1.2.7.1 Non-ATC waypoints. Aircraft will occasionally send reports with non-ATC waypoints as reporting points, NEXT waypoint, and NEXT+1 waypoint. The front-end processor could convert these to POS messages and forward them to the ACC. If necessary, ATC will verify a position report through voice communication (see paragraph 4.5.3.3 for related flight crew procedures).

3.1.2.7.2 Receipt of multiple copies of an ADS report. When multiple copies of an ADS report are received, the front-end processor will log all copies but will process only the one received first, discarding all others.

3.1.2.7.3 Discarding old ADS reports. When the front-end processor receives an ADS report that is more than N (a local system parameter) minutes old, according to its position time stamp, it will log the message and discard it without providing any data to other systems and without further processing.

Editor's note 9. — TK – Next paragraph, do we need to identify these aircraft in Appendix F?

3.1.2.7.4 Discarding erroneous met reports Met reports from aircraft that are known to generate erroneous met data will be discarded.

3.1.2.8 Satcom channel numbers in CPDLC contact messages

3.1.2.8.1 Airbus and Boeing aircraft use different encoding for the [Frequencysatchannel] variable in CPDLC monitor and contact messages e.g. UM 117, UM 118 and UM 119. air traffic controllers are reminded not to use these messages until their systems have been modified to encode the messages in the format appropriate to the type of aircraft to which the message is being sent.

3.1.2.8.2 Air traffic service providers are recommended to consider modifying their systems in this respect. It is recommended that, where practicable, messages with this parameter are disabled to prevent their inadvertent use until such modifications are complete.

NAT-8.— TK – Next paragraph, NAT para 3.2, 3.2.1 through 3.2.3.

3.1.3 Contractual considerations for CSP

3.1.3.1 For those situations where service providers cannot continue to provide data link communications, they will inform ATSPs and operators in accordance with established coordination procedures.

3.1.3.2 In the event of a centralized ADS (CADS) failure, the CADS provider should inform ATS.

3.1.3.3 In the event of a CFRS failure, the CFRS service provider should inform ATS.

3.1.3.4 See Appendix B and Appendix C for performance criteria for communication services.

3.1.4 Ground-ground coordination

FOM 4.— TK – Next paragraph, FOM para 3.2 (for controller only).

3.1.5 Personnel licensing and training

Prior to operating ATC data link communications equipment, controllers shall receive appropriate training in accordance with Annex 1 to the Convention on International Civil Aviation.

3.1.6 Aeronautical information, notifications, and interfacility agreements

NAT-9.— TK – Next paragraph, NAT 2.5.2.1 (first sentence only)

3.1.6.1 All downlink message elements as defined in Appendix A will be supported, unless otherwise published in appropriate regional/State documentation together with procedures for the handling unsupported message elements.

Note.— Emergency messages shall, as a minimum, be displayed to the controller per paragraph 3.1.2.3.

NAT-10.— TK – Next paragraph, NAT para 3.3, 3.3.1 through 3.3.6.

3.1.6.2 An ATS provider may suspend ADS-C, FMC WPR and/or CPDLC (including trials) for the control area under its jurisdiction. Notification to affected ATSUs should be carried out in accordance with coordination requirements specified in applicable interfacility agreements.

3.1.6.3 For scheduled and/or extended outages of the ground component of the ADS or FMC WPR system, a NOTAM shall be issued. During such outages, position reports will be required via voice communications.

3.1.6.4 When an ATS provider suspends CPDLC operations or when a planned system shutdown of the communications network or the ATS system occurs, the ATS provider should publish a NOTAM to inform all affected parties of the shutdown period. During this time period, voice communications will be used. Aircraft currently in communication with the ATC unit should be informed by voice of any imminent loss of CPDLC service.

3.1.6.5 In the event of an unexpected ground system ADS outage, ATS should:

a) inform other ATS units concerned; and

b) issue a NOTAM, if required.

3.1.6.6 In the event of an unexpected ground system CPDLC outage, or in the event that an ATSU suspends CPDLC operations without prior notice, the ATSU should:

a) inform aircraft currently in communication with the ATC unit of the loss of CPDLC service;

b) inform other ATS units concerned;

c) specifically advise whether the outage also affects ADS service; and

d) issue a NOTAM, if required.

Editor's note 10. — TK – Next paragraph, unknown cross-reference (see NAT 3.3.6).

3.1.6.7 ATS providers who offer CPDLC services should develop procedures to ensure the END SERVICE message is sent (see paragraph 3.1.2.5 regarding related ATS automation and ??? (See NAT 3.3.6) for related information):

a) in sufficient time to allow the NDA (if established) to establish an active CPDLC connection prior to the aircraft crossing the common boundary;

b) in sufficient time to prevent an inappropriate active CPDLC connection from continuing with an aircraft while it is transiting non-CPDLC airspace; and

c) in accordance with interfacility coordination requirements contained in applicable agreements.

FOM 5.— TK – Next paragraph, FOM para 3.1, 3.6 and 3.9.1.

3.1.7 Monitoring and data recording

3.1.7.1 The FANS-1/A CNS/ATM environment is an integrated system including physical systems (hardware, software, and communication networks), human elements (pilots and controllers), and the procedures for use by pilots and controllers.

3.1.7.2 Because of the integrated nature of the system and the degree of interaction among its components, end-to-end system monitoring is required. The procedures described in Appendix D aim to ensure end-to-end system integrity by validation and the identification, reporting and tracking of problems revealed by monitoring.

3.1.7.3 These procedures do not replace the ATS incident reporting procedures and requirements, as specified in ICAO PANS/ATM, Appendix 4; ICAO Air Traffic Services Planning Manual (Doc 9426), Chapter 3; or applicable State regulations, affecting the parties directly involved in a potential ATS incident.

3.1.7.4 Routine collection of data is necessary in order to ensure that the system continues to meet its performance, safety and interoperability requirements, and that operations and procedures are working as planned. Guidelines for data collection, monitoring, analysis, and results can be found in Appendix D.

3.1.7.5 ATS providers and communication service providers shall retain the records defined in Appendix D for at least 15 days to allow for accident/incident investigation purposes. (The providers are strongly encouraged to retain the records for at least 30 days.) These records shall be made available for air safety investigative purposes on demand. These recordings shall allow replaying of the situation and identification of the messages that were sent or received by the ATS system.

3.2 Operator eligibility

Editor's note 11. — TK – This section should include any aircraft equipage requirements, training, crew qualification, operational authorizations, etc.

FOM 6.— TK – Next paragraph, FOM para 3.2.

3.2.1 Personnel licensing and training

3.2.1.1 Prior to operating ATC data link communications equipment, pilots and dispatchers shall receive appropriate training in accordance with Annex 1 and Annex 6 to the Convention on International Civil Aviation.

3.2.1.2 Notwithstanding the above requirement, special arrangements may be made directly between an operator and an ATSU for the purposes of undertaking trials of ATC data link equipment.

3.2.2 FANS 1/A and FANS 1/A ADS-C data link operations

NAT-11.— TK -.TK – Next paragraph, NAT 3.1.14.

3.2.2.1 Operators are required to obtain a data link authorization with the State of registry in accordance with their rules and means of compliance (such as FAA AC 120-70a). This operational authorization should address flight crew training and qualification, maintenance, MEL, user modifiable software, service agreements with CSP, and procedures for submitting problem reports and data to the central reporting/monitoring agencies. It should also ensure that aircraft equipment has been approved for the intended use, e.g. RCP 240 or RCP 400 operations, in accordance with airworthiness requirements and related means of compliance (such as FAA AC 20-140).

NAT-12.— TK – Next paragraph, NAT 2.1.9.

3.2.2.2 To avoid logons being rejected and to ensure FANS 1/A ADS-C and CPDLC downlinks are properly routed, each participating operator must initially coordinate with its CSP or CSPs to initiate FANS 1/A ground system configuration for its aircraft.

3.2.3 FMC WPR

NAT-13.— TK – Next paragraph, NAT 2.1.4, 2.1.5.

3.2.3.1 Operators who intend to participate in FMC WPR trials or operations must:

a) advise whether the FMC WPRs will be manually triggered by the flight crew or be fully automated;

b) confirm that the necessary coordination has taken place with the CSP; and

c) ensure that the registrations of aircraft new to the trial are notified at least 30 days in advance, since reports can only be received from aircraft whose registrations are known to the system

3.2.3.2 Operators wishing to participate in FMC WPR must successfully complete a pre-operational test.

NAT-14.— TK – Next paragraph, NAT 2.4.2.

3.2.3.3 Each Operator must demonstrate that they meet the success criteria (see Appendix D) for the provision of FMC WPRs for ATS purposes. Once this has been demonstrated, the Operator will be able to participate in FMC WPR operations. Utilizing FMC WPR will be at the discretion of the operator.

NAT-15.— TK – Next paragraph, NAT 2.1.10.

3.2.3.4 To ensure FMC WPR downlinks are properly routed to the CFRS systems of both ARINC and SITA, participating Operators must coordinate with their CSPs to configure for routing their FMC WPRs to both CFRS systems.

NAT-16.— TK – Next paragraph, NAT 3.1.7, 3.1.9, 1.4.3, and 10.1.b)

3.2.3.5 Operators participating in FMC WPR should ensure that:

a) FMC WPRs are generated at each ATC waypoint of a cleared route in FMC WPR airspace;

b) any waypoints uplinked to the FMS for the purposes of generating automatically initiated FMC WPRs consist solely of ATC waypoints; and

c) FMC WPRs contain all data elements that are required for ATC, as per ICAO Doc 4444.

3.2.3.6 Whenever possible, operators should avoid the use of flight numbers that contain alphabetic characters by flights participating in FMC WPR. For example, avoid the use of flight numbers such as ABC124A or ABC324W. The use of such flight numbers results in the FMC WPR not being associated with the flight.

Note.— It is impossible for the ground system to properly associate FMC WPRs with the flight if the flight number contains an alphabetic character (for example ABC124A or ABC324W). Such flights cannot participate in FMC WPR.

NAT-17.— TK – Next paragraph, NAT 2.1.11.

3.2.3.7 Certain pre-FANS Airbus avionics configurations should not participate in FMC WPR because they are prone to large errors in position data. This can be rectified with a software upgrade. For further advice operators should contact Airbus.

3.2.4 Operator responsibilities with regional/state monitoring agencies

NAT-18.— TK – Next paragraph, NAT 2.1.2, 2.1.6, 2.1.7, 3.1.10, and 3.1.11.

3.2.4.1 Operators must indicate their intention to participate in trials by contacting the appropriate regional/State authority and providing the following information:

a) requested ATS data link services;

b) Operator name;

c) Operator contact person;

d) aircraft type(s) and associated registration(s);

e) whether the option of updating the FMC time using the GPS time has been installed for the particular aircraft involved; and

f) anticipated start date of participation.

3.2.4.2 Operators participating in FMC WPR should notify the appropriate regional/State monitoring agency thirty days in advance of the registrations of all aircraft that are intended to participate in FMC WPR, including any aircraft to be added to the operation subsequently.

Editor's note 12. — TK – Next paragraph, "must provide" to whom? FCMA?

3.2.4.3 Operators who require receipt of converted ADS or FMC reports must provide the appropriate 8-letter aeronautical fixed telecommunication network (AFTN) address(es).

3.2.4.4 Operators are requested to advise the appropriate regional/State monitoring agency of any changes to the information provided.

3.2.4.5 Operators should inform the appropriate regional/State monitoring agency of any pilot reported problems associated with FMC WPR, ADS-C or CPDLC (see Contacts, page 3).

3.2.4.6 Filing a report with regional/State monitoring agencies does not replace the ATS incident reporting procedures and requirements, as specified in ICAO Doc 4444, Appendix 1; ICAO Doc 9426, Chapter 3; or applicable State regulations affecting parties involved in a potential ATS incident.

3.2.5 Operations manuals, notifications and documentation for flight crews/dispatchers

NAT-19.— TK – Next paragraph, NAT 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, and 3.1.8.

3.2.5.1 Operators should assess operational requirements, establish policy and procedures, and incorporate them in appropriate company documents.

3.2.5.2 Advisory information should be distributed within the flight operations department to ensure that all personnel concerned are aware of:

a) FMC WPR concepts and any necessary programs for the introduction of FMC WPR for ATC purposes (this is especially important for those fleets that require manual initiation of FMC WPR downlinks);

b) FANS 1/A concepts and any necessary programs for the introduction of CPDLC; or

c) FANS 1/A concepts and any necessary programs for the introduction of ADS-C.

3.2.5.3 Company Operations Manuals and other documentation for ADS-C, FMC WPR or CPDLC should include:

a) crew procedures;

b) pilot responsibility for establishing and maintaining voice communications (including a SELCAL check) with every OCA along the route of flight; and

c) Minimum equipment lists (MEL) modifications (if required).

3.2.5.4 Operators participating in ADS-C should ensure that all personnel concerned are aware of ADS functionality, including normal and emergency operations.

3.2.5.5 Because there are differences in the avionics supporting CPDLC and ADS, Operators should advise flight crews of the flight deck indications resulting from logon for the purpose of ADS only.

3.2.5.6 When aware of any FMC WPR or ADS-C system failures, operators should advise concerned crews to revert to voice communications at the next scheduled reporting point.

3.3 Flight planning

NAT-20.— TK – Next paragraph, NAT para 3.1.12, 3.1.13, 4.1, and 4.1.1.

3.3.1 CPDLC and ADS-C

3.3.1.1 Operators participating in FANS 1/A operations should ensure that the proper information is included in the ATC Flight plan.

3.3.1.2 It is the responsibility of the Operator to ensure that only crews trained and qualified in CPDLC avail themselves of FANS services when filing to use these services.

3.3.1.3 ATS systems use Field 10 (Equipment) of the standard ICAO flight plan to identify an aircraft's data link capabilities. Operators should insert the following items into the ICAO flight plan form for FANS 1/A equipped aircraft:

a) Field 10a (Radio communication, navigation and approach equipment); insert the letter "J" to indicate data link equipment.

b) Field 10b (Surveillance equipment); insert the letter "D" to indicate ADS capability.

c) Field 18 (Other Information); insert the characters "DAT/" followed by one or more letters as appropriate to indicate the type of data link equipment carried, when the letter "J" is inserted in field 10. (see table below)

Table 3-1 Indicating data link equipment in Field 18

Letter following DAT/	Type of data link equipment
S	Satellite data link
H	HF data link
V	VHF data link
M	SSR Mode S data link

FOM 7.— TK – Next paragraph, FOM para 4.1.2.

3.3.1.4 ATS systems compare the registration number of the aircraft contained in Field 18 (Other Information) of the ICAO flight plan with the registration contained in the AFN logon. The operator is responsible for ensuring that the correct aircraft registration is filed in Field 18 of the ICAO flight plan.

NAT-21.— TK – Next paragraph, NAT para 4.1.2.

3.3.2 FMC WPR

3.3.2.1 There are no additional flight planning requirements specific to participation in FMC WPR.

Note.— The aircraft identification (ACID) provided in the FMC WPR is correlated with the ID provided in the filed flight plan and will be rejected if they do not match.

Chapter 4. Operating procedures (Norm/Gordon)

This section provides:

a) the procedures intended for pilots and controllers.

b) the procedures for pilots, controllers, and radio operators in abnormal situations. It includes voice phraseology related to data link operations and to support the abnormal procedures when things go awry with the data link capability.

This information is also intended for those involved in developing training programs.

4.1 General use of data link capability

Editor's note 13. — TK - Obviously, this section would be removed if nothing is placed here.

4.2 ATS facilities notification (AFN) - CPDLC and ADS-C connection management

FOM 8.— TK – Next paragraph, FOM para 4.3.

4.2.1 ATS facilities notification (AFN)

4.2.1.1 Prerequisite for CPDLC and / or ADS-C connection

The AFN logon is a prerequisite to any CPDLC or ADS-C connection.

4.2.1.2 Initiating an AFN logon

The AFN logon can be initiated:

- manually by the pilot during an "initial logon," or
- by an ATSU using the address forwarding process.

4.2.1.3 Purpose of an AFN logon

The AFN logon serves the following purposes:

a) To provide an ATSU with the data link application context of the aircraft, namely:

1) The ATS data link applications supported on board (CPDLC, ADS-C),

2) Their version numbers, and

3) The associated addresses (in the FANS-1/A context, these are the ACARS addresses unique to each aircraft).

b) To provide an ATSU with information such as the flight identification and the registration number. This information will allow the correlation of the flight attempting to logon with the corresponding flight data held by the ATS system. The aircraft logging on will then be positively identified by the ATS system.

c) To allow ATSUs to establish both ADS-C and CPDLC connections, where applicable.

4.2.1.4 The initial AFN logon

The initial AFN logon is performed by the pilot manually sending an AFN CONTACT message (FN_CON) containing the 4 character ICAO code of the ATSU. An initial AFN logon is required when the aircraft does not already have an ADS-C or CPDLC connection, such as:

- when the aircraft is preparing to depart from an airport and the first logon to a ground system is executed, or
- when the aircraft will enter a CPDLC or ADS-C area from an area where CPDLC or ADS-C services have not been provided.

NAT-22.— TK – Next paragraph, NAT para 4.2.5.

Note.— After completing the logon procedure, the aircraft system will send an AFN CONTACT message to the specified ground system. The ground system will automatically acknowledge this message, completing the transaction. Some ATSUs will not establish a CPDLC connection immediately after AFN Logon but will delay the connection until the flight is close to the OCA/FIR boundary.

NAT-23.— TK – Next paragraph, NAT para 4.6.2.

If an AFN logon is rejected, the flight crew should

a) check whether the aircraft identification/call-sign/flight ID in the FMC matches the aircraft identification/call-sign/flight ID provided in the flight plan and make corrections if necessary; and

b) check whether the aircraft registration matches the aircraft registration provided in the flight plan, and arrange for the flight plan to be modified, if necessary.

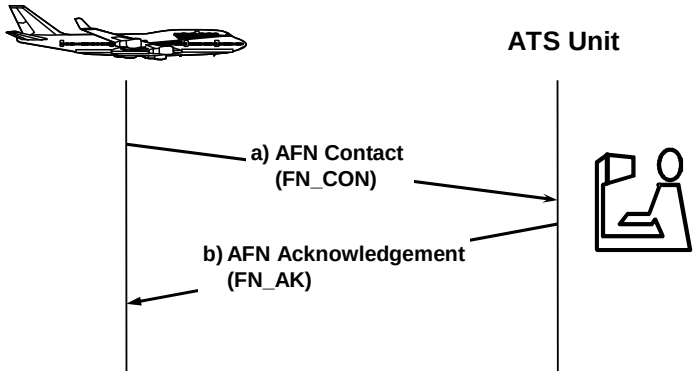


Figure 4-1. Initial AFN logon

FOM 9.— TK – Next paragraph, FOM para 4.3.4.1.

4.2.1.4.1 Timing of the initial AFN logon

The pilot should transmit an initial AFN logon:

- For aircraft departing from an airport located within an FIR that provides data link services:

– On the ground, no earlier that 45 minutes prior to ETD, using the logon address for the FIR that the departure airport is located within; or

Editor's note 14. — ND – The next paragraph (sub-bullet) is not supported in NAT material.

– Airborne at any time after passing 10 000ft, using the logon address for the FIR in which the aircraft is currently operating, with the exception that an aircraft approaching an FIR boundary should logon to the next unit, rather than the current unit.

- Between 15 and 45 minutes prior to the FIR boundary estimate for an FIR providing data link services. If the aircraft is departing from an airport in proximity to the FIR boundary, this logon should not be sent until the aircraft has passed 10 000ft.

- When instructed by ATC for situations such as an unsuccessful data link transfer.

NAT-24.— TK – Next paragraph, NAT para 4.2.4.

Flight crews should note that standard ATS procedures require that when an ATSU is in communication with a flight under the control of another ATSU, no clearances or instructions are given to that flight without the appropriate coordination between the ATSUs.

FOM 10.— TK – Next paragraph, FOM 4.3.4.2.

4.2.1.4.2 Notification of ATS variations

Editor's note 15. — ND – (Next paragraph) This would pertain for Reykjavik: (15 to 25 minutes in the case of Reykjavik)

Any ATSU where the ground system is unable to accept an FN_CON message sent between 15 and 45 minutes prior to the ETD or the estimate for entering the FIR shall publish instructions notifying the parameters during which a logon will be accepted.

4.2.1.4.3 Constructing the FN_CON message

NAT-25.— TK – Next paragraph includes text from NAT, para 4.2.2.

To avoid an automatic rejection of the logon, the pilot shall ensure that the flight identification and registration numbers contained in the FN_CON message are exactly the same as the flight identification and registration numbers filed in the flight plan. If a flight crew becomes aware that they have provided incorrect flight identification data for the AFN Logon, they shall immediately terminate FANS and re-logon with a correct identification.

FOM 11.— TK – Next paragraph, FOM 4.3.4.4.

4.2.1.4.4 FMS and ACARS flight identification

When comparing aircraft identifiers to enable flight plan coupling with the logon, the ATSU shall only use the flight identifier and aircraft registration as contained within the end system (CRC'd) portion of AFN logon message. The flight identifier in the ACARS message header has a different format to that required by the ground system (i.e. a two alpha character airline identifier followed by up to four numeric characters) and should not be used by the pilot to notify aircraft identification.

4.2.2 CPDLC and ADS-C connection management

FOM 12.— TK – Next paragraph, FOM, para 4.4.

4.2.2.1 CPDLC connection

4.2.2.1.1 Purpose CPDLC connection

The purpose of a CPDLC connection is to allow the exchange of CPDLC messages between an aircraft and an ATSU.

4.2.2.1.2 Management of CPDLC connections

ATSUs shall manage CPDLC connections to ensure that wherever possible the active CPDLC connection is held by the ATSU with responsibility for the flight. Connections should be maintained and terminated to support this requirement, however aircraft may be connected with another ATSU or sector on occasions such as:

a) When an aircraft is transiting a CPDLC serviceable FIR subject to coordination between ATSUs;

b) During the CPDLC connection transfer process;

c) Where the active connection is retained by the transferring ATSU subject to prior coordination;

d) When the aircraft is within a non-serviceable or non-CPDLC FIR and logs on to the ATSU responsible for the next FIR; or

e) In emergency circumstances.

Care must be taken not to issue clearances or instructions to a flight via CPDLC when it is under the control of another sector/ATSU.

NAT-26.— TK – Next paragraph, NAT para 4.2.6.

If, after initiating an AFN logon, the active centre does not match the AFN address specified during the logon, the flight crew should attempt another logon. If the active centre remains incorrect, CPDLC should be disconnected and the flight should continue with voice communications.

NAT-27.— TK – Next paragraph, NAT para 4.2.9.

In the event of an abnormal disconnect from the FANS 1/A network, another manually initiated AFN logon will be required in order to resume FANS 1/A data link operations.

FOM 13.— TK – Next paragraph, FOM para 4.4.3.

4.2.2.1.3 CPDLC connection sequence

A CPDLC connection attempt can only occur after the AFN logon has been completed. The CPDLC connection is initiated by sending the CONNECTION REQUEST message by the ATSU and is established when the CONNECTION CONFIRM message is received from the aircraft:

a) If there is no existing connection, the avionics will accept this connection as the active connection.

b) If there is an existing connection, the avionics will check that the initiating ATSU has been established as the next data authority. If so, the avionics will accept this connection as the non-active connection.

c) In all other situations, the avionics will reject the connection request.

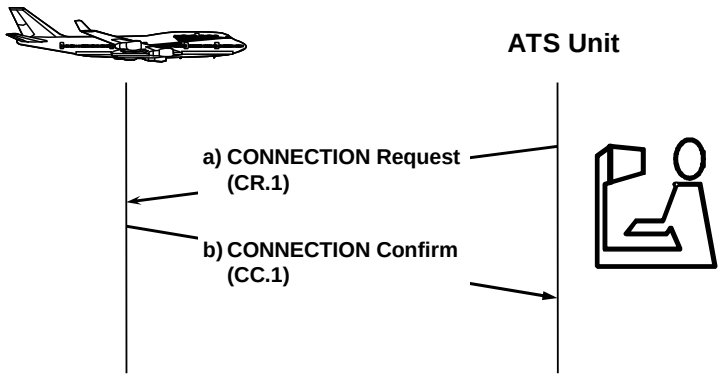


Figure 4-2. CPDLC connection sequence

4.2.2.1.4 Active and inactive CPDLC connections

A CPDLC connection established between an aircraft and an ATSU is either active or non-active.

a) A connection is active when CPDLC messages can be exchanged.

b) A connection is non-active when CPDLC messages cannot be exchanged.

FANS-1/A aircraft can have two CPDLC connections established, each with a different ATSU. Only one of these connections can be active at any given time. A non-active connection becomes active as soon as the active connection is terminated.

4.2.2.1.4.1 Determination of an active CPDLC connection

When the aircraft had a CPDLC connection with the previous ATSU, there are two ways for the controller to know if the CPDLC connection is active:

a) To send a message with the possibility of receiving a NOT CURRENT DATA AUTHORITY error message if the connection is not yet active; or

b) To wait until a CPDLC message is received from the pilot.

FOM 14.— TK – Next paragraph, FOM para 4.5.

4.2.2.2 Next data authority notification

4.2.2.2.1 Purpose of the NDA message

Definition: The ATSU holding the active connection with the aircraft is known as the 'Data Authority'.

The purpose of the NEXT DATA AUTHORITY (NDA) message is to advise the avionics of the next ATSU to become the data authority. The sending of the NDA message is the first step in the CPDLC transfer sequence between an aircraft and two ATSUs. The avionics will only accept a CPDLC connection request from the ATSU quoted in the NDA message.

4.2.2.2.2 Procedure for the NDA notification

The ATSU with the current active connection notifies the avionics of the next data authority by sending a NEXT DATA AUTHORITY [icaofacilitydesignation] message.

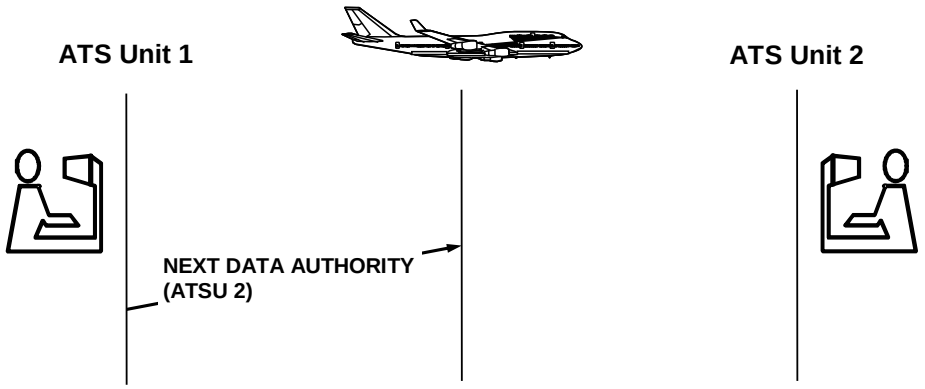


Figure 4-3. Next data authority notification

4.2.2.2.2.1 Sequence of the NDA and FN_CAD messages

The CPDLC connection sequence can be initiated by automated systems immediately following the AFN logon, the NDA message shall be sent prior to the AFN CONTACT ADVISORY (FN_CAD) to avoid a rejection of the connection. The avionics must receive the NDA prior to receiving a connection request message; otherwise the connection request will be rejected.

4.2.2.2.2.2 Change of the NDA

If the next data authority should change after the NDA message has been sent (e.g. an aircraft re-route due to weather), a new NDA message must be sent. This new NDA will supersede the original NDA message in the avionics and will disconnect any inactive connection already established by the unit that had been previously designated as the next data authority. In the following diagram, an inactive connection that is established with ATSU 2 would be dropped when a new NDA designating ATSU 3 is received.

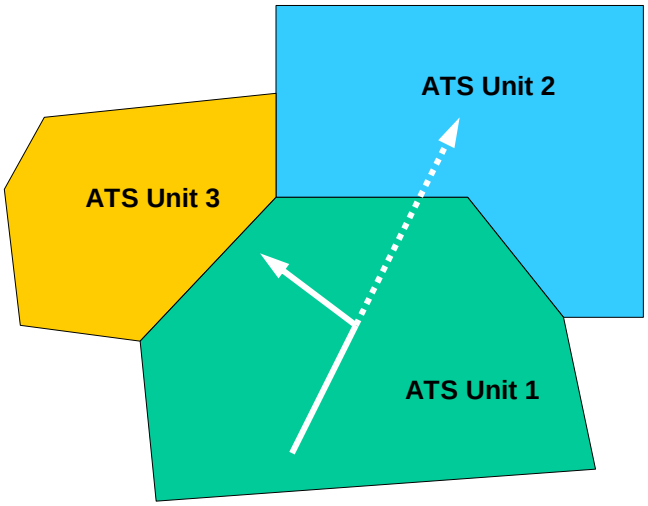


Figure 4-4. Subsequent next data authority notification

4.2.2.2.3 Abnormal cases relating to the NDA notification

If the NDA message (containing the correct next data authority designation) is not received by the avionics before receiving the CONNECTION REQUEST message sent by the subsequent ATSU, the CONNECTION REQUEST message will be rejected. The pilot has no indication that the CONNECTION REQUEST has been rejected.

4.2.2.2.3.1 Unsuccessful NDA delivery

When the NDA delivery has not been successful, the controller's initial action should be to send another NDA message. If this is also unsuccessful, the controller shall instruct the pilot to manually initiate an AFN logon with the subsequent ATSU after termination of the CPDLC connection. An END SERVICE message is not required in this case.

The phraseology to be used via CPDLC or voice will be:

Controller	CONTACT [icaounitname] [frequency] Select ATC com off then logon to [ATSU name] *Note.— When via CPDLC, this last element will be free text)*
Pilot	WILCO

The [ATSU name] is the relevant four character ICAO code.

Note.— Instructing the pilot to select ATC com off will result in loss of CPDLC connectivity. This procedure should only be applied approaching the FIR boundary with the next ATSU.

4.2.2.2.3.2 Duplication of the NDA message

Receipt by the aircraft of a second NDA message may (depending on the aircraft equipment) disconnect the non-active CPDLC connection, even if the NDA message specifies the same (non-active) ATSU that is already connected. Therefore, under normal circumstances, duplicate NDA messages shall not be uplinked.

FOM 15.— TK - Next paragraph, FOM para 4.6

4.2.2.3 AFN logon triggered by address forwarding

4.2.2.3.1 Purpose and procedure

The address forwarding process is initiated by the ground system and consists of an ATSU sending an AFN CONTACT ADVISORY message (FN_CAD) to the avionics. The FN_CAD instructs the avionics to automatically perform an AFN logon to the ATSU address included in the message. Address Forwarding is used to allow a subsequent ATSU to establish an inactive CPDLC connection and ADS contracts, and to allow adjacent ATSUs to establish ADS contracts for monitoring purposes.

Note.— The FN_CAD message should be sent at least 15 minutes prior to the estimated time of arrival at the FIR boundary.

4.2.2.3.2 An aircraft transferring from one data link area to another

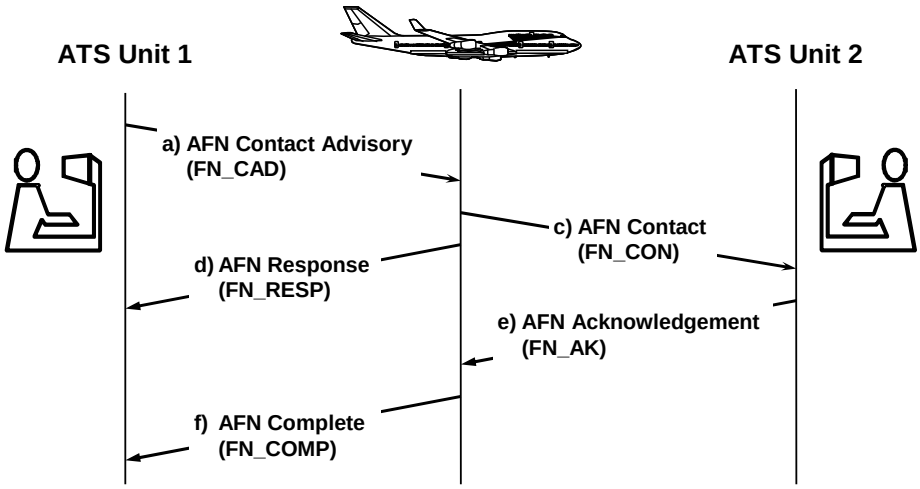


Figure 4-5. Transfer between areas where data link is provided

The address forwarding process is invisible to the flight crew. As a result, the flight crew does not receive an indication as to whether or not the FN_CON or FN_AK messages have been delivered correctly. However, the crew does receive an indication of a change to the active ATSU following a successful CPDLC connection transfer.

4.2.2.3.3 Aircraft transiting data link areas

Multiple examples have been found of connection transfer failures attributed to controllers or systems not completing all of the messaging requirements for the connection transfer during a short transit time across a portion of the FIR.

When an ATSU will only have jurisdiction over a data link connected aircraft for a relatively short duration (e.g. less than 30 minutes flying time), the requirements for the transfer of communications for the aircraft should be coordinated between the controlling and affected units, or covered in appropriate letters of agreement between all affected ATSUs. If the ATSU concerned requires ADS contracts to monitor the transit of the aircraft across a portion of the FIR, but the transfer of CPDLC is not required, the controlling unit should perform address forwarding in the order of priority described by the following diagram.

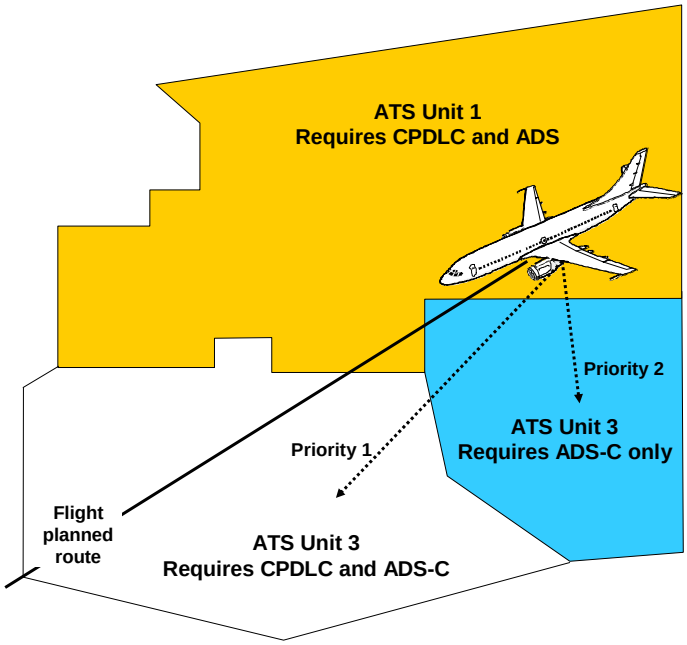


Figure 4-6. Transiting data link areas

ATSU 1 should address forward to ATSU 3 (priority 1) to ensure that a CPDLC connection and ADS contracts are established prior to address forwarding to ATSU 2 (priority 2) so that ADS contracts can be established for monitoring the transit of the aircraft across the relevant portion of the FIR.

4.2.2.3.3.1 Options for initiating the AFN logon

The AFN logon may be initiated by one of the following options.

a) Option 1 - Initial AFN logon: CPDLC shall cease between the aircraft and ATSU 1. The aircraft will enter ATSU 2 using voice. Pilots should initiate an initial AFN logon to ATSU 3 between 15 and 45 minutes prior to the estimated time at the FIR boundary.

b) Option 2 - AFN logon triggered by address forwarding: Address forwarding may be used to "jump" the connections over a FIR not requiring a CPDLC connection when agreed by the appropriate ATSUs. In this circumstance, the controller shall inform the pilot of this intention by appending the free text message CONTACT WITH [ATSU name] NOT REQUIRED to the frequency transfer instructions For example: AT TEKEP MONITOR NADI CENTER 13261. CONTACT WITH AUCKLAND NOT REQUIRED.

4.2.2.3.3.2 Transferring CPDLC for short transits

Where an ATS Unit decides to accept the transfer of data link for a short transit across its FIR, the receiving controller needs to be aware of whether any automated transfer process to the subsequent unit will be affected by the relatively short transit period across the FIR.

If so, then the controller must ensure that all messages required to successfully transfer the connections to the next unit (e.g. NDA, address forwarding, MONITOR/CONTACT information, and END SERVICE

messages) are sent in the proper sequence at the correct time, whether they are sent automatically by the system or manually by the controller.

Note.— The receiving unit must also be the current data authority (CDA) before any of these messages can be sent successfully. For example, if the receiving unit tries to send the NDA message prior to becoming the CDA to account for a short transit time, the messages will fail.

NAT-28.— TK – Next paragraph, NAT para 4.9.7.

4.2.2.3.4 Unsuccessful logon to NDA

If the controller becomes aware that the AFN logon to the NDA is not successful, the controller should instruct the aircraft to manually initiate an AFN logon with the next ATSU (see paragraph 4.7 for the appropriate voice phraseology). Do not re-send the NDA message (see paragraph 3.1.2 regarding related ATS automation).

a) Coordinate with the next ATSU, establishing clearly when or where the aircraft will be instructed to initiate AFN logon with that unit.

b) The AFN logon instruction should be timed to allow the next ATSU to establish an active CPDLC connection prior to the aircraft's crossing the common boundary. Note that this process will terminate the current CPDLC connection.

FOM 16.— TK – Next paragraph, FOM, para 4.7

4.2.2.4 End of service and CPDLC connection transfer

4.2.2.4.1 Purpose and procedure

Under normal conditions, the current ATSU initiates the CPDLC connection termination sequence by sending an END SERVICE uplink message. In response to an END SERVICE message:

- The avionics will downlink a DISCONNECT message. The avionics will consider the aircraft to be disconnected as soon as the DISCONNECT message is sent.
- The current connection will be terminated, activating the non-active connection. The subsequent ATSU will now be able to exchange CPDLC messages with the aircraft.

The success of the CPDLC transfer is dependent upon the next ATSU establishing its own CPDLC connection prior to the END SERVICE message being received by the aircraft. Failure of the next ATSU to establish a CPDLC connection before the END SERVICE reaches the aircraft will leave the aircraft without CPDLC connectivity.

There are two cases in which the avionics will terminate established CPDLC connections.

- Depending on the software load, when any uplink messages remain open when the aircraft receives an END SERVICE.
- When the END SERVICE element is part of a multi-element message where none of the elements require a WILCO response.

In both cases an error message will be generated to both ATS systems.

If any downlink messages remain open when the aircraft receives an END SERVICE message, the avionics will close the messages and terminate the CPDLC connection with the current ATSU. This will not affect the CPDLC connection with the next ATSU.

4.2.2.4.1.1 Dialogs to be closed before the END SERVICE

NAT-29.— TK – Next paragraph, NAT, para 4.6.7.

It is important for the flight crew to respond to uplink messages promptly and appropriately, particularly when approaching an FIR boundary. It should be noted that if any uplink messages are open when the END SERVICE message is sent, the CPDLC connection to the CDA will be terminated and the CPDLC connection to the NDA may be terminated.

FOM 17.— TK – Next paragraph, FOM para 4.7.1.1.

The controller shall ensure that no open uplink CPDLC messages exist prior to the uplinking of an END SERVICE message. In the event that a CPDLC uplink is unanswered, ATC should uplink the free text: CHECK AND RESPOND TO OPEN CPDLC MESSAGES

NAT-30.— TK – Next paragraph, NAT, para 5.6.3.

It is the responsibility of the CDA to either:

a) ensure that no uplink messages remain open before sending the END SERVICE message; or

b) coordinate with the NDA with reference to messages which were open when the END SERVICE message was sent.

NAT-31.— TK – Next paragraph, NAT, para 4.9.10.

Editor's note 16. — TK - Contains cross-reference to NAT para 5.7.2. (Not yet in GOLD).

If an NDA was established, controllers should coordinate with that ATSU regarding any CPDLC uplink messages that were open at the time the END SERVICE message was sent (see NAT 5.7.2 for related information).

NAT-32.— TK – Next paragraph, NAT, para 4.9.9,

Editor's note 17. — TK - Contains cross-reference to NAT, para 5.7.1. (Not yet in GOLD).

Controllers should send appropriate responses to any received downlink messages prior to sending the END SERVICE message (see NAT 5.7.1 for related information).

FOM 18.— TK – Next paragraph, FOM para 4.7.1.2.

4.2.2.4.1.2 Use of CONTACT/MONITOR uplink message

The purpose of the CONTACT/MONITOR uplink messages (UM 117 to UM 122) is to advise the pilot when (and where) a change to the nominated frequency is required. When any of the "Monitor" uplink messages are received the pilot shall change to the nominated frequency at the appropriate time. A check call is not required on the frequency. When any of the "Contact" messages are received the pilot shall change to the nominated frequency at the appropriate time and perform a check call on the frequency.

The sending or receipt of any of the "Contact" uplink messages is not an indication to the pilot that CPDLC use must be terminated or suspended once voice contact is established. If termination or suspension of CPDLC use is intended by the controller when voice contact is established then the requirement must be specifically stated in addition to the CONTACT message element.

4.2.2.4.1.3 Synchronizing the CPDLC and voice transfer

If the CPDLC MONITOR (or CONTACT) [icaounitname] [frequency] message element and the END SERVICE message element are to be sent as separate uplink messages, the END SERVICE message should be sent as soon as possible after the receipt of the WILCO response. This is to ensure synchronization of the CPDLC and the voice communication transfers.

4.2.2.4.1.4 Timing of the transfer of communications

The MONITOR (or CONTACT) [icaounitname] [frequency] and END SERVICE message elements should normally be sent after receipt of the last position report before crossing the FIR boundary, but not less than 5 minutes prior to the FIR boundary. This allows the next ATSUs connection to be active when the aircraft crosses the FIR boundary.

4.2.2.4.1.5 Aircraft entering VHF coverage

For aircraft entering airspace where radar and air-ground VHF are provided, and the aircraft will not cross an FIR boundary, it is not necessary to send an END SERVICE message to disconnect CPDLC. In this case, the CPDLC connection will remain active until termination of flight. If subsequent control sectors within the system do not have CPDLC capability, and local instructions do not exist to the contrary, the controller with jurisdiction for CPDLC must ensure that CPDLC clearances or instructions are not issued to the aircraft while it is under the control of another sector.

4.2.2.4.1.6 Timing of the CPDLC connection

Under normal circumstances the CPDLC connection should be established with the next data authority prior to the connection between the aircraft and the current data authority being terminated.

Either of the following options may be utilized to complete the CPDLC connection transfer process:

a) Option 1 the MONITOR (or CONTACT) [icaounitname] [frequency] and END SERVICE message elements are sent in the same CPDLC uplink message.

Note.— Because the CPDLC connection will be terminated when the pilot sends the WILCO response, this multi element message should not be sent more than 10 minutes from the frequency transfer point.

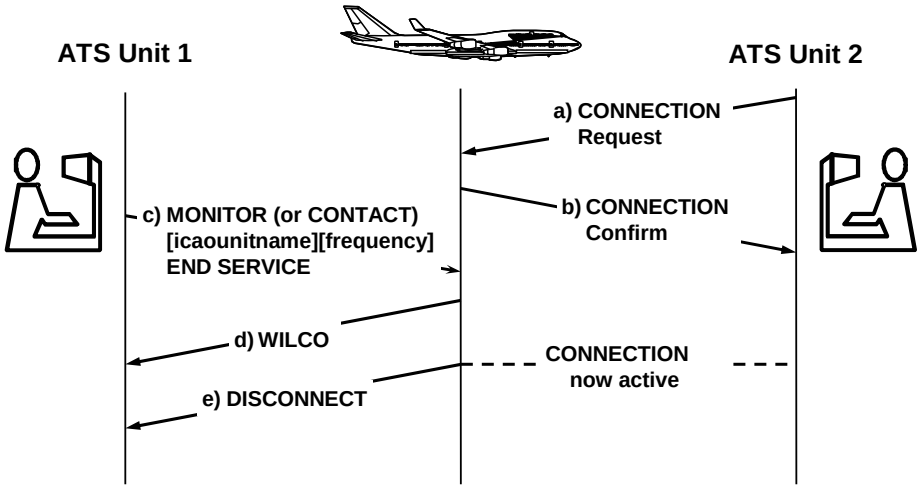


Figure 4-7. CPDLC connection transfer - Option 1

b) Option 2: the MONITOR (or CONTACT) [icaounitname] [frequency] and the END SERVICE message elements are sent as separate CPDLC uplink messages. The END SERVICE is sent as soon as possible after the receipt of the WILCO response to the MONITOR (or CONTACT) instruction.

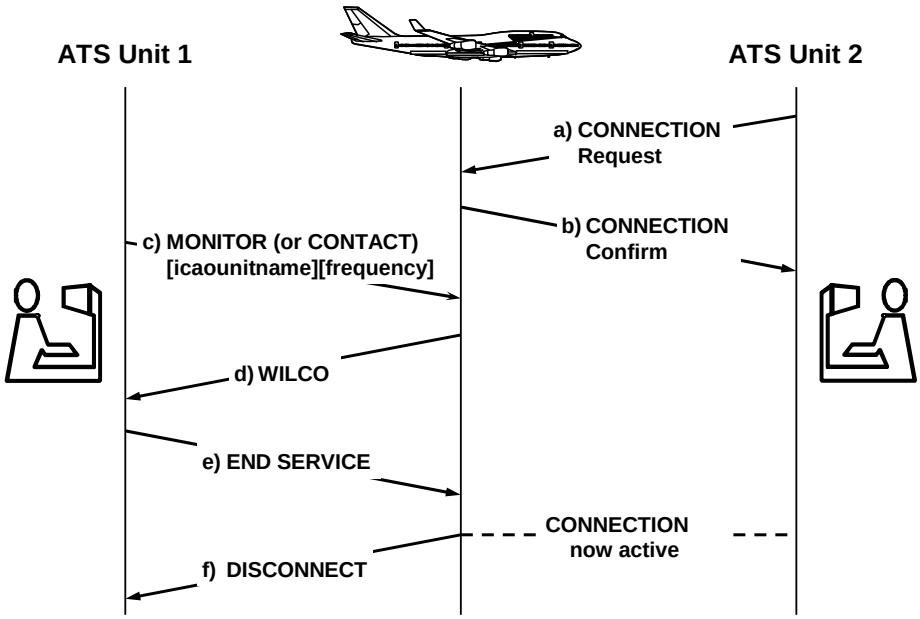


Figure 4-8. CPDLC connection transfer - Option 2

c) Option 3: the AT [position](or AT [time]) MONITOR (or CONTACT) [icaounitname] [frequency] and the END SERVICE message elements are sent as separate CPDLC uplink messages. The END SERVICE is sent after the receipt of the WILCO response to the MONITOR (or CONTACT) instruction, and approaching the FIR boundary.

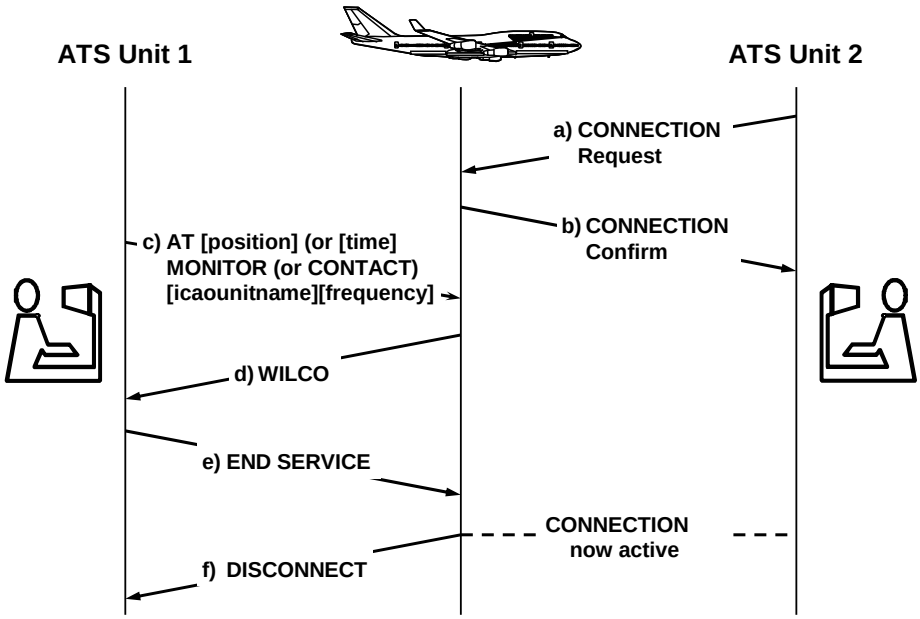


Figure 4-9. CPDLC connection transfer - Option 3

4.2.2.4.2 Abnormal cases at the time of the connection/disconnection

4.2.2.4.2.1 Non-delivery of END SERVICE message

There may be unusual situations where a CPDLC connection cannot be automatically terminated (e.g. if the END SERVICE message does not trigger the disconnection, or if the END SERVICE message is not delivered to the avionics). If the controller is aware that the END SERVICE message has been unsuccessful, the controller's initial action should be to send another END SERVICE message. If this is also unsuccessful the pilot will be instructed to terminate the CPDLC connection and logon to the next unit.

The voice phraseology to be used will be:

Controller Select ATC com off then logon to [ATSU name]

Pilot Roger

Note.— The [ATSU name] is the four character ICAO code.

4.2.2.4.2.2 Non-automatic termination of the connection

If the CPDLC connection with the current ATSU does not terminate automatically at the appropriate time (i.e. before the position or time notified in the CONTACT/MONITOR message), then the pilot shall send the CPDLC position report to the current active center. If receipt of the position report does not prompt the current centre to send an END SERVICE message within three minutes of the report being sent, then the pilot should manually disconnect from the current ATSU and logon to the subsequent ATSU.

If the CPDLC transfer is intended to be delayed until after the aircraft has passed the FIR transfer point, the controller shall notify the pilot of the intended delay with the free text message EXPECT CPDLC TRANSFER AT [time].

If the aircraft crosses the FIR boundary prior to the time notified in the free text uplink, the boundary position will be sent to the ATSU with the active connection.

If the CPDLC transfer has not been completed by the time notified in the uplink message, the pilot is entitled to manually disconnect from the active ATSU and logon to the subsequent ATSU.

NAT-33.— TK – Next paragraph, NAT, para 4.6.3.

4.2.2.4.3 CPDLC transfers to adjacent ATSUs offering CPDLC services should be automatic. Normally, the transfer will occur at or shortly before crossing the OCA/FIR boundary. When the ATSU intends the transfer to take place after the OCA/FIR boundary, preformatted free text message EXPECT CPDLC TRANSFER AT [time] will be uplinked (see Appendix A, paragraph A.4, for the list of preformatted free text messages). When a flight does not receive preformatted free text message EXPECT CPDLC TRANSFER AT [time] and crosses an OCA/FIR boundary without the active center changing to reflect the transfer, flight crews should manually disconnect and logon to the appropriate ATSU.

NAT-34.— TK – Next paragraph, NAT, para 4.6.4.

4.2.2.4.4 When exiting a CPDLC OCA/FIR into a non-CPDLC OCA/FIR flight crews should expect the active centre to terminate the CPDLC connection, leaving the aircraft with no CPDLC connectivity. Normally, the transfer will occur at or shortly before crossing the OCA/FIR boundary. When the ATSU intends the transfer to take place after the OCA/FIR boundary, preformatted free text message EXPECT CPDLC TRANSFER AT [time] will be uplinked (see Appendix A, paragraph A.4 for the list of preformatted free text messages). When a flight does not receive preformatted free text message EXPECT CPDLC TRANSFER AT [time] and crosses an OCA/FIR boundary without the CPDLC connection being terminated, flight crews should manually disconnect. Crews should follow the direction at paragraph 4.2.1.4.1 if entering a subsequent CPDLC OCA/FIR.

NAT-35.— TK – Next paragraph, NAT, para 4.6.5.

4.2.2.4.5 Unless otherwise instructed, flight crews should revert to voice communications while transiting non-CPDLC OCA/FIRs. Crews should note that an active CPDLC connection may be established with the next CPDLC OCA/FIR well before entering that OCA/FIR. Such connections should not be used except in highly unusual or emergency situations.

4.2.2.5 ADS-C Connection Management

NAT-36.— TK – Next paragraph, NAT, para 4.2.7.

4.2.2.5.1 Once an AFN logon is completed to any ATSU, ground systems will transfer and manage the various connections required for FANS services as the aircraft traverses OCAs and FIRs served by the various ATSUs. These transfers are initiated and completed automatically, without action by the flight crew.

a) The ATS ground system will accept the AFN CONTACT (FN_CON) from the aircraft and generate an AFN ACKNOWLEDGEMENT (FN_AK). The FN_AK will indicate if ADS-C and/or CPDLC are supported.

b) When the ATS ground system receives an AFN logon message, it may use the received information to immediately initiate an ADS waypoint event contract request to the aircraft.

c) When the ATS ground system initiates an ADS waypoint event contract request, it may also initiate any required ADS periodic contract request (e.g.. a contract for periodic reporting of the meteorological group data with a typical reporting period of 30 minutes).

d) When the aircraft has exited ADS-C airspace, the ATS ground system will terminate ADS-C reporting.

FOM 19.— Next paragraph, FOM, para 5.

4.3 Controller-pilot data link communications (CPDLC)

NAT-37.— TK – Next paragraph, NAT, para 4.6.10.

It is possible for multi-element CPDLC messages to be displayed on more than one screen page. Crews should carefully refer to screen page numbers to ensure that elements have been read in the proper order. Printing and reading the entire CPDLC message prior to responding may be an appropriate technique to avoid missing any message elements.

FOM 20.— TK – Next paragraph, FOM, para 5.1.

4.3.1 Means of communication

4.3.1.1 General

Generally, when a CPDLC aircraft is operating within a CPDLC airspace beyond the range of VHF voice communications, and other local rules do not apply, then:

- CPDLC will be the primary means of communication, and
- Voice will be used as the backup communication medium (for example VHF, direct HF, third party HF, Satvoice).

The response to a CPDLC message should be via CPDLC, and a response to voice should be via voice.

NAT-38.— TK – Next paragraph, NAT, para 4.6.9.

4.3.1.2 Reverting to voice communications

4.3.1.2.1 The flight crew should initiate voice contact to clarify the meaning or intent if an unexpected or illogical response is received to a CPDLC downlink message. In the event of receiving a CPDLC clearance which is not clearly understood, the message should be rejected and an UNABLE response sent. The intent of the message should then be confirmed by voice.

NAT-39.— TK - Next paragraph, NAT, para 4.9.4.

Editor's note 18. — TK - Contains cross-reference to paragraph NAT 5.9.5, not yet in GOLD.

4.3.1.2.2 Controllers should initiate voice contact to clarify the meaning or intent if an unexpected or inappropriate response is received to a CPDLC uplink message (see NAT 5.9.5 for details regarding appropriate responses to clearance messages).

NAT-40.— TK – Next paragraph, NAT, para 4.9.5.

4.3.1.2.3 Controllers should immediately revert to voice communications if at any time it appears that there is a misunderstanding about the intent of a CPDLC dialogue. If possible, all open messages should be closed, regardless of any associated voice communications. These responses should be consistent with the voice communication, in order to prevent confusion.

FOM 21.— TK – Next paragraph, FOM para 5.1.2.

4.3.1.3 Voice communications

4.3.1.3.1 Notification of frequencies to the preceding ATSU

ATSUs shall advise frequencies to the preceding ATSU, in accordance with the appropriate letters of agreement.

4.3.1.3.2 Notification of HF frequencies by CPDLC

The uplink CPDLC frequency transfer message elements can accommodate only one frequency variable. Due to this limitation, the controller will insert the primary HF frequency in these messages. This applies to the following uplinks:

UM 117	CONTACT [icaounitname][frequency]
UM 118	AT [position] CONTACT [icaounitname][frequency]
UM 119	AT [time] CONTACT [icaounitname][frequency]
UM 120	MONITOR [icaounitname][frequency]
UM 121	AT [position] MONITOR [icaounitname][frequency]
UM 122	AT [time] MONITOR [icaounitname][frequency]

In areas of poor HF coverage, the controller may consider appending free text nominating a secondary HF frequency. The format of this message is described in Appendix A, paragraph A.4. In the CONTACT and MONITOR messages RADIO is not an option within the [icaounitname] field. Therefore, CENTER will be used to identify a RADIO facility.

FOM 22.— TK – Next paragraph, FOM, para 5.2.

4.3.2 CPDLC capability

4.3.2.1 Notification of CPDLC capability

An AIP Supplement, or similar, shall be published to advise the CPDLC capability of an ATS system and its AFN logon address. An aircraft's CPDLC capability shall be notified in the flight plan.

4.3.2.2 Downlink messages

ATS systems that allow the use of all elements contained in the FANS-1/A message set should be capable of correctly processing all the FANS-1/A downlink message elements. However, where specific CPDLC implementations do not include all message set elements, such as domestic airspace or initial and temporary situations, the ATSUs involved should publish the reduced message set with appropriate explanatory material. Where these reduced implementations occur across a group of adjoining ATSUs, every attempt should be made to ensure that the message set chosen is common to all applicable airspace within the implementation boundaries. ATSUs should exercise caution when specifying reduced message sets, ensuring that the messages handled are adequate for all envisaged scenarios in the airspace to be served by CPDLC.

If the ground system receives a downlink message that is not supported by the implemented message set, then the free text uplink message UM 169 MESSAGE NOT SUPPORTED BY THIS FACILITY should be sent rather than terminating the connection.

4.3.2.3 Uplink messages

For various reasons some States may not have implemented specific FANS-1/A uplink message elements contained in the message set in Appendix A (e.g. UM 33 CRUISE [altitude]). These individual implementations shall not impact overall operations.

FOM 23.— TK – Next paragraph, FOM, para 5.3.

4.3.3 Use of pre-formatted and free text messages

4.3.3.1 Preferred use of pre-formatted messages

Free text messages shall be used only when an appropriate pre-formatted message element does not exist. In particular, the creation of a clearance request and the issuing of a clearance shall be performed by the use of pre-formatted message elements only. The use of pre-formatted message elements allows on board data processing such as the automatic insertion of the clearance information into the FMC. It also allows the controller to respond more quickly when the ATS system has the capability to automatically link a pre-formatted request to a pre-formatted response. Additionally, this process minimizes the risk of input errors.

When a free text message is required, standard ATC phraseology and format shall be used. Non-essential words and phrases should be avoided. Abbreviations should only be included in free text messages when they form part of standard ICAO phraseology, e.g. ETA.

4.3.3.2 Standardized free text messages

While pre-formatted message elements are required to be used whenever possible, there are occasions where frequent use of free text allows the meaning and appropriate response to be standardized. The standard free text message set is shown in Appendix A, paragraph A.4.

4.3.3.3 Storing free text messages

ATSUs capable of storing free text messages should select those message elements from the standard free text message set (see Appendix A, paragraph A.4) appropriate to their particular environments. When the storage of free text messages is not possible, controllers shall use the same message formats when typing free text messages.

FOM 24.— TK – Next paragraph, FOM, para 5.4.

4.3.4 Exchange of CPDLC messages

4.3.4.1 Message assurance

The FANS-1/A system does not provide for end-to-end message assurance. Therefore, there can be no guarantee provided by the ground system or the avionics that the message has been delivered to the controller or pilot. However:

- The ATS system will receive a network acknowledgement (MAS Message Assurance) to an uplink message indicating that the message has been delivered to the aircraft's ACARS MU, and
- The avionics will receive a network acknowledgement to a downlink message indicating that the message has been delivered to the communication service provider system.

4.3.4.2 Ambiguous dialogues

In the case of a controller or pilot having any doubt as to the intent of a message, or if any other ambiguity exists, clarification shall be sought through the use of voice communication.

4.3.4.3 Interruption of a CPDLC dialogue

If a CPDLC dialogue is interrupted by a system shutdown, the entire dialogue shall be re-commenced by voice communication.

4.3.4.4 Approval of request or clearance / instruction

4.3.4.4.1 Affirmative response to a clearance/instruction

The WILCO downlink message indicates that the pilot will comply fully with the clearance/instruction contained in the associated uplink message. The readback of a clearance or instruction issued by CPDLC is not required.

4.3.4.4.2 Affirmative response to a clearance request

The ROGER or AFFIRM uplinks are not appropriate responses to a clearance request and shall not be used for this purpose. The controller shall only approve a clearance request by uplinking a message containing an actual clearance.

4.3.4.4.3 Conditions relating to a specific clearance

Terms or conditions relating to a specific clearance shall be included in the clearance uplink message. They shall not be sent as a separate message.

4.3.4.4.4 Affirmative response to a negotiation request

AFFIRM is an appropriate response to an uplinked negotiation request message that is acceptable (e.g. CAN YOU ACCEPT [altitude] AT [time]).

4.3.4.5 Negative response to a downlink request

4.3.4.5.1 Negative response to a clearance request

When a clearance request is denied, the controller shall use the element UNABLE (not NEGATIVE) in the uplink response. The aircraft's current clearance shall not be re-stated.

4.3.4.5.2 Explanation of negative response

Pre-formatted elements such as DUE TO TRAFFIC (or a free text element) should be added to the response message if clarification is considered necessary. Additional elements (including free text elements) in the form of an explanation must be included when responding to a multiple clearance request where some, but not all clearance requests can be granted.

4.3.4.5.3 Offering alternative clearances to downlink requests

If the clearance contained in a downlink request is not available, but an alternative (similar) clearance is available, ATC must not simply respond to the downlink request with the alternative uplink clearance. An UNABLE must be uplinked to close the original clearance request. Depending on workload and traffic, ATC may then uplink an alternative clearance.

Example:

Pilot	REQUEST CLIMB TO F370
Controller	UNABLE. DUE TO TRAFFIC
Controller	CLIMB TO AND MAINTAIN F350. REPORT LEVEL F350

The ATC response in the following example is incorrect and should not be used

Pilot	REQUEST CLIMB TO F370
Controller	~~UNABLE. CLIMB TO AND MAINTAIN F350. REPORT LEVEL F350~~

4.3.4.6 Negative response to an uplink request

NEGATIVE is an appropriate response to an uplink negotiation request that is not acceptable (e.g. CAN YOU ACCEPT [altitude] AT [time]).

Editor's note 19. — TK – Next paragraphs, need to consider impact of RCP specifications.

4.3.4.7 Time period between receiving and responding to a message

The controller and the pilot shall respond to incoming requests as soon as practicable to avoid duplicate messages entering the system.

4.3.4.7.1 Delays in responding

The controller and the pilot should consider that it takes up to one minute for a message to be received, time for the pilot (or the controller) to take action and respond, and up to one minute for the reply to be received. Nevertheless, they should be aware that extra delays could occur in the transmission of any response to a CPDLC message.

Note.— Transmission times for messages may vary depending on the transmission media.

4.3.4.7.2 Delay expected after receiving a UM 1 STANDBY message

The intended use of the uplink UM 1 STANDBY message element is to provide advice to the flight crew that their requested clearance is being assessed, but is not immediately available. This may be due to traffic, delays in coordination with the next sector or ATS unit etc).

It should not be used as a means of simply acknowledging that the downlink request has been received by the ATS ground system.

If the UM 1 STANDBY response is received, a further response can be expected within 10 minutes. The message remains open. If the pilot (or the controller) does not respond within this time, the next message should be in the form of an inquiry, not a duplicated request.

4.3.4.8 Re-sending Messages

4.3.4.8.1 Re-sending of a message when no alert received

When the pilot (or the controller) elects to re-send a message after a reasonable period of time has passed and no error message has been received indicating the non-delivery of the message, the message shall be sent as a query message. Alternatively, voice communication may be used.

Example:

Pilot	REQUEST CLIMB [level]

Pilot	WHEN CAN I EXPECT [level]

4.3.4.8.2 Re-sending of a message when an alert has been received

When an error message indicating the non-delivery of the message has been received at the flight deck or at the controller work station, the pilot (or the controller) may elect to re-send an identical message. Alternatively, voice may be used.

4.3.4.9 Duplicate requests received

4.3.4.9.1 Second identical request after an uplink STANDBY message

If a second identical downlink request is sent by the pilot after a reasonable period (more than 10 minutes) has passed since receiving a STANDBY response to an earlier request, the controller should respond with UNABLE REQUEST DEFERRED. This will close out the second message, inform the pilot that the reply will take longer, and will leave only one open message requiring a response.

4.3.4.9.2 Multiple identical requests

All messages requiring a response must be answered. If the controller (or the pilot) receives a second identical CPDLC request prior to having answered the first, they shall respond to both of the messages to ensure message closure. On rare occasions, the first uplink message may generate an “invalid reference number” error message, in the avionics.

4.3.4.10 Altitude change clearances

4.3.4.10.1 Issuing conditional altitude change clearances

NAT-41.— TK – Next paragraph, NAT, para 5.17.5.

Flight crews shall pay special attention to the intended meaning of Uplink Vertical Clearance message elements that contain words “AT” or “BY” (refer to Appendix A, paragraph A.2). Operational experience has shown that those message elements are most likely to be misunderstood by flight crews. Flight crews that do not have English as their native language may be especially open to error since the words “AT” or “BY” may have a different meaning in their native language. It is therefore of utmost importance that flight crews know the meaning of the words “AT” and “BY” in CPDLC communications. The following table clarifies the intended meaning for these message elements.

Table 4-1. Clarification of Uplink Messages Elements.

UM #	Message Intent	Message Element	Response
UM 21	Instruction that AT or AFTER the specified time, a climb to the specified level is to commence and once reached the specified level is to be maintained.	AT [time] CLIMB TO AND MAINTAIN [altitude]	W/U
UM 22	Instruction that AFTER PASSING the specified position, a climb to the specified level is to commence and once reached the specified level is to be maintained.	AT [position] CLIMB TO AND MAINTAIN [altitude]	W/U
UM 24	Instruction that AT or AFTER the specified time, a descent to the specified level is to commence, and once reached, the specified level is to be maintained.	AT [time] DESCEND TO AND MAINTIN [altitude]	W/U
UM 25	Instruction that AFTER PASSING the specified position, a descent to the specified level is to commence and once reached the specified level is to be maintained.	AT [position] DESCEND TO AND MAINTAIN [altitude]	W/U

UM 26	Instruction that a climb is to commence at a rate such that the specified level is reached AT or BEFORE the specified time.	CLIMB TO REACH [altitude] BY [time]	W/U
UM 27	Instruction that a climb is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.	CLIMB TO REACH [altitude] BY [position]	W/U
UM 28	Instruction that a descent is to commence at a rate such that the specified level is reached AT or BEFORE the specified time.	DESCEND TO REACH [altitude] BY [time]	W/U
UM 29	Instruction that a descent is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.	DESCEND TO REACH [altitude] BY [position]	W/U

FOM 25.— TK – Next paragraph, FOM para 5.4.10.1.

The potential exists for the restriction "AT" contained at the beginning of the following conditional clearances to be missed by aircrew and consequently the clearance may be executed prematurely.

- UM 21 AT [time] CLIMB TO AND MAINTAIN [altitude]
- UM 22 AT [position] CLIMB TO AND MAINTAIN [altitude]
- UM 24 AT [time] DESCEND TO AND MAINTAIN [altitude]
- UM 25 AT [position] DESCEND TO AND MAINTAIN [altitude]

Controllers shall precede UM 21, UM 22, UM 24 and UM 25 with UM 19 MAINTAIN [altitude] indicating to aircrew to maintain their present altitude until the condition of the clearance is satisfied.

NAT-42.— TK – Next paragraph, NAT, para 5.17.3.

Including this message element will emphasize that the message contains a conditional altitude clearance and may prevent such clearances being executed prematurely.

FOM 26.— TK – Next paragraph, FOM para 5.4.10.2.

4.3.4.10.2 Level report requirements for climb or descent clearances

Editor's note 20. — TK – Use of UM 129 - Potential conflict with Appendix A.

If a CPDLC level report is required, controllers shall append UM 129 REPORT LEVEL [altitude] to any vertical change clearance to a single altitude so that flight crews have access to the pre-formatted downlink report.

NAT-43.— TK - Next paragraph, NAT, para 5.17.1.

UM 129 REPORT LEVEL [level] will be appended to every altitude clearance where a single level is assigned

FOM 27.— TK – Next paragraph, FOM para 5.4.10.2.

If no REPORT LEVEL [altitude] is received, the crew has no requirement to report maintaining the cleared flight level.

Example clearance issued to a flight currently cruising at FL310 requesting climb to FL350 when the climb can not be executed until the aircraft is at MICKY

Controller	MAINTAIN FL310, AT MICKY CLIMB TO AND MAINTAIN FL350, REPORT LEVEL FL350

Note.— Some States do not require this CPDLC level report in airspace in which ADS-C is in use.

NAT-44.— TK - Next paragraph, NAT para 5.17.2.

UM 175 REPORT REACHING [level] should not be used to determine when an aircraft is level at the specified level. The programmed intent of this message element is to request a report if the aircraft occupies the specified level, which occurs as the aircraft is about to level at the specified level, but also occurs if the aircraft passes through the specified level during a climb or descent.

FOM 28.— TK – Next paragraph, FOM para 5.4.10.3.

4.3.4.10.3 Canceling block altitude clearances

A block altitude clearance is an authorization for an aircraft to operate between and at the levels specified in the clearance. A pilot report at the floor or ceiling of the block altitude clearance does not cancel the block altitude clearance – the clearance is only cancelled by the pilot acceptance of a subsequent (vertical) clearance issued by ATC. If the current block altitude clearance is no longer required, the pilot should request the level(s) preferred.

To cancel a previously issued block clearance and limit the aircraft to one specific level the controller shall issue an appropriate vertical instruction such as:

- UM 19 MAINTAIN [altitude];
- UM 20 CLIMB TO AND MAINTAIN [altitude]; or
- UM 28 DESCEND TO REACH [altitude] by [time].

The controller should also add UM 129 REPORT LEVEL [altitude].

The WILCO response to the vertical clearance uplink cancels any previously issued block clearance.

4.3.4.10.4 Issuing Level Restrictions

Depending on how they are used, certain CPDLC message elements may be used as either:

a) A "stand-alone" clearance; or

b) A level requirement for an interim level, when appended to another CPDLC vertical clearance.

This applies to the following message elements:

- UM 26 CLIMB TO REACH [altitude] BY [time]
- UM 27 CLIMB TO REACH [altitude] BY [position]
- UM 28 DESCEND TO REACH [altitude] BY [time]
- UM 29 DESCEND TO REACH [altitude] BY [position]

Example 1:

ATC	CLIMB TO REACH FL390 BY 2200
Meaning	The aircraft is cleared to climb to FL390 and is required to be maintaining FL390 by 2200.

Example 2: The following format may be used to issue a requirement for an interim level. The example shown reflects ICAO phraseology. Some FIRs may choose to reverse the order of the elements shown in the example, so long as both are included.

ATC	CLIMB TO AND MAINTAIN FL390 CLIMB TO REACH FL370 BY 0100
Meaning	The aircraft is cleared to climb to FL390, and is required to reach FL370 (or higher) by 0100.

Note 1.— Because of limitations in the FANS-1/A message set, there is no specific message element to issue a requirement for an intermediate level.

Note 2.— In the ICAO CPDLC message set, CLIMB TO [level]. REACH [level] BY [time/position], would be used (see Example 2a)

Example 2a:

ATC	CLIMB TO AND MAINTAIN FL390 REACH FL370 BY 0100
Meaning	The aircraft is cleared to climb to FL390, and is required to reach FL370 (or higher) by 0100.

Example 3: Confusion may occur if the vertical clearance and the requirement were sent separately. (This scenario might occur, for example, if the controller decided to add a requirement after issuing the initial clearance):

~~Controller~~	~~CLIMB TO AND MAINTAIN FL390~~
~~Pilot~~	~~WILCO~~
	~~followed by~~
~~Controller~~	~~CLIMB TO REACH FL370 BY 2200~~

Technically, the second clearance amends the final cleared level of the aircraft (to FL370), which was not the intention of the controller. Because of the confusion inherent in this type of message exchange, this message should not be used in this manner; instead, the entire clearance should be re-stated; i.e. CLIMB TO AND MAINTAIN FL390. REACH FL370 BY 2200.

NAT-45.— TK – Next paragraph, NAT 5.17.4.

4.3.4.10.5 Clearance to Intermediate Level

In the event that ATC is not able to approve a request to climb or descend to a particular level, but is able to approve a climb or descent to an intermediate level:

a) ATC will respond to the request with UM 0, UNABLE and

b) Issue a separate message to clear the aircraft to climb to the intermediate level.

FOM 29.— TK – Next paragraph, FOM para 5.4.11.

4.3.4.11 Requesting an aircraft's speed

When the aircraft's Mach number or indicated airspeed is requested, the controller shall use the pre-formatted message element CONFIRM SPEED.

4.3.4.12 Advising a wake turbulence offset

In the event of a pilot initiating a wake turbulence offset (up to 2nm either side of track) in RVSM airspace for which the controller is not required to issue a clearance, the pilot shall advise the controller. The following data or voice phraseology shall be used:

Pilot	WAKE DEV [direction]

Note.— [direction] L or R (left or right) as appropriate.

4.3.4.13 Direct Tracking and UPR Aircraft

UPRs are calculated by airline flight planning systems as being the optimal route clearance for the specific aircraft taking into account the latest available weather information. As such, controllers should not offer unsolicited direct tracking to aircraft flying a UPR as the direct route may be less optimal than the aircraft's current route.

Editor's note 21. — TK – Next paragraphs, need review with new procedures. Also, remove references to the FOM.

4.3.4.14 Planned Airborne Re-route Procedure – DARP (Data link Aircraft)

A planned airborne re-route will occur periodically on long haul Pacific routes when a new forecast is issued after departure, indicating that significant time and/or fuel savings can be made. The following procedures apply when aircraft request a planned re-route while en-route.

Note 1.— At the time of incorporation into the FOM, this Section applies only to routes transiting directly from/to Auckland / Oakland Oceanic Airspace Use of these procedures in other FIRs/areas is appropriate without further FOM modification, provided some written agreement between the participants is in place.)

AOC will plan the re-route and uplink the route to the aircraft, commencing from the waypoint on the current route, ahead of the Aircraft and finishing at destination.

Note 2.— Some Flight Management Systems allow AOC uplinks to the Active Route. It is recommended that all AOC route uplinks are directed to the Inactive Route.

Flight crew will load the re-route into the "Inactive Route" of the FMC then Downlink the unedited route request to the ATSU.

Note 3.— Crew are not permitted to edit the route, other than to delete a waypoint that may have been crossed between the re-route being prepared by the AOC, and the ATC route request being sent.

ATC (1) receives the downlink re-route request (message DM 24)

Pilot	REQUEST [departure airport:xxxx destination airport:xxxx (fix1)(fix2)(fix3) …]

The ground system will "auto populate" the uplink reply.

ATC (1) will do either "a" or "b" below:

a) uplink route clearance (message UM 83) with the departure airport deleted:

Controller	AT [fix 1] CLEARED [destination airport:xxxx (fix1)(fix2)(fix3) …]

ATC (1) will then transmit the new route to ATC (2) via AIDC messaging;

b) reply UNABLE due to traffic where conflicting traffic prevents route clearance at the current flight level.

The following operational requirements apply:

a) The requested route must commence from the waypoint on the current route ahead of the aircraft, and (if the divergence waypoint is not the next fix ahead of the aircraft) must contain all waypoints on the current route ahead of the aircraft up to the divergence waypoint, followed by the revised routing to destination.

b) The re-route request must be made at least 20min before the divergence waypoint, to allow processing time.

c) The re-route request must not be made within 60min of the common FIR boundary to allow electronic route data transfer ATC(1) to ATC(2). [AIDC messaging].

d) The re-route request may be made to the new Data Authority, immediately after crossing the common FIR boundary

FOM 30.— TK – Next paragraph, FOM para 5.5.

4.3.5 Multi-element requests

4.3.5.1 Avoiding multiple element clearance requests

To avoid potential ambiguity, pilots should, where possible, avoid sending multiple clearance requests in the one downlink message.

4.3.5.2 Responding to multiple element clearance requests

4.3.5.2.1 Multiple clearance requests in one message: All approved

Where a multiple clearance request is received and all clearance request elements can be approved, each clearance request element shall be specifically addressed in the response.

Example

Pilot	REQUEST CLIMB TO [level] REQUEST DIRECT TO [position]
Controller	CLIMB TO AND MAINTAIN [level] PROCEED DIRECT TO [position]

4.3.5.2.2 Multiple clearance requests in one message: All not approved

If the response to a multi-element message is Unable then the reply applies to all elements of the original message. The aircraft's current clearance shall not be re-stated.

Example

Pilot	REQUEST CLIMB TO [level] REQUEST DIRECT TO [position]
Controller	UNABLE

4.3.5.2.3 Multiple clearance requests in one message: Some approved / Some not approved

When a multi-element clearance request is received and part of it can be granted and part of it cannot, the uplink shall not contain the single word UNABLE and a clearance. If UNABLE is used within a clearance message, it must contain a qualifier to remove any ambiguity.

The following examples illustrate correct ATC responses.

First correct example:

Pilot	REQUEST CLIMB TO [level] REQUEST DIRECT TO [position]
Controller Controller	UNABLE HIGHER ALTITUDE PROCEED DIRECT TO [position]

Second correct example:

Pilot	REQUEST CLIMB TO [level] REQUEST DIRECT TO [position]
Controller	UNABLE HIGHER ALTITUDE PROCEED DIRECT TO [position]

The ATC response in the following example is incorrect and shall never be used:

Pilot	REQUEST CLIMB TO [level] REQUEST DIRECT TO [position]
Controller	~~UNABLE~~ ~~PROCEED DIRECT TO [position]~~

FOM 31.— TK – Next paragraph, FOM para 5.6.

4.3.6 Multi-element uplink messages

4.3.6.1 Combining multiple elements into a single message

Only uplink elements that are related to the overall message should be combined into a single message. Messages that contain unrelated elements could either cause confusion or result in the crew rejecting the entire message when one of the elements on its own could have been acceptable. The following multi-element uplink is an example of a clearance that can be unambiguously sent as a single message.

Controller	WHEN READY DESCEND TO AND MAINTAIN FL280 REPORT LEVEL FL280

When the elements are not dependent on each other, controllers should send a single element clearance and wait for the response before sending a subsequent instruction.

4.3.6.2 Dependent Clearances

A dependent clearance is a message consisting of more than one clearance element, where the pilot must comply with each of the elements. A rejection of any of the elements, either singly or in combination, renders the entire clearance invalid. The following multi-element uplink is an example of a dependent clearance:

Controller	CLIMB TO AND MAINTAIN FL330 AT FL330 PROCEED DIRECT TO TUNTO REPORT LEVEL FL330.

In this example the aircraft must complete a change of level in order to be issued with an amended route clearance.

Whenever possible, all elements of a dependent clearance should be sent in a single uplink message. Sending the elements as individual messages may compromise safety or separation if the pilot accepts the first uplink of a dependent clearance, complies with the instruction, and then responds UNABLE to the next message when received. By the time that the controller has received the UNABLE response, the aircraft could have begun executing the first instruction of a clearance that is invalid if the pilot cannot comply with the second element.

The response to a multi-element uplink message will either be a WILCO or UNABLE that refers to the entire message. It is not possible for the pilot to respond to individual elements of a multi-element message.

Note.— Care must be taken in the construction of dependent clearances to ensure that there is no ambiguity present in the message. In the example above, the second element has been carefully chosen to reinforce the requirement instead of using the word THEN followed by the route clearance PROCEED DIRECT TO TUNTO.

The following message is an example of poor message construction as it does not unambiguously convey to the pilot that the climb clearance must be completed prior to commencing the route clearance component. This format should not be used for dependent clearances:

Controller	~~CLIMB TO AND MAINTAIN FL330~~ ~~THEN~~ ~~PROCEED DIRECT TO TUNTO~~

FOM 32.— TK – Next paragraph, FOM para 5.7.

4.3.7 Message closure

4.3.7.1 General

Definitions:

- A message requiring a response remains open until a referenced response is received.
- A message is closed when either a response is not technically required, or after a referenced response other than STANDBY or REQUEST DEFERRED has been received.

A normal downlink free text message (based on downlink message element DM 67) does not require a response from the controller to close the CPDLC exchange. However, a downlink free text message based on downlink message element DM 68 (Distress attribute) does require a response and the message will remain open until a referenced response is received.

Any uplink message containing only free text requires a ROGER response. The message will remain open until a referenced response containing ROGER is received.

4.3.7.2 Answering an uplink free text

When the controller sends a message containing only free text, or a free text element combined with elements that do not require a response, the pilot must respond to the free text with a ROGER response before responding to the actual contents of the message.

4.3.7.3 Dialogue commenced via CPDLC and continued via voice

If a CPDLC message requiring a closure response is subsequently negotiated by voice, a CPDLC closure response message is still necessary to ensure the proper synchronization of ground and aircraft systems.

FOM 33.— TK – Next paragraph, FOM para 5.8.

4.3.8 Position reporting

4.3.8.1 General

To harmonize waypoint position reports by either voice or data, the “Position” and “Next Position” shall only contain compulsory reporting points unless requested otherwise by ATC. The “Ensuing Significant Point” may be either the compulsory or non-compulsory reporting point after the “Next Position” (Refer AIREP form PANS/ATM, Appendix 1).

4.3.8.2 Downlink of position report

When a CPDLC connection exists in a procedural, non-ADS-C environment, pilots shall ensure that position reporting is conducted via CPDLC. A CPDLC position report shall be sent manually by the pilot whenever an ATC waypoint is passed over, (or passed abeam when offset flight is in progress). ATC expects position reports based on downlink message DM 48 POSITION REPORT.

4.3.8.3 Flexible track position reports

All waypoints published for an independent flex track or UPR are compulsory reporting points. However, when the track follows a published ATS route, position reports are not required at any non-compulsory waypoints defined for that ATS route.

4.3.8.4 First position report

Pilots shall downlink a CPDLC position report (ATC waypoint) to the next ATSU after the completion of:

- An initial CPDLC connection (when inbound from an area not providing CPDLC services), or during a connection transfer;
- Either when the CPDLC connection transfer has been completed; or at the associated FIR boundary.

Editor's note 22. — ND – Next paragraph, Possible conflict with NAT procedures?

This position report is required whether or not there is an ADS-C contract in place. It serves as confirmation that the receiving centre is the current data authority.

4.3.8.5 Sending of ATC waypoints only

Editor's note 23. — ND – Next paragraph, Conflict with ADS-C?: Correct Procedure for ADS-C waypoint reporting precludes use of non-ATC waypoints in the FMS

Additional non-ATC waypoints may be sequenced by the FMC, however information relating to these waypoints is not of interest to ATC. It is the pilot's responsibility to report only at ATC waypoints.

4.3.8.6 Updating a waypoint estimate

Editor's note 24. — ND – Next paragraph, But this downlink is available to crew only if requested by uplink (?)

When it is necessary to update a waypoint ETA, a free text message shall be sent in the form of – REVISED ETA [position] [time].

4.3.8.7 Non-receipt of a scheduled position report

If a scheduled position report is not received via CPDLC, the use of voice communication by the controller is not mandatory. The controller may obtain the report by uplinking message UM 147 - REQUEST POSITION REPORT.

4.3.8.8 Sequencing 'ABEAM' waypoints in excess of FMC parameters

When an aircraft passes abeam a waypoint in excess of the defined sequencing parameter for the aircraft type the FMC will not sequence the active waypoint on the Legs and Position Report pages. Operators shall develop appropriate airborne procedures to ensure correct waypoint sequencing.

Note.— Some ATS systems use current GPS position that is included in the ATC position report to update their ground systems.

4.3.8.9 ARINC 424 fix names

Crews should be aware that ATC ground systems can not process latitudes and longitudes encoded as fix names in the ARINC 424 format. Example 10N40 (indicates lat/long of 10N140W). Downlinks containing such fix names may be rejected by ATC systems.

FOM 34.— TK – Next paragraph, FOM para 7.5.

4.3.9 Using CPDLC to relay messages

When an ATSU and an aircraft cannot communicate, and an intermediary data link aircraft is used for relaying messages, the following shall apply:

- Only a free text message shall be used;
- The first word in the message shall be "RELAY."

Note 1.— The use of pre-formatted messages is prohibited because the intermediary aircraft's FMS could be unintentionally armed.

Note 2.— The call sign of the aircraft should be expressed as the radiotelephony call sign, rather than the ICAO three letter or IATA two letter designator.

Example

Controller (all free text)	RELAY. [atsu] Clears [call-sign] CLIMB TO AND MAINTAIN F340
Pilot (all free text)	RELAY FROM [call-sign] CLIMBING F340

FOM 35.— TK – Next paragraph, FOM para 7.6.

4.3.10 Weather deviation procedures

4.3.10.1 Multiple weather deviations

The distance off track contained in a weather deviation request or clearance is measured reference the nominally cleared track of the aircraft. Subsequent weather deviations or route clearances supercede any previous weather deviation clearance.

Example

Aircraft requests and is cleared to operate 20NM left of track

Pilot	REQUEST WEATHER DEVIATION UP TO LEFT 20NM
Controller	CLEARED TO DEVIATE UP TO 20NM LEFT OF TRACK
Pilot	WILCO

If the aircraft then requires a clearance to operate a further 30NM left of track, the clearance request shall be based on the nominal route rather in relation to the current weather deviation clearance.

Pilot	REQUEST WEATHER DEVIATION UP TO 50NM LEFT OF TRACK
Controller	CLEARED TO DEVIATE UP TO 50NM LEFT OF TRACK
Pilot	WILCO

If the aircraft then requires a clearance to operate 30NM right of track

Pilot	REQUEST WEATHER DEVIATION UP TO 30NM RIGHT OF TRACK
Controller	CLEARED TO DEVIATE UP TO 30NM RIGHT OF TRACK
Pilot	WILCO

Whilst the aircraft navigates from one side of track to the other in order to comply with the above clearance, it is the responsibility of ATC to ensure that the appropriate separation standards are being applied. The aircraft should expeditiously navigate so as to establish itself to the right side of track

4.3.10.2 Deviations either side of track

There are a number of valid formats for the CPDLC [direction] variable. A number of aircraft types, however, can only request directions left or right in weather deviation requests. If one of these aircraft requires a deviation to the left and right of track, the following procedure should be used:

- Construct a preformatted weather deviation downlink request for a deviation on one side of track, and
- Append free text describing the distance to the other side of track

Example

Pilot	REQUEST WEATHER DEVIATION UP TO LEFT 20NM. (free text) AND 20NM RIGHT
Controller	CLEARED TO DEVIATE UP TO 20NM EITHER SIDE OF ROUTE
Pilot	WILCO

4.3.10.3 Reporting back on track

A weather deviation clearance remains in effect until either:

- A “back on route” report is received; or
- The aircraft reaches a subsequent waypoint to which it has been cleared when clear of weather.

Editor's note 25. — TK – Next paragraph, review for aircraft specific information. Possible candidates for Appendix F.

NAT-46.— TK – Next paragraph, NAT para 5.16.

4.3.11 Delayed uplink messages

4.3.11.1 A CPDLC function has been implemented in some aircraft. This function identifies whether an uplink message has been received more than XXX seconds after it was sent, where XXX is either a default maximum delay value or a value set by the flight crew. At present, it is not possible to identify the relatively small number of aircraft with this function. To avoid confusion, flight crews will not normally be instructed to set a maximum delay value.

4.3.11.2 For Airbus aircraft entering a FIR, this function should automatically be re-set to OFF whenever the current data authority changes to a ATSU.

a) It is possible a flight crew may set a maximum delay value, even if not instructed to do so. In this case, the avionics will reject uplink messages that are received after the maximum delay time.

b) The flight crew will not see such messages. If such a message is rejected, the ATSU will receive the following downlink message: INVALID DATA UPLINK DELAYED IN NETWORK AND REJECTED RESEND OR CONTACT BY VOICE. This message will include a link to the delayed uplink message.

c) If an ATSU receives the above downlink, the following free text message should be sent: SET MAX UPLINK DELAY VALUE TO 999 SEC. This will minimise the possibility of subsequent uplink messages being rejected. If this message is also rejected, the instruction should be provided via voice.

d) The delayed uplink may be re-sent or the flight contacted via voice, at the controller's discretion.

4.3.11.3 For most Boeing aircraft entering a FIR, this function should be automatically be set to OFF with the following exceptions:

a) Boeing 777 (AIMS 1 and AIMS 2) aircraft have a default maximum delay value of 360 seconds;

b) all Boeing aircraft whose CPDLC connection has been transferred in accordance with xxx to xxx will maintain any maximum delay value enabled during the previous CPDLC connection;

c) Boeing 777 (AIMS 1 and AIMS 2) aircraft will maintain the last maximum delay value enabled during any previous CPDLC connection, until the aircraft has landed; and

d) it is possible the flight crew may set a maximum delay value, even if not instructed to do so.

4.3.11.4 For Boeing aircraft with this function ON, uplink messages received after the maximum delay time will be displayed to the flight crew, beneath the following text: UPLINK DELAY EXCEEDED.

NAT-47.— TK – Next paragraph, paragraph 4.6.11.

a) In the event a CPDLC uplink is received with the notation UPLINK DELAY EXCEEDED, the flight crew should:

1) REJECT the message (sends a NEGATIVE or UNABLE response);

2) advise, via voice, "DELAYED CPDLC MESSAGE RECEIVED"; and

3) request verification of ATC intent.

Note.— This paragraph is applicable only to Boeing aircraft for which the CODKC latency time function has been implemented - 777 AIMS 1 BP-03, 777 AIMS 2, 777 BP05, 737-600, 700, 800 & 900, 747-400 (Pegasus 3), 757 (Pegasus 3) and 767 (Pegasus 3).

NAT-48.— TK – Next paragraph, paragraph 4.6.12.

b) In the event a CPDLC uplink is received with the notation UPLINK DELAY EXCEEDED, and the flight crew is unable to establish voice contact, they should:

1) REJECT the message (this sends a NEGATIVE or UNABLE response); and

2) send the following free text message: DELAYED CPDLC MESSAGE RECEIVED; or

3) (for Boeing 777 aircraft) include the following reject reason: NOT CONSISTENT, PLEASE RE-SEND.

NAT-49.— TK – Next paragraph, NAT, para 5.16.4.2.

c) If an ATSU is advised that a delayed CPDLC message has been received, the following free text uplink message should be sent: SET MAX UPLINK DELAY VALUE TO 999 SEC. This will minimise the possibility of subsequent uplink messages being rejected. If this message is also rejected, the instruction should be provides via voice.

NAT-50.— TK – Next paragraph, NAT, para 5.16.4.3.

Editor's note 26. — TK - Contains cross-reference, NAT 4.11, not included in this version of GOLD.

d) Controllers should be aware of the flight crew procedures detailed in paragraph 4.3.11.4a) and b) and, at their discretion, re-send the delayed uplink or clarify the situation via voice (see NAT 4.11 for related aeradio procedures).

FOM 36.— TK – Next paragraph, FOM para 7.

4.4 Emergency and non-routine procedures

4.4.1 Emergency procedures

Although an emergency CPDLC message such as MAYDAY or PAN does not require a closure response, the controller must acknowledge receipt of the message and attempt to determine the nature of the emergency and ascertain any assistance required.

4.4.1.1 Response to an emergency message

NAT-51.— TK – Next paragraph, NAT, para 5.19.2.

Any downlink message that contains an emergency message element (see Appendix A, paragraph A.3 for the list of emergency message elements) should be treated as an emergency message.

FOM 37.— TK – Next paragraph, FOM para 7.1.1.

When a CPDLC or ADS-C emergency message is received the controlling authority, in order to better assess the nature of the emergency shall respond as in paragraph 4.4.1, and may also choose to:

a) Increase the periodic contract reporting rate to 5 minutes, or

b) Send a demand contract request.

Note 1.— This is not required if the periodic reporting rate has been increased – an ADS-C report will have already been triggered by the avionics when the new periodic contract is received).

Note 2.— Increasing the ADS-C reporting rate also reduces the period between cancellation of the ADS-C emergency and receipt of the ADS-C Cancel Emergency downlink.

4.4.1.2 Confirmation of emergency activation

NAT-52.— TK – Next paragraph, NAT, para 4.7.4.

When an ADS-C emergency message is received, the controller with control responsibility for the aircraft shall request confirmation of the emergency through voice communications with the aircraft (see paragraph 3.1.2.3.2 for related information).

NAT-53.— TK – Next paragraph, NAT, para 4.7.5.

When a controller not having control responsibility for the aircraft receives an ADS-C emergency report, he/she shall co-ordinate with the controlling authority to ensure that the emergency report has been received (see paragraph 3.1.2.3.2 for related information).

FOM 38.— TK – Next paragraph, FOM para 7.1.2.

When the ADS emergency mode is activated without a CPDLC emergency message or voice confirmation, and the demand contract report appears to indicate that the aircraft is maintaining normal operations (e.g. the aircraft is not in descent or involved in abrupt maneuvers), the aircraft may be subject to unlawful interference. To check for covert or inadvertent activation of the ADS-C emergency mode the free text uplink CONFIRM ADS shall be appended to a CONFIRM SPEED data or voice request:

Controller (free text)	CONFIRM SPEED CONFIRM ADS

The pilot shall then check the status of the aircraft's ADS-C Emergency Mode and if the emergency mode has been activated inadvertently, the pilot shall select ADS-C Emergency Mode to "OFF" and advise ATC by voice or the following CPDLC free text downlink.

Editor's note 27. — TK – Does response below require first a ROGER, then (free text) ADS RESET?

Pilot (free text)	ADS RESET

If the aircraft continues with the ADS-C emergency mode activated ATC shall assume the aircraft is in emergency conditions and follow normal alerting procedures.

4.4.1.3 Acknowledgement of an emergency message

When an ADS-C emergency accompanied by a CPDLC emergency message is received, the controller shall immediately acknowledge receipt of the emergency with the pilot by the most appropriate means (voice or CPDLC).

4.4.1.4 CPDLC acknowledgement of an emergency

A CPDLC acknowledgement shall be in the form of a free text message using the words ROGER MAYDAY or ROGER PAN. This uplink free text message requires a response from the pilot to close the CPDLC exchange. Depending on the nature of the emergency, the free text message may or may not be acknowledged by the pilot.

NAT-54.— TK – Next paragraph, NAT, para 5.19.4.

Editor's note 28. — TK - I believe that the aircraft will reject the UM3 response since, response attribute to downlink is N. Also, the crew will be required to respond to free text with a R response attribute for message closure.

Upon receipt of an emergency downlink message, the controller shall indicate to the aircraft that the message was received by:

a) responding with preformatted free text message ROGER PAN if the message contains DM 55 PAN PAN PAN;

b) responding with preformatted free text message ROGER MAYDAY if the message contains DM 56 MAYDAY MAYDAY MAYDAY; or

c) responding with UM 3 ROGER if the message contains DM 57, DM 58, DM 59, DM 60 or DM 61.

FOM 39.— TK – Next paragraph, FOM para 7.1.4.1.

4.4.1.4.1 Voice contact

When an emergency is acknowledged by CPDLC, controllers may also attempt to make voice contact with the aircraft.

NAT-55.— TK – Next paragraph, NAT, para 5.19.1.

It is expected that, in an emergency, flight crews will immediately revert to voice communications. This does not preclude crews from using CPDLC for emergency communications if unable to establish voice contact

FOM 40.— TK – Next paragraph, FOM para 7.1.5.

4.4.1.5 Retaining the active connection

If CPDLC is the best (or only) communications medium available between the aircraft and any ATSU, the ATSU with the active connection should maintain that connection until better assistance can be provided by another means. In this case, transfer of the connection should not occur to another unit, and any automatic transfer capability should be disabled, if possible, in order to improve the chances of the CPDLC connection being retained.

4.4.1.5.1 Communications responsibility

It is recognized that if a transfer of the CPDLC connection does not occur, then the responsibility for maintaining communications with the aircraft is retained by the current ATSU.

4.4.1.5.2 Executive control responsibility

In accordance with established procedures, the responsibility for the control of the flight rests with the ATSU within whose airspace the aircraft is operating. If the pilot takes action contrary to a clearance that has already been coordinated with another sector or ATSU and further coordination is not possible in the time available, then this action would be performed under the pilot's emergency authority.

4.4.1.6 Normal emergency procedures

After receipt of the emergency message is acknowledged, normal emergency response procedures shall be followed.

4.4.1.7 Coordination in the case of emergency

When the ADS-C emergency mode is observed by an ATSU that is not in control of the aircraft, that ATSU shall coordinate with the controlling authority to ensure that the emergency report has been received. Adjacent ATSUs shall not increase the reporting rate of the periodic contract.

NAT-56.— TK – Next paragraph, NAT, para 5.19.5.

4.4.1.8 Inadvertent emergency report

If an emergency downlink message is inadvertently sent, the flight crew should send DM 58 CANCEL EMERGENCY as soon as practicable. After sending DM 58, the flight crew should confirm their status and intentions via voice.

FOM 41.— TK – Next paragraph, FOM, para 7.2.

4.4.2 Data link connection failures

NAT-57.— TK – Next paragraph, NAT, para 4.9.3.

When CPDLC fails and communications revert to voice, all open messages should be considered not delivered and any dialogues involving those messages should be re-commenced by voice.

FOM 42.— TK – Next paragraph, FOM para 7.2.1.

4.4.2.1 Detected by the controller

When the controller recognizes a failure of the data link connection, the controller shall instruct the pilot to terminate the connection, by selecting ATC Com Off, and then initiate another AFN logon. Once the AFN logon is established, the ATS system should send a Connection Request message to re-establish the connection.

The voice phraseology to be used shall be:

Controller	Data link failed. Select ATC Com Off then Logon to [ATSU name]
Pilot	Roger

Note.— The [ATSU name] is the 4 character ICAO code.

4.4.2.2 Detected by the airborne system

When the avionics/pilot recognizes a failure of the data link connection, the pilot shall terminate the connection by selecting ATC Com Off and then initiate a new AFN logon (FN_CON) to the current controlling authority.

4.4.2.3 Inability to establish the data link connection

In situations where a data link connection cannot be established successfully, the ATS system should indicate to the controller that no connection has been established.

FOM 43.— TK – Next paragraph, FOM, para 7.3.

4.4.3 Data link system shutdowns

4.4.3.1 Unexpected data link shutdowns

In the event of an unexpected data link shutdown, the relevant ATSU shall inform:

- All currently connected FANS-1/A equipped aircraft via voice;

The voice phraseology to be used shall be:

Controller	Data link failed. Select ATC Com Off. Continue on voice
Pilot	Roger

- The adjacent ATSUs by direct coordination; and
- All relevant parties via the publication of a NOTAM, if appropriate.

Pilots shall terminate the data link connection and use voice until informed by the ATSU that the data link system has resumed normal operations.

4.4.3.2 Planned data link shutdowns

When a planned data link system shutdown of the communications network, or of the ATS system, occurs a NOTAM shall be published to inform all affected parties of the shutdown period. During that time period, voice shall be used.

The following voice or data phraseology shall be used to advise airborne aircraft prior to the commencement of the shutdown.

Controller	Data link will be shutdown. Select ATC Com Off. Continue on voice *Note.— The pilot shall select ATC Com Off when the message is received.*
Pilot	Roger

4.4.3.3 Resumption of data link operations

The following voice phraseology shall be used to advise pilots that the data link system has resumed operations.

Controller	Data link operational Logon to [ATSU name]
Pilot	Logon [ATSU name]

Note.— The [ATSU name] is the 4 character ICAO code.

4.4.3.4 Data link component shutdown

Some ATSUs are not equipped with both CPDLC and ADS-C and consequently may experience shutdown of a single component of the data link system (i.e. CPDLC or ADS-C). For those ATSUs that

have both CPDLC and ADS-C it is not likely that just one component will shutdown, however it is possible.

ATSUs experiencing a shutdown of either CPDLC or ADS-C shall follow the procedures above for data link shutdowns as appropriate.

4.4.3.4.1 ADS-C only failure

When a shutdown of the ground component of the ADS-C system occurs, the ATSU affected shall inform all other affected parties of the shutdown and likely period. During that time period, position reports (via CPDLC if available, or via voice) will be required.

If a CPDLC service is still available, a CPDLC free text message shall be sent to the pilot notifying reporting requirements. The following phraseology shall be used:

Controller (free text)	ADS SHUTDOWN REVERT TO ATC DATA LINK POSITION REPORTS
Pilot	ROGER

4.4.3.4.2 Loss of ADS-C

If it is not possible to establish ADS-C contracts, or if ADS-C reporting from an aircraft ceases unexpectedly, it is possible that the pilot may have inadvertently selected ADS-C off. If CPDLC is still available, a CPDLC free text message shall be sent to the pilot, using the following phraseology.

Controller (free text)	CONFIRM ADS ARMED
Pilot	ROGER

Note.— If ADS-C had been turned off, re-arming it will not re-initiate previous ADS contracts. New ADS contracts will need to be uplinked by the ground station.

4.4.3.5 Network and satellite data service outages

In the event of a planned or unexpected network or satellite data service outage (e.g., Ground Earth Station failure), the communications service provider shall make timely notification of the situation to all ATSUs within the affected area.

- All currently connected FANS equipped aircraft via voice, using the following voice phraseology:

Controller	Data link failed Select ATC Com Off. Continue on voice
Pilot	Roger

- The adjacent ATSUs by direct coordination,
- All relevant parties via the publication of a NOTAM, if appropriate.

Pilots shall terminate CPDLC connections with the ATSU and use voice communications until informed by the ATSU that the system is again fully functional.

4.4.3.6 Unexpected avionics system shutdown

In the event of an unexpected avionics data link shutdown, pilots shall inform the ATSU of the situation using voice.

The voice phraseology to be used shall be:

Pilot	Data link failed. Selecting ATC Com Off. Continuing on voice
Controller	Roger. Continue on voice

Pilots shall continue to use voice until the functionality of the avionics can be re-established.

FOM 44.— TK – Next paragraph, FOM, para 7.4.

4.4.4 Total communications failure

The procedures covering complete communications failure (CPDLC and voice) shall be in accordance with current ICAO procedures.

FOM 45.— TK – Next paragraph, FOM, para 6..

4.5 Automatic dependent surveillance – contract (ADS-C)

FOM 46.— TK – Next paragraph, FOM, para 6.1.

4.5.1 Introduction

In the CNS/ATM environment, surveillance may be provided by Automatic Dependent Surveillance – Contract (ADS-C).

ADS-C allows the establishment of communication contracts between ground systems and an aircraft's avionics system. An ADS-C contract contains the ATC data requirements for ADS-C reporting as well as frequency of the ADS-C reports.

The implementation of ADS-C provides surveillance capability in oceanic and en-route continental airspace and is intended to replace CPDLC and verbal position reporting in areas where non-radar separation is currently applied.

In non-radar airspace, the effective use of ADS-C in the provision of air traffic services enhances flight safety, facilitates the reduction of separation minima and better accommodates user-preferred flight profiles.

FOM 47.— TK – Next paragraph, FOM, para 6.2.

4.5.2 ADS-C description

Three types of ADS contracts can be established with an aircraft. Each of these contracts operates independently from the others. These contracts are the:

- Periodic;
- Event; and
- Demand.

The establishment of ADS contracts is initiated by the ground system and does not require pilot action providing that the airborne system is armed. The pilot has the ability to cancel all contracts by selecting ADS-C off.

4.5.2.1 The periodic contract

The periodic contract allows an ATSU to specify the reporting frequency, to request that optional data groups be added to the basic ADS-C report, and to specify the frequency at which the optional groups are to be included in the reports.

The periodic reporting rate can generally be altered by the controller to allow for situations where a higher or lower reporting rate may be required. Only one periodic contract can be established between a ground system and a particular aircraft at any one time. Whenever a new periodic contract is established, the previous periodic contract is replaced. The periodic contract will remain in effect until it is modified or cancelled.

4.5.2.2 The event contract

An event contract specifies a request for reports to be transmitted by the aircraft whenever a defined "event" occurs. Only one event contract can be established between a ground system and a particular aircraft at any one time, however the event contract can contain multiple event types.

Note that multiple ATSUs with ADS-C connections can each establish their own event contracts with an aircraft.

Once an event contract has been established, it remains in effect until the specific event requests are fulfilled, or it is cancelled by the ground system.

The ***Vertical Rate Change Event*** is triggered when the aircraft's vertical rate is either less than or greater than a parameter defined in the contract.

The ***Lateral Deviation Change Event*** is triggered when the aircraft's actual position exceeds a lateral distance parameter from the aircraft's expected position on the active flight plan.

The ***Altitude Range Change Event*** is triggered when the aircraft's altitude exceeds the altitude ceiling or floor defined in the contract by the ground system.

Once a vertical rate change, lateral deviation change, or altitude range event trigger has occurred, a recurrence of this event no longer triggers an event report. The ground system must initiate a new event contract every time that one of these specific events occurs.

The ***Waypoint Change Event*** is triggered by a change to the next or the next-plus-one waypoints. Such a change normally occurs due to routine waypoint sequencing. However, it will also be triggered by occurrences such as a change to a non-ATS waypoint entered by the pilot for operational reasons, or execution of a new route affecting the next or next-plus-one waypoints. Unlike the other event contracts, the waypoint change event

trigger remains in effect for all waypoint changes.

4.5.2.3 The demand contract

The demand contract is a "one-off" request from the ground system for the FMS to provide an ADS-C report containing specific data as defined in the request. A demand contract can be requested by the ground system at any time. The demand contract request will not affect any existing contracts.

4.5.2.4 Emergency mode

The emergency mode can only be activated by the pilot and is normally cancelled by the pilot. While it is possible for some ground systems to cancel the emergency mode status, most ground systems do not have this capability although some ground systems can control the "display" of the emergency mode status to the controller. The pilot normally activates the ADS-C emergency mode automatically by sending a CPDLC MAYDAY message, although the ADS-C emergency mode can also be set independently. When the ADS-C emergency mode is set, the aircraft immediately sends an ADS-C report containing an emergency flag that is interpreted by all ground systems that currently have periodic or event contracts established with that aircraft. The aircraft does not automatically send an ADS-C report at the time that the emergency mode is set.

When the pilot cancels the emergency mode, the aircraft will send an emergency mode cancellation message to each ground station receiving the emergency mode reports with the next periodic report, whenever it may be due. The cancellation message will remove the emergency flag from the periodic contract, but the data contents will remain the same as per the emergency contract. Any previously existing data groups requested by the ground system will not be restored unless the ground system re-negotiates the periodic contract following receipt of the emergency cancellation message. Existing event contracts are unaffected by the emergency cancellation.

Note.— the Boeing B717 and B737 models will send the ADS-C emergency cancellation message immediately after being selected by the pilot.

FOM 48.— TK – Next paragraph, FOM, para 6.3.

4.5.3 Factors to be considered when using ADS-C

4.5.3.1 Vertical and lateral variations

Where the Altitude Range Change Event and Lateral Deviation Event contracts are established, the controller will only be alerted to vertical or lateral variations that exceed the associated tolerances.

Note.— If a regular periodic report is sent as the aircraft is deviating from cleared level or route (but still within the level or lateral tolerances) the controller will still be alerted to the variation despite no event report having been sent.

4.5.3.2 Figure of Merit (FOM) data in ADS-C reports

ADS-C reports contain FMS information relating to the figure of merit, ACAS/TCAS and the aircraft's navigational redundancy. Some automated ground systems use the FOM value received in an ADS-C report to determine whether to display the report to controllers, or to display a "high" or "low" quality ADS-C symbol.

FOM data is not required for the use of current separation standards. However, where the separation standard being applied requires specific navigational accuracy, such as RNP, controllers shall rely on pilot advice as to the extent of any navigational degradation and shall adjust separation accordingly.

4.5.3.3 Flight crew modification of active route

The flight crew will often insert non-ATS waypoints into the active flight plan in the FMS for flight system monitoring, or will modify the active route for planning purposes. Once the change is activated, a Waypoint Change Event report may be triggered. If so, non-ATS waypoints included in the active flight plan will be reflected in the Predicted Route Group, as well as the Intermediate and Fixed Projected Intent Groups, which may result in the next, or the next-plus-one waypoints from the report not being waypoints expected in the ATS flight plan or flight data record.

NAT-58.— TK – Next paragraph, NAT, para 4.4.1.

Flight crews should not insert non-ATC waypoints (e.g. mid-points) in cleared oceanic flight legs, as it will result in transmission of unwanted ADS-C reports. Non ATC waypoints may prevent the provision of proper ETA data in the ADS-C reports required for ATC purposes.

FOM 49.— TK – Next paragraph, FOM, para 6.4.

4.5.4 ADS-C connection management

4.5.4.1 Priority for the ADS-C connection

FANS-1/A equipped aircraft can have up to five ADS-C connections. One of the five connections is reserved for use by the AOC. The aircraft has the capacity to report to four different ATSUs simultaneously using ADS-C.

The FANS-1/A system does not assign any technical priority to ADS-C connections; therefore the controlling ATSU may not be aware of other connections established with the aircraft. As a result, a procedural hierarchy controlled by the Address Forwarding process (FN_CAD message) has been established.

4.5.4.1.1 Allocation of ADS-C connections

Using the Address Forwarding process, the current controlling authority shall allocate ADS-C connection priority to the next ATSU that will have air traffic control responsibility for the aircraft. The priority for the allocation of ADS-C connections shall be in accordance with the following list:

a) The Current Data Authority,

b) The Next Data Authority,

c) An ATSU requiring a connection for monitoring operations close to a boundary,

d) Airline AOC

e) Other miscellaneous connections.

4.5.4.2 Near boundary ADS-C connections

4.5.4.2.1 Monitoring of an aircraft operating close to an airspace boundary

Editor's note 29. — ND – Next paragraph, conflicts with NAT, in which management of ADS-C connections is automatic.

When an aircraft will operate within the defined coordination parameter of the boundary with an adjacent ADS-C capable FIR, controllers shall determine during coordination whether that ATSU requires an ADS contract to monitor the aircraft's progress near the boundary.

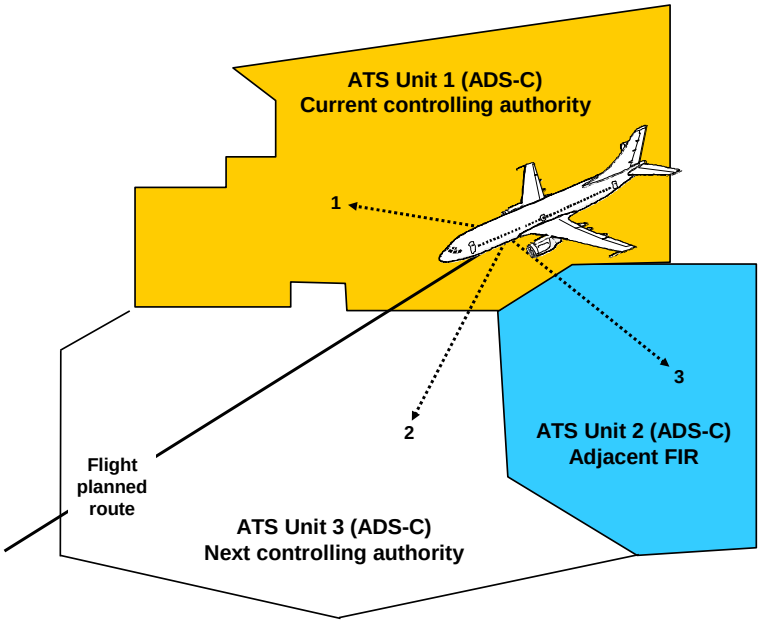


Figure 4-10. Priorities for ADS-C connections

An ADS-C contract is required by ATSU 2 to monitor the aircraft's progress near the FIR boundary. To ensure that the next unit with direct control responsibility for the aircraft has priority over the ADS-C connections, Address Forwarding to ATSU 3 will be initiated by ATSU 1 prior to Address Forwarding to ATSU 2.

4.5.4.2.2 Other ground facilities requesting ADS contracts

All ground facilities, without having direct control or monitoring requirements for that aircraft, seeking an ADS contract with a specific aircraft (e.g. for ADS-C test purposes) must coordinate with the controlling authorities and the operator prior to the departure of the flight.

4.5.4.3 ADS-C connections not available

When all available ADS-C connections with a particular aircraft have been established (see Figure 2), any other ATSUs attempting to connect with the aircraft will receive an ADS DISCONNECT REQUEST message with "reason code 1" (Congestion).

When an ADS DISCONNECT REQUEST is received by an ATSU, which would normally have priority for an ADS-C connection, the current controlling authority should be notified. The controlling authority shall resolve the situation.

The controlling authority has a number of options available, such as coordination with the previous ATSU or other adjacent ATSUs to ensure that existing ADS-C connections are still required, or when considered absolutely necessary, instructing the pilot to turn the ADS-C application off and turn it on again. The latter option will terminate all current ADS contracts; therefore, the controlling authority should consider the operational effect on other ATSUs prior to employing this method.

Once all contracts have been terminated, the controlling authority shall allocate priority for the connections to other ATSUs via the Address Forwarding process. Only ATSUs with direct control or monitoring responsibilities shall re-establish contracts with the aircraft.

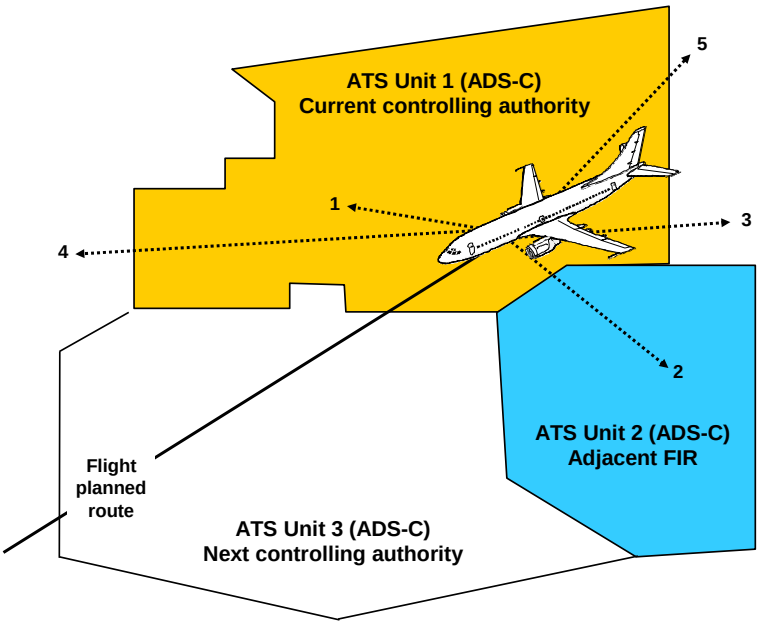


Figure 4-11. ADS-C connection not available

The aircraft has ADS-C connections with four ground facilities and the airline AOC:

Connection:	1 - with ATSU 1, 2 - with ATSU 2, 3 - with the previous controlling authority, 4 - with the airline AOC, 5 - with a ground facility collecting test data.

ATSU 3, the next controlling authority, is unable to establish an ADS-C connection with the aircraft due to congestion.

4.5.4.4 Ground system termination of ADS-C connections

The termination of ADS contracts with an aircraft, whether performed automatically or manually, should be strictly monitored to avoid situations leading to congestion. ADS contracts and connections should be terminated by the ground system when the:

- Aircraft has crossed an FIR boundary and has passed beyond the normal "back coordination" parameter; or
- The ground system's FDPS flight plan for the aircraft has been cancelled or has finished; or
- Previous ATSU, the controlling authority or an adjacent ATSU has no further surveillance or monitoring requirements for a particular flight.

FOM 50.— TK – Next paragraph, FOM, para 6.5.

4.5.5 Reporting rates

4.5.5.1 General

There are a number of situations where a controller may consider the use of a reporting rate other than that used as the default in the periodic reporting contract. Some automated systems have the capability of defining reporting rates that can automatically change from one area to another along the route segment to take into account changes in traffic density along the route.

Where the ground system does not contain the ability to automatically change the reporting rate, the controller should take action, where possible, to manually change the periodic reporting rate when operationally required. Some examples where a change to the rate may be required are:

- When the aircraft is approaching a crossing route on which there is other traffic;
- When the aircraft is approaching areas of known significant weather;
- During periods of turbulence; or
- When an unauthorized deviation from the clearance is detected.

4.5.5.2 Appropriate reporting rates

ATSUs should ensure that the periodic reporting rate in use is in accordance with the position reporting requirements of the separation standards being used. When not required for the application of separation, or other factors, ATSUs should consider using less frequent periodic reporting rates for individual aircraft to reduce overall costs to the system.

4.5.5.3 Avoid high periodic reporting rates

Arbitrarily selecting high periodic reporting rates adds undue economic costs and unnecessarily loads the data link system.

4.5.5.4 Other factors to be considered

Editor's note 30. — ND – Next paragraph, perhaps make this 14 to allow flexibility for 30/30 reporting requirement?

Depending on individual circumstances the controlling authority should limit the periodic reporting rate to not more frequently than five (5) minutes. Adjacent ATSUs with ADS contracts established with the same aircraft should restrict the periodic reporting rate to not more frequently than 15 minutes unless coordination is performed with the controlling authority and the controlling authority agrees to reduce any relatively high reporting rate currently in effect.

4.5.5.5 Default periodic reporting rates

When setting a default periodic reporting rate, ATSUs should take into account factors such as conformance with ATC clearance requirements, traffic levels, alerting service requirements, and separation standard requirements.

FOM 51.— TK – Next paragraph, FOM, para 6.6.

4.5.6 Separation

ADS-C may be used for the application of procedural separation within a mixed surveillance environment, such as airspace where position reports are provided by a mixture of ADS-C, CPDLC and voice.

For example, ADS-C may be used to determine separation between two or more aircraft reporting by ADS-C, between ADS-C and non-ADS-C aircraft, between ADS-C aircraft and an aircraft identified on radar, and to ensure separation between ADS-C aircraft and special use airspace, such as military restricted areas.

4.5.6.1 Appropriate ADS-C reporting requirements

When position reporting is being provided via ADS-C, to ensure that estimates being used for the application of separation are accurate ATSUs should establish appropriate:

- ADS contracts; and
- Periodic reporting frequencies.

4.5.6.2 Appropriate separation standard

A separation standard to be applied in a mixed surveillance environment must be appropriate to the communications and navigational capability of the relevant aircraft. In the case of separation being

applied between ADS-C and non-ADS-C aircraft, the separation standard must be appropriate to the capabilities of the non-ADS-C aircraft.

4.5.6.3 Vertical separation

4.5.6.3.1 Vertical tolerance consistency

Where practical, the tolerances used to determine whether a specific level is occupied by an ADS-C reporting aircraft within the airspace of a specific ATSU should be consistent with other tolerances used throughout the airspace. For example, the vertical tolerances for ADS-C should be consistent with vertical tolerances used for level adherence monitoring by other forms of surveillance, such as radar.

4.5.6.3.2 Application of vertical tolerances

Where other vertical tolerances do not exist, the vertical tolerances to be applied for ADS-C shall be (±) 300 feet. However, an individual ATSU may specify in local instructions and the AIP that a tolerance of not less than (±) 200 feet will be used to provide consistency with other vertical tolerances applied within the FIR.

4.5.6.3.3 ADS-C level information does not satisfy vertical tolerance

If displayed ADS-C level information does not satisfy the required tolerance for an individual ATSU then the pilot shall be advised accordingly and requested to confirm the aircraft's level. If following confirmation of the level the displayed ADS-C level information is still beyond the required tolerance, another method of separation or another method of determining level information may need to be applied.

4.5.6.3.4 Use of ADS-C level information

When displayed ADS-C level information is within the specified tolerance of the expected or cleared flight level, the ADS-C level information may be used for the application of vertical separation, and to determine that an aircraft has reached or is maintaining a specified level.

4.5.6.3.5 Passing or leaving a level

An aircraft can be considered to have left a specified level when the displayed ADS-C level information indicates that the aircraft has passed the level in the required direction by more than the required tolerance.

4.5.6.4 Longitudinal separation

4.5.6.4.1 Limitations on the use of tools

ATSUs that use approved or integrated measurement tools for the purpose of determining screen-based separation should publish in local documentation any limitations on the use of such tools for the establishment and monitoring of separation standards.

4.5.6.4.2 Establishing longitudinal separation

ADS-C reports may be used to establish and monitor longitudinal time and distance separation standards.

4.5.6.4.3 Using extrapolated or interpolated positions

Some ground systems display an extrapolated or interpolated ADS-C symbol between the receipt of ADS-C reports. Providing that the periodic reporting rate in use is in accordance with any reporting rate

required by the separation standard, separation may be determined between the extrapolated/interpolated symbols by the use of screen-based measurement tools, or by the use of automated conflict detection tools.

4.5.6.4.4 Validity of displayed information

When extrapolated or interpolated ADS-C symbols are being used to provide separation and any doubt exists as to the integrity or validity of the information being presented, the controller shall send a Demand Contract Request to update the relevant information. If doubt still exists, the controller should consider the use of an alternative method of separation.

4.5.6.4.5 Time-based separation

Ground system flight data records updated by ADS-C reports may be used in the application of appropriate time-based separation standards. Methods of determination may include reference to:

- Estimates at actual waypoints;
- Calculated estimates for positions not contained in the ATS flight plan;
- Screen-based measurement tools; or
- Automated conflict detection tools.

4.5.6.4.6 Distance-based separation

ADS-C reports may be used for the application of appropriate longitudinal distance standards. Methods of determination may include:

- The use of automated system tools to measure the displayed positions of two or more aircraft reporting by ADS-C;
- Comparing the displayed position of an ADS-C aircraft with the position of another aircraft determined by an alternative form of surveillance; or
- The use of automated conflict detection tools.

4.5.6.5 Lateral separation

4.5.6.5.1 Areas of lateral conflict

ADS-C reports can be used to determine whether an aircraft is within or beyond an area of lateral conflict. Where lateral conflict calculations are not made by automated conflict detection tools, an ADS-C report observed outside an area of lateral conflict displayed or calculated on the screen is confirmation that the aircraft is outside the area of conflict.

FOM 52.— TK – Next paragraph, FOM, para 6.7.

4.5.7 Air traffic clearance monitoring

ADS-C reports can be used to monitor conformance with air traffic clearances.

4.5.7.1 Deviations from ATC clearances

The pilot of an ADS-C aircraft observed to deviate significantly from its cleared flight profile shall be advised accordingly. The controller shall also take action as appropriate if such deviation is likely to affect the air traffic service being provided.

FOM 53.— TK – Next paragraph, FOM, para 6.8.

4.5.8 Coordination

4.5.8.1 Duty of care responsibility

As airlines bear the cost of data link communications, ATSUs should be aware of Duty of Care responsibility issues when ADS-C and other technologies allow the surveillance of aircraft and the possible detection of conflicts inside another ATSU's airspace. Local ATS instructions and/or Letters of Agreement between units should detail the coordination response required from one ATSU in the case of a suspected conflict being detected in the adjacent ATSU's airspace. Unless required for safety purposes, ATSUs should ensure that ADS-C is only enabled for aircraft inside their Area of Interest.

4.5.8.2 Coordinated data inconsistent with ADS-C displayed data

The transferring controller shall advise during coordination if the aircraft is currently at a level or on a route different from that intended for the boundary crossing. When the coordination information relating to the transfer of control is different from the displayed ADS-C information and the required advice has not been provided, the receiving controller shall confirm the coordinated information with the transferring controller.

FOM 54.— TK – Next paragraph, FOM, para 6.9.

4.5.9 Alerting service

For ADS-C aircraft, the provision of the alerting service should be based on the scheduled position reports provided by the periodic reporting contract.

4.5.9.1 Late or missing ADS-C Reports

Editor's note 31. — ND – Next paragraph, differs from NAT material as below.

Whenever an ADS-C report (either a periodic or waypoint report) is not received within a parameter of the expected time, the controller should initiate a demand contract request or establish a new periodic contract with the aircraft.

NAT-59.— TK – Next paragraph, NAT, para 4.7.1.

Whenever an ADS-C waypoint position report is overdue by more than an interval, as determined by ATC, a controller shall action to advise the aircraft concerned, confirm their ADS-C is armed, and request a voice position report. If the pilot or the controller notices intermittent operation, either may elect to revert to voice reporting at any time. (Flight crews would be expected to terminate ADS-C and resume voice reporting for the remainder of the flight.)

NAT-60.— TK – Next paragraph, NAT, para 4.7.2.

4.5.9.2 Corrupt or incorrect ADS-C Reports

A controller who becomes aware of corrupt or incorrect data shall initiate action to establish voice contact with the aircraft concerned in order to correct the situation.

NAT-61.— TK – Next paragraph, NAT, para 4.7.3.

4.5.9.3 Data Link failure

If the controller is advised, or becomes aware of, a data link communications failure, aircraft concerned shall be advised as necessary to revert to voice position reporting.

FOM 55.— TK – Next paragraph, FOM, para 6.10.

4.5.10 Aircraft navigation

4.5.10.1 Aircraft in heading select mode

When the aircraft is in Heading Select Mode, the intent and predicted route information being transmitted by the aircraft will project towards the next FMS flight plan waypoint regardless of the actual position and heading of the aircraft. Predicted information is based on the FMS intent, which may not necessarily be the intent of the pilot.

If the aircraft is in Heading Select Mode, and the aircraft passes abeam a flight planned waypoint by more than a defined parameter the FMS will not sequence this or subsequent waypoints. The effect on a ground system of a waypoint that has not been sequenced is that the intent information, once the aircraft has passed the waypoint, will be directed back towards the non-sequenced waypoint. As a result, some ground systems may see an extrapolated symbol move in a different direction to the actual track of the aircraft.

4.5.10.2 Sequencing subsequent waypoints

If a waypoint is passed abeam by more than the aircraft FMS parameter while flying in Heading Select Mode, the FMS must be re-programmed (e.g. to fly direct to the next relevant waypoint) to enable subsequent waypoints to be sequenced.

Note.— See also CPDLC Sequencing "ABEAM" waypoints in excess of FMS parameters.

FOM 56.— TK – Next paragraph, FOM, para 6.11.

4.5.11 Position reporting

4.5.11.1 Position reporting requirements in ADS-C airspace

ATSUs may promulgate in the AIP that ADS-C reports fulfill all normal position reporting requirements within the nominated FIR.

4.5.11.1.1 Publishing reporting requirements

ATSUs should publish ADS-C and CPDLC position reporting requirements in the AIP.

4.5.11.1.2 CPDLC report at FIR entry position

Editor's note 32. — ND – Next paragraph, not a NAT procedure.

When an ATSU has nominated the use of ADS-C reporting only within the associated FIR, a CPDLC position report at the FIR entry position is still required to confirm that the ATSU holds the status of Current Data Authority. Following the initial CPDLC report at the boundary, no further CPDLC or voice position reports will be required for operations within the FIR.

4.5.11.1.3 Updating waypoint estimates

ATSUs should publish in the AIP that pilots are not required to update estimates for waypoints when the aircraft is reporting by ADS-C in airspace where additional CPDLC or voice reports are not required. Exceptions to this rule are that updates to estimates are required when:

- An estimate previously advised by voice or CPDLC will change by more than 2 minutes; or
- A pilot-initiated action, such as a change in speed, will change the estimate for the next reporting point by more than 2 minutes.

NAT-62.— TK – Next paragraph, NAT, para 4.4.2.

- The crew may assume that the estimate for the next waypoint, shown on the FMS at the time a waypoint is crossed, is the estimate transmitted to ATC in the ADS-C report. If that estimate subsequently changes by three minutes or more, a revised estimate shall be transmitted via voice to the ATS unit concerned as soon as possible.

FOM 57.— TK – Next paragraph, FOM para 6.11.1.4.

4.5.11.1.4 Non-compulsory waypoints

Editor's note 33. — ND – Next paragraph, direct conflict with NAT procedures

When reporting by ADS-C only, the flight crew is not required to modify the route to remove non-compulsory waypoints. Waypoint event reports will be sent at all non-compulsory reporting points and will be reflected in the predicted route group.

4.5.11.2 Discrepancies between ADS-C and CPDLC estimates

Controllers should be aware that CPDLC and ADS-C estimates received from the same aircraft for the same position may differ as a result of the ADS-C application reporting time to the second and the time reported by CPDLC application either being truncated or rounded to the nearest full minute (depending on aircraft type). The pilot also has the ability to modify the estimate for the next position in the CPDLC position report. Any such modification will not be reflected in the ADS-C report.

4.5.11.2.1 Actions to be followed when there is an estimate discrepancy

When an ATSU is using both ADS-C and CPDLC reporting and a discrepancy of less than 3 minutes between the reports is detected, the ATSU should detail in local documentation methods to be used by the controller for the reconciliation of the time difference. Where the time difference exceeds 3 minutes, the controller shall query the estimate received in the CPDLC position report and request confirmation of the estimate for the waypoint in question.

Editor's note 34. — TK - It may be desirable to include FMC WPR procedures in Appendix or remove altogether from this document.

4.6 Flight management computer waypoint position reporting (FMC WPR)

4.6.1 Flight crew - FMC WPR

NAT-63.— TK – Next paragraph, NAT, para 10.1.c.

4.6.1.1 The aircraft identification (ACID) shall be correct as per filed flight plan.

NAT-64.— TK – Next paragraph, NAT, para 10.7.

Editor's note 35. — TK – Do we need some text in Appendix F for aircraft variation?

4.6.1.2 Participating flights (except for those of Boeing 777 aircraft with software prior to BLOCK.01) shall provide for FMC derived air report (ARP) messages with accurate wind and temperature data, to MET facilities as appropriate for each FIR.

NAT-65.— TK – Next paragraph, NAT, para 4.5.

4.6.1.3 When FMC WPRs are manually initiated, this should be done within 3 minutes of crossing each waypoint. If this cannot be achieved, the FMC WPR should not be triggered, but a voice report made instead.

4.6.1.4 The crew may assume that the estimate for the next waypoint, shown on the FMS at the time a waypoint is crossed, is the estimate transmitted to ATC in the ADS-C report. If that estimate subsequently changes by three minutes or more, a revised estimate shall be transmitted via voice to the ATS unit concerned as soon as possible.

4.6.1.5 Flight crews should avoid inserting non-ATC waypoints (e.g. mid-points) in cleared oceanic flight legs, as non-ATC waypoints may prevent the provision of proper ETA data in the FMC reports required for ATC purposes.

Editor's note 36. — TK – Next paragraph, contains NAT cross-references not yet in GOLD.

4.6.1.6 If the flight number contains an alphabetic character (such as ABC132A or ABC324W) the flight cannot participate in FMC WPR and the flight crew should not use the term "F-M-C" during contact with aeradio (see paragraph 3.2.3.6 for more information regarding this technical problem). Flight crews should not use the initial contact procedures in NAT para 4.3, but should revert to normal voice procedures.

NAT-66.— TK – Next paragraph, NAT, para 4.8.

4.6.2 ATC - FMC WPR

4.6.2.1 Whenever an FMC WPR is overdue by more than a specific interval, as determined by ATC, a controller must take action to advise the aircraft concerned and request a voice position report. If either the pilot or the controller notices intermittent operation, either may revert to voice reporting at any time. (Crews would be expected to report by voice for the remainder of the flight.)

4.6.2.2 A controller who becomes aware of corrupt or incorrect data shall initiate action to establish voice contact with the aircraft concerned in order to correct the situation.

4.6.2.3 If the controller is advised, or becomes aware of, a data link communications failure, aircraft concerned shall be advised as necessary to revert to voice position reporting.

NAT-67.— TK – Next paragraph, NAT, para 9.

4.7 CPDLC voice phraseologies

Where CPDLC-related voice communications are required, flight crews and controllers should utilise the appropriate phraseology as detailed below.

The phrase "CPDLC" is spoken as "see-pee-dee-ell-see".

The phrase "ADS" is spoken as "ay-dee-ess".

4.7.1 ATC phraseology

To instruct flight crews to manually initiate Logon to the subsequent ATSU:

SELECT ATC COM OFF THEN LOGON TO [ATSU name]

Note 1.— Use the ICAO four character code when identifying the ATSU.

Note 2.— Use this phraseology when the NDA message delivery or address forwarding is unsuccessful or when the END SERVICE message does not terminate the CPDLC connection.

To inform aircraft that the FANS 1/A data link has failed:

DATA LINK FAILED. SELECT ATC COM OFF. CONTINUE ON VOICE.

To advise aircraft prior to the commencement of a FANS 1/A data link shutdown:

DATA LINK WILL BE SHUT DOWN. SELECT ATC COMM OFF. CONTINUE ON VOICE.

To advise 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 of a complete ground system failure:

ALL STATIONS CPDLC FAILURE [identification of station calling].

4.7.2 Pilot phraseology

To advise ATC that the CPDLC connection is being terminated manually:

CPDLC CONNECTION WITH [current ATSU] TERMINATED. CONNECTING WITH [subsequent ATSU].

Note.— The pilot may use the ICAO four-character codes or plain language at his/her discretion.

To advise 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 a delayed CPDLC uplink has been received:

DELAYED CPDLC MESSAGE RECEIVED.

Note.— See paragraph 4.3.11.4 a) for associated procedures.

Appendix A CPDLC message elements and standardized free text messages (Tom)

NAT-68.— TK – This Appendix, NAT para 6.7, 6.7.1, 7, 8, 8.1, 8.2, 8.3, 8.4.

FOM 58.— TK – This Appendix, FOM, para 5.9, 5.9.1 through 5.9.24, 5.10, 5.10.1 through 5.10.6, 9.4, 9.4.1, 9.4.2.

Editor's note 37. — TK - The references used to create this section are listed below:
a) **PANS/ATM** *– ICAO Doc 4444, 15th Edition, Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM), applicable date 27 November 2003.*
b) **Asia-Pac** *– FANS 1/A Operations Manual, Version 6, dated September 2008.*
c) **NAT** *– North Atlantic Guidance Material for ATS Data Link Services in North Atlantic Airspace, version 18, dated November 2008.*
d) **Ocean SPR** *– RTCA DO-306/EUROCAE ED-122, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard), dated 11 October 2007.*
e) **FANS 1/A-ATN** *– RTCA DO-305/EUROCAE ED-154, Future Air Navigation System 1/A – Aeronautical Telecommunication Network Interoperability Standard (FANS 1/A – ATN INTEROP Standard), dated 26 June 2007.*
f) **Cont SPR** *– RTCA DO-290/EUROCAE ED-120, Change 1 and Change 2, Safety and Performance Requirements Standard for Air Traffic Data Link Services in Continental Airspace (Continental SPR Standard), dated 26 June 2007.*
g) **ATN B1** *– RTCA DO-280B/ED-110B, Interoperability Requirements Standard for ATN Baseline 1 (ATN B1 INTEROP Standard), dated 26 June 2007. (Refers only to message elements defined for ACM, ACL, and AMC data link services, i.e., Link 2000+)*
h) **FANS 1/A** *– RTCA DO-258A/ED-100A, Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications (FANS 1/A INTEROP Standard), dated 7 April 2005.*

Color coding and emphatic text is used as follows:
a) White text is taken from PANS/ATM and represents the intended global baseline.
b) Text supplemental to PANS/ATM is highlighted in yellow.
*c) In the "Message Element" and "Resp." columns, bold text is used to indicate "**preferred**" or what is to be used for future builds; italics is used to indicate "legacy" or FANS 1/A implementation.*
c) The cells "GOLD review" column are shaded green if they are valid messages in the PANS/ATM message set and red if they are reserved in the PANS/ATM message set.
d) The "GOLD review" column provides the source documents that discuss the message element. If the source document does not discuss the message element, it is not listed in the column, unless otherwise indicated (NL), which is only in the case of the **NAT** *on some of the message elements.* **N/A** *indicates that guidance for the message element is not provided in any of the source documents.*
e) The source document is highlighted in the opposite color of the cell color to indicate and inconsistency. In other words, red is used in a green cell when the source document states that the message element is not being used, but the message element is defined in PANS/ATM. Green is used in a red cell when the source document states that the message element is being used or has been implemented, but the message element is "reserved" in the PANS/ATM.

ACTION for the GOLD Ad Hoc Working Group:
a) review text highlighted in yellow to determine whether or not to incorporate it into the GOLD as

supplemental to the PANS/ATM material.
b) review each of the inconsistencies identified in the "GOLD review" column and determine how to address the inconsistency in the GOLD.

This appendix contains the CPDLC message elements and standardized and preformatted free text messages. The following guidelines apply:

a) In cases where there is a choice for the message element or the response attribute, the first choice that appears in the row for that message element is shown in **bold text** and indicates the preferred choice and should be used for new implementations. The second choice is shown in *italic text* and indicates legacy implementations that are considered acceptable.

b) The following variables are considered operationally interchangeable in this document respecting range and resolution variations as defined in interoperability standards:

ICAO Doc 4444 variable	**Equivalent variable**
[level]	[altitude] *(See Note)*
[specified distance][direction]	[distance offset][direction]
[departure clearance]	[predeparture clearance]
[unitname]	[icao unitname]
[code]	[beacon code]
[facility designation]	[icao facility designation]
[persons on board]	[souls on board]

Note.— ICAO Doc 4444 notes that message elements that contain the [level] variable can be specified as either a single level or a vertical range. **FANS 1/A** *only considers the [level] variable as a single level and uses message elements that are intended exclusively for specifying a vertical range, e.g., UM 30, UM 31, UM 32, UM 180, DM 7, DM 76, DM 77, etc.* **ATN B1** *uses the [level] variable to specify a vertical range and does not use the message elements intended exclusively for specifying a vertical range, except in cases where an ATN B1 ground system provides data link service to FANS 1/A aircraft.*

A.1 CPDLC message element response requirements key

Response column	**PANS/ATM, References: a), b), c), and i)** **Supplemental information, References: All**
	For uplink message
W/U	Response required. Yes Valid responses. WILCO, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR *FANS 1/A – WILCO, UNABLE, STANDBY, ERROR, NOT CURRENT DATA AUTHORITY.* *Asia-Pac and NAT – WILCO, UNABLE, will close the uplink message. Under some circumstances, and ERROR message will also close an uplink message.*
A/N	Response required. Yes Valid responses. AFFIRM, NEGATIVE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR *FANS 1/A – AFFIRM, NEGATIVE, STANDBY, ERROR, NOT CURRENT DATA AUTHORITY.* *Asia-Pac and NAT – AFFIRM, NEGATIVE, will close the uplink message. Under some circumstances, and ERROR message will also close an uplink message.*
R	Response required. Yes Valid responses. ROGER, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR *FANS 1/A.— ROGER, STANDBY, ERROR, NOT CURRENT DATA AUTHORITY.* *Asia-Pac and NAT.— ROGER, will close the uplink message. Under some circumstances, and ERROR message will also close an uplink message.* *Note.— FANS 1/A aircraft do not have the capability to send UNABLE in response to an uplink message containing message elements with an "R" response attribute. For these aircraft, the flight crew may use alternative means to UNABLE the message. These alternative means will need to be taken into consideration to ensure proper technical and operational closure of the communication transaction.*
Y	Response required: Yes Valid responses: Any CPDLC downlink message, LOGICAL ACKNOWLEDGEMENT (only if required)
N	Response required. No, unless logical acknowledgement required. Valid Responses. LOGICAL ACKNOWLEDGEMENT (only if required), NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, ERROR *Asia-Pac, NAT, & FANS 1/A – Defined "Response not required," but not used. Under some circumstances, and ERROR message will also close an uplink message.*

NE	Response required. [Not defined] *FANS 1/A.— WILCO, UNABLE, AFFIRM, NEGATIVE, ROGER, STANDBY, not enabled.* *Asia-Pac and NAT.— Most messages with an NE attribute require an operational response. Only the correct operational response is presented to the pilot. The uplink message is considered to be closed on sending and does not require a response to close the dialogue. The WILCO, UNABLE, AFFIRM, NEGATIVE, ROGER, and STANDBY responses are not enabled for pilot selection. Under some circumstances, and ERROR message will also close an uplink message.*
	For downlink messages
Y	Response required. Yes Valid responses. Any CPDLC uplink message, LOGICAL ACKNOWLEDGEMENT (only if required) *Asia-Pac, NAT, and FANS 1/A.— Response required.*
N	Response required. No Valid responses. LOGICAL ACKNOWLEDGEMENT (only if required), SERVICE UNAVAILABLE, FLIGHT PLAN NOT HELD, ERROR *Asia-Pac, NAT, and FANS 1/A.— Response not required.* *Note.— FANS 1/A aircraft do not have the capability to receive responses to downlink message elements with an "N" response attribute. In some cases, such as for most emergency messages, the response attribute is different between FANS 1/A aircraft and PANS/ATM. For these aircraft, the ATC will need to use alternative means to acknowledge to the flight crew that the message has been received.*

Multi element uplink messages require only a single closure response. The response required for a multi element message is the highest priority response out of each of the elements in the message. When determining the highest priority, the following priority order is used:

a) W/U

b) A/N

c) R

d) N or NE

For example, the uplink CLIMB TO AND MAINTAIN FL370. REPORT LEVEL FL370 contains two elements. The first element requires a "W/U" response, the second an "R" response. The highest priority response is W/U, therefore this is the response required for closure.

A.2 CPDLC uplink message elements

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
	Responses/ Acknowledgements (uplink)			
UM 0	Indicates that ATC cannot comply with the request.	UNABLE	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 1	Indicates that ATC has received the message and will respond. *Asia-Pac & NAT.— The pilot is informed that the request is being assessed and there will be a short-term delay (within 10 minutes). The exchange is not closed and the request will be responded to when conditions allow.*	STANDBY	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 2	Indicates that ATC has received the request but it has been deferred until later. *Asia-Pac & NAT.— The pilot is informed that the request is being assessed and a long-term delay can be expected. The exchange is not closed and the request will be responded to when conditions allow.*	REQUEST DEFERRED	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 3	Indicates that ATC has received and understood the message.	ROGER	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 4	Yes.	AFFIRM	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 5	No	NEGATIVE	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 235	Notification of receipt of unlawful interference message.	ROGER 7500	N	N/A (Urgent)
UM 211	Indicates that the ATC has received the request and has passed it to the next control authority. *FANS 1/A-ATN.— ATN uses FANS 1/A free text.*	REQUEST FORWARDED	N	Cont SPR ATN B1
UM 218	Indicates to the pilot that the request has already been received on the ground.	REQUEST ALREADY RECEIVED	N	N/A
UM 237	Indicates that the request cannot be responded to by the current unit and that it should be requested from the next unit. *FANS 1/A-ATN.— ATN uses FANS 1/A free text.*	REQUEST AGAIN WITH NEXT UNIT	N	Cont SPR ATN B1
	Vertical Clearances (uplink)			
UM 6	Notification that a level change instruction should be expected.	EXPECT [level]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 7	Notification that an instruction should be expected for the aircraft to commence climb at the specified time.	EXPECT CLIMB AT [time]	R	Ocean SPR NAT(NL) Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 8	Notification that an instruction should be expected for the aircraft to commence climb at the specified position.	EXPECT CLIMB AT [position]	R	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
UM 9	Notification that an instruction should be expected for the aircraft to commence descent at the specified time.	EXPECT DESCENT AT [time]	R	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
UM 10	Notification that an instruction should be expected for the aircraft to commence descent at the specified position.	EXPECT DESCENT AT [position]	R	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
UM 11	Notification that an instruction should be expected for the aircraft to commence cruise climb at the specified time. *Asia-Pac.— Due to different interpretations between the various ATS units this element should be avoided.*	EXPECT CRUISE CLIMB AT [time]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 12	Notification that an instruction should be expected for the aircraft to commence cruise climb at the specified position. *Asia-Pac.— Due to different interpretations between the various ATS units this element should be avoided.*	EXPECT CRUISE CLIMB AT [position]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 13	(Reserved) *Asia-Pac.— Notification that an instruction should be expected for the aircraft to commence climb at the specified time to the specified level.*	**N/A** *Or* *AT [time] EXPECT CLIMB TO [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 14	(Reserved) *Asia-Pac.— Notification that an instruction should be expected for the aircraft to commence climb at the specified position to the specified level.*	**N/A** *Or* *AT [position] EXPECT CLIMB TO [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 15	(Reserved) *Asia-Pac.— Notification that an instruction should be expected for the aircraft to commence descent at the specified time to the specified level.*	**N/A** *Or* *AT [time] EXPECT DESCENT TO [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 16	(Reserved) *Asia-Pac.— Notification that an instruction should be expected for the aircraft to commence descent at the specified position to the specified level.*	**N/A** *Or* *AT [position] EXPECT DESCENT TO [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 17	(Reserved) *Asia-Pac.— Notification that an instruction should be expected for the aircraft to commence cruise climb at the specified time to the specified level.* *Due to different interpretations between the various ATS units, this element should be avoided.*	**N/A** *Or* *AT [time] EXPECT CRUISE CLIMB TO [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 18	(Reserved) *Asia-Pac.— Notification that an instruction should be expected for the aircraft to commence cruise climb at the specified position to the specified level.* *Due to different interpretations between the various ATS units, this element should be avoided.*	**N/A** *Or* *AT [position] EXPECT CRUISE CLIMB TO [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 19	Instruction to maintain the specified level.	MAINTAIN [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 20	Instruction that a climb to a specified level is to commence and once reached the specified level is to be maintained.	**CLIMB TO [level]** *Or* *CLIMB TO AND MAINTAIN [altitude]*	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 21	Instruction that at the specified time a climb to the specified level is to commence and once reached the specified level is to be maintained. *NAT.— Instruction that AT or AFTER the specified time, a climb to the specified level is to commence and once reached the specified level is to be maintained.*	**AT [time] CLIMB TO [level]** *Or* *AT [time] CLIMB TO AND MAINTAIN [altitude]*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 22	Instruction that at the specified position a climb to the specified level is to commence and once reached the specified level is to be maintained. NAT.— Instruction that AFTER PASSING the specified position, a climb to the specified level is to commence and once reached the specified level is to be maintained.	**AT [position] CLIMB TO [level]** *Or* *AT [position] CLIMB TO AND MAINTAIN [altitude]*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 185	(Reserved)	N/A	W/U	N/A
UM 23	Instruction that a descent to a specified level is to commence and once reached the specified level is to be maintained.	**DESCEND TO [level]** *Or* *DESCEND TO AND MAINTAIN [altitude]*	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 24	Instruction that at a specified time a descent to a specified level is to commence and once reached the specified level is to be maintained. *NAT.— Instruction that AT or AFTER the specified time, a descent to the specified level is to commence, and once reached, the specified level is to be maintained.*	**AT [time] DESCEND TO [level]** *Or* *AT [time] DESCEND TO AND MAINTAIN [altitude]*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 25	Instruction that at the specified position a descent to the specified level is to commence and once reached the specified level is to be maintained. *NAT.— Instruction that AFTER PASSING the specified position, a descent to the specified level is to commence and once reached the specified level is to be maintained.*	**AT [position] DESCEND TO [level]** *Or* *AT [position] DESCEND TO AND MAINTAIN [altitude]*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 186	(Reserved)	N/A	W/U	N/A
UM 26	Instruction that a climb is to commence at a rate such that the specified level is reached at or before the specified time. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *NAT.— Instruction that a climb is to commence at a rate such that the specified level is reached AT or BEFORE the specified time.*	CLIMB TO REACH [level] BY [time]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 27	Instruction that a climb is to commence at a rate such that the specified level is reached at or before the specified position. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *NAT.— Instruction that a climb is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.*	CLIMB TO REACH [level] BY [position]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 28	Instruction that a descent is to commence at a rate such that the specified level is reached at or before the specified time. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *NAT.— Instruction that a descent is to commence at a rate such that the specified level is reached AT or BEFORE the specified time.*	DESCEND TO REACH [level] BY [time]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 29	Instruction that a descent is to commence at a rate such that the specified level is reached at or before the specified position. When this message element is not concatenated with another vertical clearance, the level specified is the assigned level which is to be maintained. *NAT.— Instruction that a descent is to commence at a rate such that the specified level is reached BEFORE PASSING the specified position.*	DESCEND TO REACH [level] BY [position]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A - ATN
UM 192	Instruction that a change of level is to continue, but at a rate such that the specified level is reached at or before the specified time.	REACH [level] BY [time]	W/U	N/A
UM 209	Instruction that a change of level is to continue, but at a rate such that the specified level is reached at or before the specified position.	REACH [level] BY [position]	W/U	N/A
UM 30	Instruction that a level within the defined vertical range specified is to be maintained.	MAINTAIN BLOCK [level] TO [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A - ATN
UM 31	Instruction that a climb to a level within the vertical range defined is to commence.	CLIMB TO AND MAINTAIN BLOCK [level] TO [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A - ATN
UM 32	Instruction that a descent to a level within the vertical range defined is to commence.	DESCEND TO AND MAINTAIN BLOCK [level] TO [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A - ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 34	Instruction that a cruise climb to the specified level is to commence and continue and, once reached the specified level is to be maintained. *Asia-Pac.— Due to different interpretations between the various ATS units, this element should be avoided.*	CRUISE CLIMB TO [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 35	Instruction to be used in conjunction with an associated level instruction indicating that a cruise climb can commence once above the specified level. *Asia-Pac.— Due to different interpretations between the various ATS units, this element should be avoided.*	**WHEN ABOVE (level) COMMENCE CRUISE CLIMB** *Or* *CRUISE CLIMB ABOVE [level]*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 219	Instruction to stop the climb at the specified level and, once reached, this level is to be maintained. The specified level will be below the previously assigned level.	STOP CLIMB AT [level]	W/U	N/A (Urgent)
UM 220	Instruction to stop the descent at the specified level and, once reached, this level is to be maintained. The specified level will be above the previously assigned level.	STOP DESCENT AT [level]	W/U	N/A (Urgent)
UM 36	Instruction that the climb to the specified level should be made at the aircraft's best rate.	EXPEDITE CLIMB TO [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 37	Instruction that the descent to the specified level should be made at the aircraft's best rate.	EXPEDITE DESCENT TO[level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 38	Urgent instruction to immediately climb to the specified level and, once reached, the specified level is to be maintained.	IMMEDIATELY CLIMB TO [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A (Distress)
UM 39	Urgent instruction to immediately descend to the specified level and, once reached, the specified level is to be maintained.	IMMEDIATELY DESCEND TO [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A (Distress)

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 40	(Reserved) *Asia-Pac & NAT.— Urgent instruction to immediately stop a climb once the specified level is reached.*	**(Not defined)** *Or* *IMMEDIATELY STOP CLIMB AT [altitude]*	**Y** *Or* *W/U*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 41	(Reserved) *Asia-Pac & NAT.— Urgent instruction to immediately stop a climb once the specified level is reached.*	**(Not defined)** *Or* *IMMEDIATELY STOP DESCENT AT [altitude]*	**Y** *Or* *W/U*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 171	Instruction to climb at not less than the specified rate.	CLIMB AT [vertical rate] MINIMUM	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 172	Instruction to climb at not above the specified rate.	CLIMB AT [vertical rate] MAXIMUM	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 173	Instruction to descend at not less than the specified rate.	DESCEND AT [vertical rate] MINIMUM	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 174	Instruction to descend at not above the specified rate.	DESCEND AT [vertical rate] MAXIMUM	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 33	(Reserved) *Asia-Pac.— Instruction that authorizes a pilot to conduct flight at any altitude from the minimum altitude up to and including the altitude specified in the clearance. further, it is approval for the pilot to proceed to and make an approach at the destination airport.* *Due to different interpretations between the various ATS units, this element should be avoided.*	**(Not defined)** *Or* *CRUISE [altitude]*	**Y** *Or* *W/U*	Ocean SPR NAT Asia-Pac FANS 1/A
	Crossing Constraints (uplink)			
UM 42	(Reserved) *Asia-Pac.— Notification that a level change instruction should be expected which will require the specified position to be crossed at the specified level.*	**N/A** *Or* *EXPECT TO CROSS [position] AT [level]*	R	Ocean SPR NAT Asis-Pac FANS 1/A
UM 43	(Reserved) *Asia-Pac.— Notification that a level change instruction should be expected which will require the specified position to be crossed at or above the specified level.*	**N/A** *Or* *EXPECT TO CROSS [position] AT OR ABOVE [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 44	(Reserved) *Asia-Pac.— Notification that a level change instruction should be expected which will require the specified position to be crossed at or below the specified level.*	**N/A** *Or* *EXPECT TO CROSS [position] AT OR BELOW [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 45	(Reserved) *Asia-Pac.— Notification that a level change instruction should be expected which will require the specified position to be crossed at the specified level which is to be maintained subsequently.*	**N/A** *Or* *EXPECT TO CROSS [position] AT AND MAINTAIN [level]*	R	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 46	Instruction that the specified position is to be crossed at the specified level. This may require the aircraft to modify its climb or descent profile.	CROSS [position] AT [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 47	Instruction that the specified position is to be crossed at or above the specified level.	CROSS [position] AT OR ABOVE [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 48	Instruction that the specified position is to be crossed at or below the specified level.	CROSS [position] AT OR BELOW [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 49	Instruction that the specified position is to be crossed at the specified level and that level is to be maintained when reached.	CROSS [position] AT AND MAINTAIN [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 50	Instruction that the specified position is to be crossed at a level between the specified levels.	CROSS [position] BETWEEN [level] AND [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 51	Instruction that the specified position is to be crossed at the specified time.	CROSS [position] AT [time]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 52	Instruction that the specified position is to be crossed at or before the specified time.	CROSS [position] AT OR BEFORE [time]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 53	Instruction that the specified position is to be crossed at or after the specified time.	CROSS [position] AT OR AFTER [time]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 54	Instruction that the specified position is to be crossed at a time between the specified times.	CROSS [position] BETWEEN [time] AND [time]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 55	Instruction that the specified position is to be crossed at the specified speed and the specified speed is to be maintained until further advised.	CROSS [position] AT [speed]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 56	Instruction that the specified position is to be crossed at a speed equal to or less than the specified speed and the specified speed or less is to be maintained until further advised.	CROSS [position] AT OR LESS THAN [speed]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 57	Instruction that the specified position is to be crossed at a speed equal to or greater than the specified speed and the specified speed or greater is to be maintained until further advised.	CROSS [position] AT OR GREATER THAN [speed]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 58	Instruction that the specified position is to be crossed at the specified time and the specified level.	CROSS [position] AT [time] AT [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 59	Instruction that the specified position is to be crossed at or before the specified time and at the specified level.	CROSS [position] AT OR BEFORE [time] AT [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 60	Instruction that the specified position is to be crossed at or after the specified time and at the specified level.	CROSS [position] AT OR AFTER [time] AT [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 61	Instruction that the specified position is to be crossed at the specified level and speed, and the level and speed are to be maintained.	CROSS [position] AT AND MAINTAIN [level] AT [speed]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 62	Instruction that at the specified time the specified position is to be crossed at the specified level and the level is to be maintained.	AT [time] CROSS [position] AT AND MAINTAIN [level]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 63	Instruction that at the specified time the specified position is to be crossed at the specified level and speed, and the level and speed are to be maintained.	AT [time] CROSS [position] AT AND MAINTAIN [level] AT [speed]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
	Lateral Offsets (uplink)			
UM 64	Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction.	OFFSET [specified distance] [direction] OF ROUTE	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 65	Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction and commencing at the specified position.	AT [position] OFFSET [specified distance] [direction] OF ROUTE	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 66	Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction and commencing at the specified time.	AT [time] OFFSET [specified distance] [direction] OF ROUTE	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 67	Instruction that the cleared flight route is to be rejoined.	PROCEED BACK ON ROUTE	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 68	Instruction that the cleared flight route is to be rejoined at or before the specified position.	REJOIN ROUTE BY [position]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 69	Instruction that the cleared flight route is to be rejoined at or before the specified time.	REJOIN ROUTE BY [time]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 70	Notification that a clearance may be issued to enable the aircraft to rejoin the cleared route at or before the specified position.	EXPECT BACK ON ROUTE BY [position]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 71	Notification that a clearance may be issued to enable the aircraft to rejoin the cleared route at or before the specified time.	EXPECT BACK ON ROUTE BY [time]	R	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 72	Instruction to resume own navigation following a period of tracking or heading clearances. May be used in conjunction with an instruction on how or where to rejoin the cleared route.	RESUME OWN NAVIGATION	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
	Route Modifications (uplink)			
UM 73	Instruction to be followed from departure until the specified clearance limit.	[departure clearance]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 74	Instruction to proceed directly from its present position to the specified position.	PROCEED DIRECT TO [position]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 75	Instruction to proceed, when able, directly to the specified position.	WHEN ABLE PROCEED DIRECT TO [position]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 76	Instruction to proceed, at the specified time, directly to the specified position.	AT [time] PROCEED DIRECT TO [position]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 77	Instruction to proceed, at the specified position, directly to the next specified position.	AT [position] PROCEED DIRECT TO [position]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 78	Instruction to proceed, upon reaching the specified level, directly to the specified position.	AT [level] PROCEED DIRECT TO [position]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 79	Instruction to proceed to the specified position via the specified route.	CLEARED TO [position] VIA [route clearance]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 80	Instruction to proceed via the specified route.	CLEARED [route clearance]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 81	Instruction to proceed in accordance with the specified procedure.	CLEARED [procedure name]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 236	Instruction to leave controlled airspace.	LEAVE CONTROLLED AIRSPACE	W/U	N/A
UM 82	Approval to deviate up to the specified distance from the cleared route in the specified direction.	CLEARED TO DEVIATE UP TO [specified distance] [direction] OF ROUTE	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 83	Instruction to proceed from the specified position via the specified route.	AT [position] CLEARED [route clearance]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 84	Instruction to proceed from the specified position via the specified procedure.	AT [position] CLEARED [procedure name]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 85	Notification that a clearance to fly on the specified route may be issued.	EXPECT [route clearance]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 86	Notification that a clearance to fly on the specified route from the specified position may be issued.	AT [position] EXPECT [route clearance]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 87	Notification that a clearance to fly directly to the specified position may be issued.	EXPECT DIRECT TO [position]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 88	Notification that a clearance to fly directly from the first specified position to the next specified position may be issued.	AT [position] EXPECT DIRECT TO [position]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 89	Notification that a clearance to fly directly to the specified position commencing at the specified time may be issued.	AT [time] EXPECT DIRECT TO [position]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 90	Notification that a clearance to fly directly to the specified position commencing when the specified level is reached may be issued.	AT [level] EXPECT DIRECT TO [position]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 91	Instruction to enter a holding pattern with the specified characteristics at the specified position and level.	**HOLD AT [position] MAINTAIN [level] INBOUND TRACK [degrees] [direction] TURNS [leg type]** *Or* *HOLD AT [position] MAINTAIN [altitude] INBOUND TRACK [degrees][direction] TURN LEG TIME [leg type]*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 92	Instruction to enter a holding pattern with the published characteristics at the specified position and level.	HOLD AT [position] AS PUBLISHED MAINTAIN [level]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 93	Notification that an onwards clearance may be issued at the specified time.	EXPECT FURTHER CLEARANCE AT [time]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 94	Instruction to turn left or right as specified on to the specified heading. *FANS 1/A – ATN.— Direction as "left," "right," or "either side." Use of "either side" discouraged.*	TURN [direction] HEADING [degrees]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 95	Instruction to turn left or right as specified on to the specified track.	TURN [direction] GROUND TRACK [degrees]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 215	Instruction to turn a specified number of degrees left or right.	TURN [direction] [degrees] DEGREES	W/U	Cont SPR ATN B1 FANS 1/A-ATN
UM 190	Instruction to fly on the specified heading. *FANS 1/A-ATN.— ATN B1 uses UM94 for FANS 1/A aircraft.*	FLY HEADING [degrees]	W/U	Cont SPR ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 96	Instruction to continue to fly on the current heading.	**CONTINUE PRESENT HEADING** *Or* *FLY PRESENT HEADING*	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 97	Instruction to fly on the specified heading from the specified position.	AT [position] FLY HEADING [degrees]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 221	Instruction to stop turn at the specified heading prior to reaching the previously assigned heading.	STOP TURN HEADING [degrees]	W/U	N/A (Urgent)
UM 98	Instruction to turn immediately left or right as specified on to the specified heading.	IMMEDIATELY TURN [direction] HEADING [degrees]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A (Distress)
UM 99	Notification that a clearance may be issued for the aircraft to fly the specified procedure.	EXPECT [procedure name]	R	Ocean SPR NAT Asia-Pac FANS 1/A
	Speed Changes (uplink)			
UM 100	Notification that a speed instruction may be issued to be effective at the specified time.	AT [time] EXPECT [speed]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 101	Notification that a speed instruction may be issued to be effective at the specified position.	AT [position] EXPECT [speed]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 102	Notification that a speed instruction may be issued to be effective at the specified level.	AT [level] EXPECT [speed]	R	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 103	Notification that a speed range instruction may be issued to be effective at the specified time.	AT [time] EXPECT [speed] TO [speed]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 104	Notification that a speed range instruction may be issued to be effective at the specified position.	AT [position] EXPECT [speed] TO [speed]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 105	Notification that a speed range instruction may be issued to be effective at the specified level.	AT [level] EXPECT [speed] TO [speed]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 106	Instruction that the specified speed is to be maintained.	MAINTAIN [speed]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 188	Instruction that after passing the specified position the specified speed is to be maintained.	AFTER PASSING [position] MAINTAIN [speed]	W/U	N/A
UM 107	Instruction that the present speed is to be maintained.	MAINTAIN PRESENT SPEED	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 108	Instruction that the specified speed or a greater speed is to be maintained.	MAINTAIN [speed] OR GREATER	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 109	Instruction that the specified speed or a lesser speed is to be maintained.	MAINTAIN [speed] OR LESS	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 110	Instruction that a speed within the specified range is to be maintained.	MAINTAIN [speed] TO [speed]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 111	Instruction that the present speed is to be increased to the specified speed and maintained until further advised.	INCREASE SPEED TO [speed]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 112	Instruction that the present speed is to be increased to the specified speed or greater, and maintained at or above the specified speed until further advised.	INCREASE SPEED TO [speed] OR GREATER	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 113	Instruction that the present speed is to be reduced to the specified speed and maintained until further advised.	REDUCE SPEED TO [speed]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 114	Instruction that the present speed is to be reduced to the specified speed or less and maintained at or below the specified speed until further advised.	REDUCE SPEED TO [speed] OR LESS	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 115	Instruction that the specified speed is not to be exceeded.	DO NOT EXCEED [speed]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 116	Instruction that the aircraft's normal speed be resumed. The previously issued speed restriction(s) are cancelled.	RESUME NORMAL SPEED	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 189	Instruction that the present speed is to be changed to the specified speed.	ADJUST SPEED TO [speed]	W/U	N/A
UM 222	Notification that the aircraft may keep its preferred speed without restriction. *FANS 1/A-ATN.— ATN uses free text for FANS 1/A aircraft.*	NO SPEED RESTRICTION	R	Cont SPR ATN B1 FANS 1/A-ATN
UM 223	Instruction to reduce present speed to the minimum safe approach speed.	REDUCE TO MINIMUM APPROACH SPEED	W/U	N/A
	Contact/Monitor/Surveillance Requests (uplink)			
UM 117	Instruction that the ATS unit with the specified ATS unit name is to be contacted on the specified frequency.	CONTACT [unitname] [frequency]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 118	Instruction that at the specified position the ATS unit with the specified ATS unit name is to be contacted on the specified frequency.	AT [position] CONTACT [unitname] [frequency]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 119	Instruction that at the specified time the ATS unit with the specified ATS unit name is to be contacted on the specified frequency.	AT [time] CONTACT [unitname] [frequency]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 238	Notification that the secondary frequency is as specified.	SECONDARY FREQUENCY [frequency]	R	N/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 120	Instruction that the ATS unit with the specified ATS unit name is to be monitored on the specified frequency. *NAT.— The pilot is not required to check in.*	MONITOR [unitname] [frequency]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 121	Instruction that at the specified position the ATS unit with the specified ATS unit name is to be monitored on the specified frequency. *NAT.— The pilot is not required to check in.*	AT [position] MONITOR [unitname] [frequency]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 122	Instruction that at the specified time the ATS unit with the specified ATS unit name is to be monitored on the specified frequency. *NAT.— The pilot is not required to check in.*	AT [time] MONITOR [unitname] [frequency]	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 123	Instruction that the specified code (SSR code) is to be selected.	SQUAWK [code]	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 124	Instruction that the SSR transponder responses are to be disabled.	STOP SQUAWK	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 239	Instruction that the ADS-B transmissions are to be terminated.	STOP ADS-B TRANSMISSION	W/U	N/A
UM 125	Instruction that the SSR transponder responses should include level information.	**SQUAWK MODE CHARLIE** *Or* *SQUAWK ALTITUDE*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 240	Instruction that the ADS-B transmissions should include level information.	TRANSMIT ADS-B ALTITUDE	W/U	N/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 126	Instruction that the SSR transponder responses should no longer include level information.	**STOP SQUAWK MODE CHARLIE** *Or* *STOP ALTITUDE SQUAWK*	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 241	Instruction that the ADS-B transmissions should no longer include level information.	STOP ADS-B ALTITUDE TRANSMISSION	W/U	N/A
UM 179	Instruction that the 'ident' function on the SSR transponder is to be actuated.	SQUAWK IDENT	W/U	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 242	Instruction that the "ident" function of the ADS-B emitter is to be activated. *Asia-Pac.— Uses FANS 1/A free text.*	TRANSMIT ADS-B IDENT	**W/U** *Or* *R (free text)*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 243	Instruction to report when the aircraft is clear of adverse meteorological conditions, and a clearance to regain cleared flight route can be accepted.	REPORT CLEAR OF WEATHER	W/U	N/A
	Report/Confirmation Requests (uplink)			
UM 127	Instruction to report when the aircraft is back on the cleared route.	REPORT BACK ON ROUTE	**W/U** *Or* *R*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 128	Instruction to report when the aircraft has vacated the specified level that has either been maintained or passed through on climb or descent. *Asia-Pac & NAT.— Either a level that has been maintained, or a level passed through on climb or descent.*	REPORT LEAVING [level]	**W/U** *Or* *R*	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 129	Instruction to report when the aircraft is in level flight at the specified level. *Asia-Pac.— Some States do not to use REPORT LEVEL [altitude] in order to avoid confusion because it does not comply with existing voice phraseology.*	**REPORT MAINTAINING [level]** *Or* *REPORT LEVEL [altitude]*	**W/U** *Or* *R*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 175	(Reserved) *Asia-Pac & NAT.— Instruction to report when the aircraft has reached the specified level* *Asia-Pac.— To be interpreted as "Report reaching an assigned level."* *NAT.— This element is not to be used to determine when an aircraft is in level flight at the specified level.*	**N/A** *Or* *REPORT REACHING [level]*	**W/U** *Or* *R*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 200	Instruction used in conjunction with a level clearance to report maintaining the level assigned.	REPORT MAINTAINING	W/U	N/A
UM 180	Instruction to report when the aircraft is within the specified vertical range.	REPORT REACHING BLOCK [level] TO [level]	**W/U** *Or* *R*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 130	Instruction to report when the aircraft has passed the specified position.	REPORT PASSING [position]	**W/U** *Or* *R*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 181	Instruction to report the present distance to or from the specified position.	REPORT DISTANCE [to/from] [position]	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 184	Instruction to report at the specified time the distance to or from the specified position.	AT TIME [time] REPORT DISTANCE [to/from] [position]	Y	N/A
UM 228	Instruction to report the estimated time of arrival at the specified position. *Asia-Pac.— Uses FANS 1/A free text.*	REPORT ETA [position]	Y DM104	Ocean SPR Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 131	Instruction to report the amount of fuel remaining and the number of persons on board.	REPORT REMAINING FUEL AND PERSONS ON BOARD	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A (Urgent)
UM 132	Instruction to report the present position.	REPORT POSITION	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 133	Instruction to report the present level.	**REPORT PRESENT LEVEL** *Or* *CONFIRM ALTITUDE*	**Y** *Or* *NE* *DM32*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 134	Instruction to report the requested speed. *Asia-Pac.— Instruction to report the present speed.* *Asia-Pac.— Uses free text when the controller is requesting the pilot to report the present ground speed.*	**REPORT [speed type] [speed type] [speed type] SPEED** *Or* *CONFIRM SPEED*	**Y** *Or* *NE* *Or* *R* *DM113*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 135	Instruction to confirm the currently assigned level.	**CONFIRM ASSIGNED LEVEL** *Or* *CONFIRM ASSIGNED ALTITUDE*	**Y** *Or* *NE* *DM38* *DM77 (TBC)*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 136	Instruction to confirm the currently assigned speed.	CONFIRM ASSIGNED SPEED	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 137	Instruction to confirm the currently assigned route.	CONFIRM ASSIGNED ROUTE	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 138	Instruction to confirm the previously reported time over the last reported waypoint.	CONFIRM TIME OVER REPORTED WAYPOINT	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 139	Instruction to confirm the identity of the previously reported waypoint.	CONFIRM REPORTED WAYPOINT	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 140	Instruction to confirm the identity of the next waypoint.	CONFIRM NEXT WAYPOINT	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 141	Instruction to confirm the previously reported estimated time at the next waypoint.	CONFIRM NEXT WAYPOINT ETA	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 142	Instruction to confirm the identity of the next but one waypoint.	CONFIRM ENSUING WAYPOINT	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 143	The request was not understood. It should be clarified and resubmitted.	CONFIRM REQUEST	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 144	Instruction to report the selected (SSR) code.	CONFIRM SQUAWK	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 145	Instruction to report the present heading.	REPORT HEADING	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 146	Instruction to report the present ground track.	REPORT GROUND TRACK	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 182	Instruction to report the identification code of the last ATIS received.	CONFIRM ATIS CODE	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 147	Instruction to make a position report. *Asia-Pac & NAT.— To be used if the controller does not receive a scheduled position report.*	REQUEST POSITION REPORT	**Y** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 216	Instruction to file a flight plan.	REQUEST FLIGHT PLAN	Y	N/A
UM 217	Instruction to report that the aircraft has landed.	REPORT ARRIVAL	Y	N/A
UM 229	Instruction to report the preferred alternate aerodrome for landing.	REPORT ALTERNATE AERODROME	Y	N/A
UM 231	Instruction to indicate the pilot's preferred level. *Asia-Pac and FANS 1/A-ATN.— uses FANS 1/A free text.*	STATE PREFERRED LEVEL	Y *DM106*	Ocean SPR NAT(NL) Asia-Pac Cont SPR ATN B1 FANS 1/A-ATN
UM 232	Instruction to indicate the pilot's preferred time and/or position to commence descent to the aerodrome of intended arrival. *Asia-Pac and FANS 1/A-ATN.— uses FANS 1/A free text.*	STATE TOP OF DESCENT	Y *DM109*	Cont SPR ATN B1 FANS 1/A-ATN
	Negotiation Requests (uplink)			
UM 148	Request for the earliest time or position at which the specified level can be accepted.	WHEN CAN YOU ACCEPT [level]	**Y** *Or* *NE* *DM81* *DM82*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 149	Instruction to report whether or not the specified level can be accepted at the specified position.	CAN YOU ACCEPT [level] AT [position]	A/N	Ocean SPR NAT Asia-Pac FANS 1/A
UM 150	Instruction to report whether or not the specified level can be accepted at the specified time.	CAN YOU ACCEPT [level] AT [time]	A/N	Ocean SPR NAT Asia-Pac FANS 1/A
UM 151	Instruction to report the earliest time or position when the specified speed can be accepted.	WHEN CAN YOU ACCEPT [speed]	**Y** *Or* *NE* *DM83* *DM84*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 152	Instruction to report the earliest time or position when the specified offset track can be accepted.	WHEN CAN YOU ACCEPT [specified distance] [direction] OFFSET	**Y** *Or* *NE* *DM85* *DM86*	Ocean SPR NAT Asia-Pac FANS 1/A
	Air Traffic Advisories (uplink)			
UM 153	ATS advisory that the altimeter setting should be the specified setting.	ALTIMETER [altimeter]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 213	ATS advisory that the specified altimeter setting relates to the specified facility. *FANS 1/A-ATN.— ATN uses free text for FANS 1/A aircraft.*	[facility designation] ALTIMETER [altimeter]	R	Cont SPR ATN B1 FANS 1/A-ATN
UM 154	ATS advisory that the radar service is terminated.	**RADAR SERVICE TERMINATED** *Or* *RADAR SERVICES TERMINATED*	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 244	ATS advisory that the radar and/or ADS-B service is terminated. *Asia-Pac.— uses FANS 1/A free text.*	IDENTIFICATION TERMINATED	R	Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 191	ATS advisory that the aircraft is entering airspace in which no air traffic services are provided and all existing air traffic services are terminated.	ALL ATS TERMINATED	R	N/A
UM 155	ATS advisory that radar contact has been established at the specified position.	RADAR CONTACT [position]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 156	ATS advisory that radar contact has been lost.	RADAR CONTACT LOST	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 210	ATS advisory that the aircraft has been identified on radar and/or ADS-B at the specified position.	IDENTIFIED [position]	R	N/A
UM 193	Notification that radar and/or ADS-B identification has been lost.	IDENTIFICATION LOST	R	N/A
UM 157	Instruction that a continuous transmission is detected on the specified frequency. Check the microphone button.	CHECK STUCK MICROPHONE [frequency]	**N** *Or* *R*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN (Urgent)
UM 158	ATS advisory that the ATIS information identified by the specified code is the current ATIS information.	ATIS [atis code]	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 212	ATS advisory that the specified ATIS information at the specified airport is current.	[facility designation] ATIS [atis code] CURRENT	R	N/A
UM 214	ATS advisory that indicates the RVR value for the specified runway.	RVR RUNWAY [runway] [rvr]	R	N/A
UM 224	ATS advisory that no delay is expected.	NO DELAY EXPECTED	R	N/A
UM 225	ATS advisory that the expected delay has not been determined.	DELAY NOT DETERMINED	R	N/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 226	ATS advisory that the aircraft may expect to be cleared to commence its approach procedure at the specified time.	EXPECTED APPROACH TIME [time]	R	N/A
	System Management Messages (uplink)			
UM 159	A system generated message notifying that the ground system has detected an error.	ERROR [error information]	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN (Urgent)
UM 160	Notification to the avionics that the specified data authority is the next data authority. If no data authority is specified, this indicates that any previously specified next data authority is no longer valid.	NEXT DATA AUTHORITY [facility]	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 161	Notification to the avionics that the data link connection with the current data authority is being terminated.	END SERVICE	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 162	Notification that the ground system does not support this message. *NAT.— Uses free text.*	**MESSAGE NOT SUPPORTED BY THIS ATS UNIT** *Or* *SERVICE UNAVAILABLE*	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 234	Notification that the ground system does not have a flight plan for that aircraft.	FLIGHT PLAN NOT HELD	N	N/A
UM 163	Notification to the pilot of an ATSU identifier.	**[facility designation]** *Or* *[icao facility designation] [tP4+Table]*	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 227	Confirmation to the aircraft system that the ground system has received the message to which the logical acknowledgement refers and found it acceptable for display to the responsible person. *FANS 1/A-ATN.— ATN B1 only. Not available for FANS 1/A.*	LOGICAL ACKNOWLEDGEMENT	N	Cont SPR ATN B1 FANS 1/A-ATN
UM 233	Notification to the pilot that messages sent requiring a logical acknowledgement will not be accepted by this ground system. *FANS 1/A-ATN.— ATN B1 only. Not available for FANS 1/A.*	USE OF LOGICAL ACKNOWLEDGEMENT PROHIBITED	N	Cont SPR ATN B1 FANS 1/A-ATN
	Additional Messages (uplink)			
UM 164	The associated instruction may be complied with at any future time.	WHEN READY	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 230	The associated instruction is to be complied with immediately.	IMMEDIATELY	N	N/A (Distress)
UM 165	Used to link two messages, indicating the proper order of execution of clearances/ instructions.	THEN	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
UM 166	The associated instruction is issued due to traffic considerations.	**DUE TO [traffic type] TRAFFIC** *Or* *DUE TO TRAFFIC*	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A
UM 167	The associated instruction is issued due to airspace restrictions.	DUE TO AIRSPACE RESTRICTION	**N** *Or* *NE*	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 168	The indicated communication should be ignored. *Asia-Pac & NAT.— The previously sent uplink CPDLC message shall be ignored. DISREGARD should not refer to a clearance or instruction. If DISREGARD is used, another element shall be added to clarify which message is to be disregarded.*	DISREGARD	R	Ocean SPR NAT Asia-Pac FANS 1/A
UM 176	Instruction that the pilot is responsible for maintaining separation from other traffic and is also responsible for maintaining visual meteorological conditions.	MAINTAIN OWN SEPARATION AND VMC	W/U	Ocean SPR NAT Asia-Pac FANS 1/A
UM 177	Used in conjunction with a clearance/instruction to indicate that the pilot may execute when prepared to do so.	AT PILOTS DISCRETION	N	Ocean SPR NAT Asia-Pac FANS 1/A
UM 178	(Reserved) *Asia-Pac & NAT.— (Message intent not defined), Listed under Uplink – Route Modifications.*	**(not defined)** *Or* *TRACK DETAIL MESSAGE*	**Y** *Or* *W/U*	Ocean SPR NAT Asia-Pac FANS 1/A
	Free Text Normal-(uplink)			
UM 169	Normal urgency attribute, low alert attribute	[free text]	R	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN
	Free Text Distress (uplink)			
UM 170	Distress urgency attribute, high alert attribute	[free text]	R	Ocean SPR NAT Asia-Pac FANS 1/A
	Free Text – Other			
UM 183	Normal urgency attribute, medium alert attribute *FANS 1/A-ATN.— ATN B1 only. Not available for FANS 1/A.*	[free text]	N	Cont SPR ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
UM 187	low urgency, normal alert	[free text]	N	N/A
UM 194	normal urgency, low alert	[free text]	Y	N/A
UM 195	low urgency, low alert	[free text]	R	N/A
UM 196	normal urgency, medium alert *Ed note.— TK - I would propose to remove all free text message elements with W/U response.*	[free text]	W/U	Cont SPR ATN B1 FANS 1/A-ATN
UM 197	urgent urgency, medium alert	[free text]	W/U	N/A (Urgent)
UM 198	distress urgency, high alert	[free text]	W/U	N/A (Distress)
UM 199	normal urgency, low alert	[free text]	N	N/A
UM 201	Not used, low urgency, low alert	[free text]	N	N/A
UM 202	Not used, low urgency, low alert	[free text]	N	N/A
UM 203	normal urgency, medium alert	[free text]	R	N/A
UM 204	normal urgency, medium alert	[free text]	Y	N/A
UM 205	normal urgency, medium alert	[free text]	A/N	N/A
UM 206	low urgency, normal alert	[free text]	Y	N/A
UM 207	low urgency, low alert	[free text]	Y	N/A
UM 208	low urgency, low alert	[free text]	N	N/A

A.3 CPDLC downlink message elements

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
	Responses/Acknowledgements (downlink)			
DM 0	The instruction is understood and will be complied with.	WILCO	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 1	The instruction cannot be complied with.	UNABLE	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 2	Wait for a reply. *Asia-Pac & NAT.— The controller is informed that the request is being assessed and there will be a short term delay (within 10 minutes). The exchange is not closed and the request will be responded to when conditions allow.*	STANDBY	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 3	Message received and understood. *Asia-Pac & NAT.— ROGER is the only correct response to an uplink free text message. Under no circumstances will ROGER be used instead of AFFIRM.*	ROGER	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 4	Yes. *Asia-Pac & NAT.— AFFIRM is an appropriate response to an uplinked negotiation request message (e.g. CAN YOU ACCEPT [altitude] at [time]).*	AFFIRM	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 5	No. *Asia-Pac & NAT.— NEGATIVE is an appropriate response to an uplinked negotiation request message (e.g. CAN YOU ACCEPT [altitude] at [time]).*	NEGATIVE	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
	Vertical Requests (downlink)			
DM 6	Request to fly at the specified level.	REQUEST [level]	Y *UM0* *UM1* *UM19* *UM20* *UM23* *UM26* *UM27* *UM28* *UM29* *UM46* *UM47* *UM48* *UM159* + *UM183* *UM162* *UM211*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 7	Request to fly at a level within the specified vertical range. *FANS 1/A-ATN.— Only for FANS 1/A aircraft. ATN B1 aircraft uses DM6 with [level] specified as a vertical range.*	REQUEST BLOCK [level] TO [level]	Y	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 8	Request to cruise climb to the specified level. *Asia-Pac & NAT.— Due to different interpretations between the various ATS units, this element should be avoided.*	REQUEST CRUISE CLIMB TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 9	Request to climb to the specified level.	REQUEST CLIMB TO [level]	Y *UM0* *UM1* *UM19* *UM20* *UM23* *UM26* *UM27* *UM28* *UM29* *UM46* *UM47* *UM48* *UM159* + *UM183* *UM162* *UM211*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 10	Request to descend to the specified level.	REQUEST DESCENT TO [level]	Y *UM0* *UM19* *UM20* *UM23* *UM26* *UM27* *UM28* *UM29* *UM46* *UM47* *UM48* *UM159* + *UM183* *UM162* *UM211*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 11	Request that at the specified position a climb to the specified level be approved.	AT [position] REQUEST CLIMB TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 12	Request that at the specified position a descent to the specified level be approved.	AT [position] REQUEST DESCENT TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 13	Request that at the specified time a climb to the specified level be approved.	AT [time] REQUEST CLIMB TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 14	Request that at the specified time a descent to the specified level be approved.	AT [time] REQUEST DESCENT TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 69	Request that a descent be approved on a see-and-avoid basis.	REQUEST VMC DESCENT	Y	Ocean SPR NAT Asia-Pac FANS 1/A
	Lateral Off-Set Requests (downlink)			
DM 15	Request that a parallel track, offset from the cleared track by the specified distance in the specified direction, be approved.	REQUEST OFFSET [specified distance] [direction] OF ROUTE	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 16	Request that a parallel track, offset from the cleared track by the specified distance in the specified direction, be approved from the specified position.	AT [position] REQUEST OFFSET [specified distance] [direction] OF ROUTE	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 17	Request that a parallel track, offset from the cleared track by the specified distance in the specified direction, be approved from the specified time.	AT [time] REQUEST OFFSET [specified distance] [direction] OF ROUTE	Y	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
	Speed Requests (downlink)			
DM 18	Request to fly at the specified speed.	REQUEST [speed]	Y *UM0* *UM1* *UM162* *UM211* *UM55* *UM61* *UM106* *UM107* *UM108* *UM109* *UM116* *UM222* *UM159* + *UM183*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 19	Request to fly within the specified speed range.	REQUEST [speed] TO [speed]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
	Voice Contact Requests (downlink)			
DM 20	Request for voice contact.	REQUEST VOICE CONTACT	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 21	Request for voice contact on the specified frequency.	REQUEST VOICE CONTACT [frequency]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
	Route Modification Requests (downlink)			
DM 22	Request to track from the present position direct to the specified position.	REQUEST DIRECT TO [position]	Y *UM0* *UM162* *UM211* *UM74* *UM96* *UM190* *UM159* + *UM183*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 23	Request for the specified procedure clearance.	REQUEST [procedure name]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 24	Request for a route clearance.	**REQUEST CLEARANCE [route clearance]** *Or* *REQUEST [route clearance]*	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 25	Request for a clearance. *Asia-Pac & NAT.— Either pre-departure or route.*	**REQUEST [clearance type] CLEARANCE** *Or* *REQUEST CLEARANCE*	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 26	Request for a weather deviation to the specified position via the specified route.	REQUEST WEATHER DEVIATION TO [position] VIA [route clearance]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 27	Request for a weather deviation up to the specified distance off track in the specified direction.	REQUEST WEATHER DEVIATION UP TO [specified distance] [direction] OF ROUTE	Y *UM0* *UM162* *UM211* *UM64* *UM74* *UM82* *UM96* *UM190* *UM159* + *UM183*	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 70	Request a clearance to adopt the specified heading.	REQUEST HEADING [degrees]	Y	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 71	Request a clearance to adopt the specified ground track.	REQUEST GROUND TRACK [degrees]	Y	Ocean SPR NAT(NL) Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
	Reports (downlink)			
DM 28	Notification of leaving the specified level.	LEAVING [level]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 29	Notification of climbing to the specified level.	CLIMBING TO [level]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 30	Notification of descending to the specified level.	DESCENDING TO [level]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 31	Notification of passing the specified position.	PASSING [position]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 78	Notification that at the specified time, the aircraft's position was as specified.	AT [time] [distance] [to/from] [position]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 32	Notification of the present level.	**PRESENT LEVEL [level]** *Or* *PRESENT ALTITUDE [altitude]*	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 33	Notification of the present position.	PRESENT POSITION [position]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 34	Notification of the present speed.	PRESENT SPEED [speed]	N	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 113	Notification of the requested speed. *Asia-Pac.— Uses free text for partial intent. The pilot notifies the controller of present ground speed, in response to UM 169b, REPORT GROUND SPEED*	[speed type] [speed type] [speed type] SPEED [speed]	N	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 35	Notification of the present heading in degrees.	PRESENT HEADING [degrees]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 36	Notification of the present ground track in degrees.	PRESENT GROUND TRACK [degrees]	N	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 37	Notification that the aircraft is maintaining the specified level.	**MAINTAINING [level]** *Or* *LEVEL [altitude]*	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 72	(Reserved) *Asia-Pac & NAT.— Notification that the aircraft has reached the specified level.*	**N/A** *Or* *REACHING [level]*	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 76	Notification that the aircraft has reached a level within the specified vertical range.	REACHING BLOCK [level] TO [level]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 38	Read-back of the assigned level.	**ASSIGNED LEVEL [level]** *Or* *ASSIGNED ALTITUDE [altitude]*	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 77	Read-back of the assigned vertical range. *FANS 1/A-ATN.— Only for FANS 1/A aircraft. ATN B1 aircraft uses DM38 with [level] specified as a vertical range.*	ASSIGNED BLOCK [level] TO [level]	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 39	Read-back of the assigned speed.	ASSIGNED SPEED [speed]	N	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 40	Read-back of the assigned route.	ASSIGNED ROUTE [route clearance]	N	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 41	The aircraft has regained the cleared route.	BACK ON ROUTE	N	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 114	Notification that the aircraft is clear of weather and is able to accept a clearance to regain cleared flight route.	CLEAR OF WEATHER	N	N/A
DM 42	The next waypoint is the specified position.	NEXT WAYPOINT [position]	N	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 43	The ETA at the next waypoint is as specified.	NEXT WAYPOINT ETA [time]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 44	The next but one waypoint is the specified position.	ENSUING WAYPOINT [position]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 45	Clarification of previously reported waypoint passage.	REPORTED WAYPOINT [position]	N	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 46	Clarification of time over previously reported waypoint.	REPORTED WAYPOINT [time]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 47	The specified (SSR) code has been selected.	SQUAWKING [code]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 48	Position report. *Asia-Pac & NAT.— Reports the current position of the aircraft when the pilot presses the button to send this message.* *ATC expects position reports based on this downlink message.*	POSITION REPORT [position report]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 79	The code of the latest ATIS received is as specified.	ATIS [atis code]	N	Ocean SPR NAT(NL) Asia-Pac FANS 1/A
DM 89	The specified ATS unit is being monitored on the specified frequency. *FANS 1/A-ATN – FANS 1/A aircraft uses free text. May require to be preformatted.*	MONITORING [unitname] [frequency]	N	Ocean SPR Cont SPR ATN B1 FANS 1/A-ATN
DM 102	Used to report that an aircraft has landed.	LANDING REPORT	N	N/A
DM 104	Notification of estimated time of arrival at the specified position. *Asia-Pac.— Uses free text.*	**ETA [position][time]** *Or* *[position][time]*	N	Ocean SPR NAT(NL) Asia-Pac
DM 105	Notification of the alternative aerodrome for landing.	ALTERNATE AERODROME [airport]	N	N/A
DM 106	Notification of the preferred level. *Asia-Pac.— Response to free text UM 169c, STATE PREFERRED LEVEL.* *FANS 1/A – ATN INTEROP – Response to UM 231, STATE PREFERRED LEVEL.*	**PREFERRED LEVEL [level]** *Or* *FL [altitude]*	N	Ocean SPR NAT(NL) Asia-Pac Cont SPR ATN B1 FANS 1/A-ATN

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 109	Notification of the preferred time to commence descent for approach. *FANS 1/A – ATN INTEROP.— Response to UM 232 or free text UM 169aa, STATE TOP OF DESCENT.*	**TOP OF DESCENT [time]** *Or* *TOD [time]*	N	Cont SPR ATN B1 FANS 1/A-ATN
DM 110	Notification of the preferred position to commence descent for approach.	TOP OF DESCENT [position]	N	N/A
DM 111	Notification of the preferred time and position to commence descent for approach.	TOP OF DESCENT [time] [position]	N	N/A
	Negotiation Requests (downlink)			
DM 49	Request for the earliest time at which a clearance to the specified speed can be expected.	WHEN CAN WE EXPECT [speed]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 50	Request for the earliest time at which a clearance to a speed within the specified range can be expected.	WHEN CAN WE EXPECT [speed] TO [speed]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 51	Request for the earliest time at which a clearance to regain the planned route can be expected.	WHEN CAN WE EXPECT BACK ON ROUTE	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 52	Request for the earliest time at which a clearance to descend can be expected.	**WHEN CAN WE EXPECT LOWER LEVEL** *Or* *WHEN CAN WE EXPECT LOWER ALTITUDE*	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 53	Request for the earliest time at which a clearance to climb can be expected.	**WHEN CAN WE EXPECT HIGHER LEVEL** *Or* *WHEN CAN WE EXPECT HIGHER ALTITUDE*	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 54	Request for the earliest time at which a clearance to cruise climb to the specified level can be expected.	WHEN CAN WE EXPECT CRUISE CLIMB TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 87	Request for the earliest time at which a clearance to climb to the specified level can be expected. *Asia-Pac and FANS 1/A.— Uses preformatted free text.*	WHEN CAN WE EXPECT CLIMB TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 88	Request for the earliest time at which a clearance to descend to the specified level can be expected. *Asia-Pac and FANS 1/A.— Uses preformatted free text.*	WHEN CAN WE EXPECT DESCENT TO [level]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
	Emergency Messages (downlink)			
DM 55	Urgency prefix.	PAN PAN PAN	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Urgent)
DM 56	Distress prefix.	MAYDAY MAYDAY MAYDAY	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Distress)
DM 112	Indicates specifically that the aircraft is being subjected to unlawful interference.	SQUAWKING 7500	N	N/A (Urgent)
DM 57	Notification of fuel remaining and number of persons on board.	**[remaining fuel] OF FUEL REMAINING AND [persons on board] PERSONS ON BOARD** *Or* *REPORT REMAINING FUEL AND SOULS ON BOARD*	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 58	Notification that the pilot wishes to cancel the emergency condition.	CANCEL EMERGENCY	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Urgent)
DM 59	Notification that the aircraft is diverting to the specified position via the specified route due to an urgent need.	DIVERTING TO [position] VIA [route clearance]	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Urgent)
DM 60	Notification that the aircraft is deviating the specified distance in the specified direction off the cleared route and maintaining a parallel track due to an urgent need.	OFFSETTING [specified distance] [direction] OF ROUTE	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Urgent)
DM 61	Notification that the aircraft is descending to the specified level due to an urgent need.	DESCENDING TO [level]	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Urgent)
DM 80	Notification that the aircraft is deviating up to the deviating distance from the cleared route in the specified direction due to an urgent need. *Asia-Pac & NAT.— Listed under downlink reports (FANS 1/A does not specify urgency attribute).*	DEVIATING UP TO [specified distance] [direction] OF ROUTE	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
	System Management Messages (downlink)			
DM 62	A system-generated message that the avionics has detected an error.	ERROR [error information]	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN (Urgent)
DM 63	A system-generated denial to any CPDLC application message sent from a ground facility that is not the current data authority.	NOT CURRENT DATA AUTHORITY	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 99	A system-generated message to inform a ground facility that it is now the current data authority.	CURRENT DATA AUTHORITY	N	Cont SPR ATN B1 FANS 1/A-ATN (Urgent)
DM 64	Notification to the ground system that the specified ATSU is the current data authority. *FANS 1/A – ATN INTEROP.— Used by FANS 1/A aircraft.*	[facility designation]	N	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN
DM 107	A system-generated message sent to a ground system that tries to connect to an aircraft when a current data authority has not designated the ground system as the NDA. *FANS 1/A – ATN INTEROP.— Used by ATN B1 aircraft.*	NOT AUTHORIZED NEXT DATA AUTHORITY	N	Cont SPR ATN B1

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 73	A system-generated message indicating the software version number. *FANS 1/A – ATN INTEROP.— Used by FANS 1/A aircraft.*	[version number]	N	Ocean SPR NAT Asia-Pac Cont SPR FANS 1/A FANS 1/A-ATN
DM 100	Confirmation to the ground system that the aircraft system has received the message to which the logical acknowledgement refers and found it acceptable for display to the responsible person. *FANS 1/A – ATN INTEROP.— Alternate means, such as message assurance, to obtain "Logical Acknowledgement" from FANS 1/A aircraft.*	LOGICAL ACKNOWLEDGEMENT	N	Cont SPR ATN B1
	Additional Messages (downlink)			
DM 65	Used to explain reasons for pilot's message.	DUE TO WEATHER	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 66	Used to explain reasons for pilot's message.	DUE TO AIRCRAFT PERFORMANCE	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 74	States a desire by the pilot to provide his/her own separation and remain in VMC.	**REQUEST TO MAINTAIN OWN SEPARATION AND VMC** *Or* *MAINTAIN OWN SEPARATION AND VMC*	**Y** *Or* *N*	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 75	Used in conjunction with another message to indicate that the pilot wishes to execute request when the pilot is prepared to do so.	AT PILOTS DISCRETION	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 101	Allows the pilot to indicate a desire for termination of CPDLC application with the current data authority.	REQUEST END OF SERVICE	Y	N/A
DM 103	Allows the pilot to indicate that he/she has cancelled IFR flight plan.	CANCELLING IFR	Y	N/A
DM 108	Notification that de-icing action has been completed.	DE-ICING COMPLETE	N	N/A
	Free Text – Normal (downlink)			
DM 67	Normal urgency, low alert *FANS 1/A – ATN.— FANS 1/A aircraft only. ATN B1 uses DM98.*	[free text]	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
	Free Text - Distress (downlink)			
DM 68	Distress urgency, high alert *NAT.— Selecting any of the Emergency message elements will result in this message element being enabled for the flight crew to include in the emergency message at their discretion.*	[free text]	Y	Ocean SPR NAT Asia-Pac FANS 1/A
DM 90	normal urgency, medium alert	[free text]	N	N/A
DM 91	normal urgency, low alert	[free text]	Y	N/A
DM 92	low urgency, low alert	[free text]	Y	N/A
DM 93	urgent urgency, high alert	[free text]	N	N/A (Urgent)
DM 94	distress urgency, high alert	[free text]	N	N/A (Distress)
DM 95	urgent urgency, medium alert	[free text]	N	N/A (Urgent)

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 96	urgent urgency, low alert	[free text]	N	N/A (Urgent)
DM 97	low urgency, low alert	[free text]	N	N/A
DM 98	normal urgency, normal alert *FANS 1/A – ATN.— ATN B1 aircraft only. FANS 1/A uses DM67.*	[free text]	N	Cont SPR ATN B1 FANS 1/A-ATN
	Negotiation Responses (downlink)			
DM 81	We can accept the specified level at the specified time. *Asia-Pac, NAT, and FANS 1/A.— Uses preformatted free text.*	**WE CAN ACCEPT [level] AT [time]** *Or* *WE CAN ACCEPT [altitude] AT [time]*	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 115	We can accept the specified level at the specified position.	WE CAN ACCEPT [level] AT [position]	N	N/A
DM 82	We cannot accept the specified level. *Asia-Pac, NAT, and FANS 1/A.— Uses preformatted free text.*	**WE CANNOT ACCEPT [level]** *Or* *WE CANNOT ACCEPT [altitude]*	N	Ocean SPR NAT Asia-Pac Cont SPR ATN B1 FANS 1/A FANS 1/A-ATN
DM 83	We can accept the specified speed at the specified time. *Asia-Pac, NAT, and FANS 1/A.— Uses preformatted free text.*	WE CAN ACCEPT [speed] AT [time]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 116	We can accept the specified speed at the specified position.	WE CAN ACCEPT [speed] AT [position]	N	N/A
DM 84	We cannot accept the specified speed. *Asia-Pac, NAT, and FANS 1/A.— Uses preformatted free text.*	WE CANNOT ACCEPT [speed]	N	Ocean SPR NAT Asia-Pac FANS 1/A

Ref #	Message Intent/Use	Message Element	Resp.	GOLD Review
DM 85	We can accept a parallel track offset the specified distance in the specified direction at the specified time. *Asia-Pac, NAT, and FANS 1/A.— Uses preformatted free text.*	WE CAN ACCEPT [specified distance] [direction] AT [time]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 117	We can accept a parallel track offset the specified distance in the specified direction at the specified position.	WE CAN ACCEPT [specified distance] [direction] AT [position]	N	N/A
DM 86	We cannot accept a parallel track offset the specified distance in the specified direction. *Asia-Pac, NAT, and FANS 1/A.— Uses preformatted free text.*	WE CANNOT ACCEPT [specified distance] [direction]	N	Ocean SPR NAT Asia-Pac FANS 1/A

A.4 CPDLC standardized free text messages

Editor's note 38. — TK - A table is provided for the CPDLC standardized uplink free text messages and a table is provided for the CPDLC standardized downlink free text messages. These messages were obtained from the sources listed at the beginning of this appendix. Unless assigned by one of the sources, an arbitrary letter was assigned to UM 169 or DM 67 and links are provided between to two tables using cross-references. You can click on these to take you to the corresponding free text message.

ACTION: The GOLD Ad Hoc Working Group needs to validate the list against the sources for completeness and determine standardized free text messages intended for the GOLD. The GOLD review column will then be removed.

A.4.1 CPDLC uplink standardized free text messages

When a free text uplink message has been received, the pilot shall respond with ROGER before responding to the message.

Ref #	Message Intent/Use	Message Element	Resp.	GOLD review
	Free Text-Standardized Report/Confirmation Requests (uplink)			
UM 169b	*Asia-Pac.— The controller is requesting the pilot to report the present ground speed.* *Note.— Intent similar partially to PANS/ATM UM 134.*	REPORT GROUND SPEED	R, and then DM 67l	Ocean SPR Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	GOLD review
UM 169c	*Asia-Pac.— The controller is requesting that the pilot advise the preferred flight level for the flight.* *Note.— Same intent as PANS/ATM UM 231*	STATE PREFERRED LEVEL	R, and then DM 67m	Ocean SPR Asia-Pac Cont SPR FANS 1/A-ATN
UM 169d	*Asia-Pac.— The controller is requesting an estimate for the specified waypoint.* *Note.— Same intent as PANS/ATM UM 228.*	REPORT ETA [position] *Example – REPORT ETA BILBO*	R, and then DM 67n	Ocean SPR Asia-Pac
UM 169e	*Asia-Pac.— The controller is requesting that the pilot notify when the specified traffic has been seen by visual contact and passed. The level specified in the traffic description is the level being maintained by the opposite direction aircraft.* *Note.— No equivalent to PANS/ATM.*	REPORT SIGHTING AND PASSING OPPOSITE DIRECTION [traffic description] ETP [time] *The traffic description is to be inserted by the controller and shall include the aircraft identification (callsign), flight level and aircraft type. ETP = Estimated Time of Passing.* *Example of the traffic description:* *SIA228 B747 FL370*	R, and then DM 67o DM 67p	Ocean SPR Asia-Pac
UM 169f	*Asia-Pac.— The controller is requesting from the pilot the time at which the aircraft will maintain the specified level.* *Note.— No equivalent to PANS/ATM.*	WHEN WILL YOU MAINTAIN FL [altitude]	R, and then DM 67r	Ocean SPR Asia-Pac
UM 169g	*Asia-Pac.— The controller is requesting the distance from the specified position or waypoint at which the aircraft will maintain the specified level. The pilot shall include the direction from the waypoint as a cardinal point, e.g. N, NE, NW, S, SW, SE, E or W.* *Note.— No equivalent to PANS/ATM.*	AT WHAT DISTANCE [position / waypoint] WILL YOU MAINTAIN FL [altitude]	R, and then DM 67s	Ocean SPR Asia-Pac
UM 169h	*Asia-Pac.— The controller is requesting that the pilot report the radial on which the aircraft is proceeding and the distance from the specified VOR.* *Note.— No equivalent to PANS/ATM.*	REPORT RADIAL AND DISTANCE [to/from] [position]	R, and then, DM 67t	Ocean SPR Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	GOLD review
UM 169i	*Asia-Pac.— The controller is requesting that the pilot makes voice contact / radio check call on the specified frequency.* *Note.— No equivalent to PANS/ATM.*	REQUEST VOICE CONTACT [frequency]	R	Ocean SPR Asia-Pac
	Free Text Instructions (uplink)			
UM 169j	*Asia-Pac.— The controller has detected that uplink messages exist that the pilot has not yet responded to. The pilot is required to check the ATC log page and to respond to unanswered uplink messages.* *Note.— No equivalent to PANS/ATM.*	CHECK AND RESPOND TO OPEN CPDLC MESSAGES *Asia-Pac: Formerly, "CHECK ATC LOG PAGE FOR OPEN MESSAGES"*	R	Ocean SPR Asia-Pac
UM 169w	*FANS 1/A.— Used by the aircraft to determine the time when messages received are delayed.* *Note.— No equivalent to PANS/ATM.*	SET MAX UPLINK DELAY VALUE TO XXX SEC	R	Ocean SPR Asia-Pac Cont SPR FANS 1/A-ATN
UM 169ai	*Asia-Pac.— Instruction that the "ident" function of the ADS-B emitter is to be activated.* *Note.— Same intent as PANS/ATM UM 242.*	TRANSMIT ADS-B IDENT	R	Ocean SPR Asia-Pac
	Free text Advisories (uplink)			
UM 169k	*Asia-Pac.— The controller is notifying the pilot that a selcal check will be made on the specified HF frequency.* *Note.— No equivalent to PANS/ATM.*	EXPECT SELCAL CHECK HF [frequency]	R	Ocean SPR Asia-Pac
UM 169l	*Asia-Pac & NAT.— The controller is notifying the pilot that the CPDLC transfer process will not be completed at the FIR boundary and will be delayed until the specified time. If the CPDLC transfer is not completed by the specified time, the pilot shall manually disconnect and logon to the next center.* *NAT.— standard free text message 006.* *Note.— No equivalent to PANS/ATM.*	EXPECT CPDLC TRANSFER AT [time]	R	Ocean SPR NAT Asia-Pac
UM 169aj	*Asia-Pac.— ATS advisory that the radar and/or ADS-B service is terminated.* *Note.— Same intent as PANS/ATM UM 244.*	IDENTIFICATION TERMINATED	R	Ocean SPR Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	GOLD review
UM 169m	*Asia-Pac.— The controller is notifying the pilot that CPDLC connection is not required by the next FIR (where the flight's transition time of that FIR is short) and CPDLC connection will be transferred to the subsequent FIR.* *The [ATSU name] is the relevant four character ICAO code.* *Note.— No equivalent to PANS/ATM.*	EXPECT NEXT CENTER [ATSU name]. CONTACT WITH [ATSU name] NOT REQUIRED	R	Ocean SPR Asia-Pac
UM 169n	*Asia-Pac.— The controller is notifying the pilot of traffic significant to the flight. The description will include the aircraft type and any other relevant information to assist the pilot in sighting the traffic. The pilot may respond that the traffic has been sighted.* *Note.— No equivalent to PANS/ATM.*	TRAFFIC IS [traffic description]	R and then, (optionally) DM 67q	Ocean SPR Asia-Pac
UM 169o	*Asia-Pac.— The controller is notifying the pilot of the secondary HF frequency for the area.* *Note.— No equivalent to PANS/ATM.*	SECONDARY HF [frequency]	R	Ocean SPR Asia-Pac
	Free Text Speed Messages (uplink)			
UM 169p	*Asia-Pac.— The controller is notifying the pilot that a speed instruction may be issued to be effective until the specified time.* *Note.— No equivalent to PANS/ATM.*	EXPECT TO MAINTAIN [speed] UNTIL [time / position]	R	Ocean SPR Asia-Pac
	Free Text Emergency Acknowledgement (uplink)			
UM 169q	*Asia-Pac.— The controller has acknowledged receipt of a MAYDAY downlink message. The controller shall attempt to make voice contact with the pilot. The pilot should only respond with ROGER if or when able to do so. If the aircraft is inbound to an airport within the FIR, a ROGER response is not required.* *NAT.— standard free text message 005. The controller received DM 56 MAYDAY MAYDAY MAYDAY.* *Note.— No equivalent to PANS/ATM.*	ROGER MAYDAY	R	Ocean SPR NAT Asia-Pac (Distress)

Ref #	Message Intent/Use	Message Element	Resp.	GOLD review
UM 169r	*Asia-Pac.— The controller has acknowledged receipt of a PAN downlink message. The controller shall attempt to make voice contact with the pilot. The pilot should only respond with ROGER if or when able to do so. If the aircraft is inbound to an airport within the FIR, a ROGER response is not required.* *NAT.— standard free text message 004. The controller received DM 55 PAN PAN PAN.* *Note.— No equivalent to PANS/ATM.*	ROGER PAN	R	Ocean SPR NAT Asia-Pac (Distress)
UM 169ak	*Asia-Pac.— When the ADS-C emergency mode is activated without a CPDLC emergency message or voice confirmation, and the demand contract report appears to indicate that the aircraft is maintaining normal operations (e.g. the aircraft is not in descent or involved in abrupt maneuvers), the aircraft may be subject to unlawful interference. To check for covert or inadvertent activation of the ADS-C emergency mode the free text uplink "Confirm ADS" shall be appended to a "Confirm Speed" data or voice request.* *If the aircraft continues with the ADS-C emergency mode activated ATC shall assume the aircraft is in emergency conditions and follow normal alerting procedures.* *Note.— No equivalent to PANS/ATM.*	CONFIRM ADS	R	Asia-Pac (Distress)
	Free Text – NAT-specific Region (uplink)			
UM 169s	*NAT.— standard free text message 001.* *The CPDLC downlink request was:* *1) part of the approved message set; and* *2) received by the controller.* *The aircraft will receive any further communication about the request via Gander aeradio.* *Note.— No equivalent to PANS/ATM.*	REQUEST RECEIVED RESPONSE WILL BE VIA GANDER AERADIO	R	Ocean SPR NAT

Ref #	Message Intent/Use	Message Element	Resp.	GOLD review
UM 169t	*NAT.— standard free text message 002.* *The CPDLC downlink request was:* *1) part of the approved message set; and* *2) received by the controller.* *The aircraft will receive any further communication about the request via Shanwick aeradio.* *Note.— No equivalent to PANS/ATM.*	REQUEST RECEIVED RESPONSE WILL BE VIA VOICE COMMUNICATION *Oceanic SPR.— REQUEST RECEIVED RESPONSE WILL BE VIA SHANWICK AERADIO*	R	Ocean SPR NAT
UM 169u	*NAT.— standard free text message 003.* *The CPDLC downlink message was not part of the approved message set.* *Note.— Equivalent to UM 162, PANS/ATM (22-Nov-07) Change.*	MESSAGE NOT SUPPORTED BY THIS UNIT *Oceanic SPR and Asia-Pac.— MESSAGE NOT SUPPORTED BY THIS FACILITY*	R	Ocean SPR NAT FOM
UM 169v	*NAT.— standard free text message 007.* *No equivalent to ICAO Doc 4444.*	UNABLE REQUESTED LEVEL	R	Ocean SPR
UM 169ac	*NAT.— standard free text message 007.* *Used by Reykjavik to indicate that part of a downlinked message was not part of the approved set.* *Note.— Adaptation of UM 162, PANS/ATM (22-Nov-07) Change.*	MESSAGE CONTAINS ELEMENT NOT SUPPORTED BY THIS UNIT. MESSAGE REJECTED.	R	NAT
UM 169ad	*NAT.— standard free text message 008.* *Used by Reykjavik to indicate which element in a message is not part of the approved message set.* *Note.— Adaptation of UM 162, PANS/ATM (22-Nov-07) Change.*	DOWNLINK <abbreviated downlink message> NOT SUPPORTED BY THIS UNIT	R	NAT
UM 169ae	*NAT.— standard free text message 009.* *Used by Reykjavik to indicate that the un-supported message has been rejected.* *Note.— Adaptation of UM 162, PANS/ATM (22-Nov-07) Change.*	MESSAGE REJECTED	R	NAT
UM 169af	*NAT.— standard free text message 010.* *Used by Reykjavik to indicate that voice should be used to repeat the rejected message.* *Note.— No equivalent to PANS/ATM.*	REPEAT VIA VOICE	R	NAT

Ref #	Message Intent/Use	Message Element	Resp.	GOLD review
UM 169ag	*NAT.— standard free text message 011. Used by Reykjavik to indicate the action to take in response to a rejected request for voice contact message.* *Note.— No equivalent to PANS/ATM.*	TRY SATCOM VOICE OR RELAY THROUGH ANOTHER AIRCRAFT	R	NAT
UM 169ah	*NAT.— standard free text message 012. Used by Santa Maria to indicate that the downlink message was not part of the approved message set. The message should be passed by voice.* *Note.— No equivalent to PANS/ATM.*	MESSAGE NOT SUPPORTED BY THIS FACILITY, CONTACT RTF	R	NAT
	Free Text – FANS 1/A use of ATN B1 data link services in Continental Airspace			
UM 169x	*Continental.— Indicates that the ATC has received the request and has passed it to the next control authority.* *Note.— Same intent as PANS/ATM UM 211.*	REQUEST FORWARDED	R UM211 Response is N	FANS 1/A-ATN
UM 169y	*Continental.— ATS advisory that the specified altimeter setting relates to the specified facility.* *Note.— Same intent as PANS/ATM UM 213.*	xxxx ALTIMETER yyyy *Where xxxx is facility designation and yyyy is altimeter both sent as free text.*	R	FANS 1/A-ATN
UM 169z	*Continental.— Notification that the aircraft may keep its preferred speed without restriction.* *Note.— Same intent as PANS/ATM UM 222.*	NO SPEED RESTRICTION	R	FANS 1/A-ATN
UM 169aa	*Continental.— Instruction to indicate the pilot's preferred time and/or position to commence descent to the aerodrome of intended arrival.* *Note.— Same intent as PANS/ATM UM 232.*	STATE TOP OF DESCENT	R, then DM 67v	FANS 1/A-ATN
UM 169ab	*Continental.— Indicates that the request cannot be responded to by the current unit and that it should be requested from the next unit.* *Note.— Same intent as PANS/ATM UM 237.*	REQUEST AGAIN WITH NEXT UNIT	R	FANS 1/A-ATN

A.4.2 CPDLC downlink standardized free text messages

Ref #	Message Intent/Use	Message Element	Resp.	Ocean SPR
	Free Text - Negotiation Responses (downlink)			
DM 67b	*Asia-Pac.— We can accept the specified level at the specified time.* *Note.— Intent equivalent to PANS/ATM DM 81.*	WE CAN ACCEPT [altitude] AT [time]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 67c	*Asia-Pac.— We can accept the specified speed at the specified time.* *Note.— Intent equivalent to PANS/ATM DM 83.*	WE CAN ACCEPT [speed] AT [time]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 67d	*Asia-Pac.— We can accept a parallel track offset the specified distance in the specified direction at the specified time.* *Intent equivalent to PANS/ATM DM 85.*	WE CAN ACCEPT [distance offset] [direction] AT [time]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 67e	*Asia-Pac.— We cannot accept the specified level.* *Note.— Intent equivalent to PANS/ATM DM 82.*	WE CANNOT ACCEPT [altitude]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 67f	*Asia-Pac.— We cannot accept the specified speed.* *Note.— Intent equivalent to PANS/ATM DM 84.*	WE CANNOT ACCEPT [speed]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 67g	*Asia-Pac.— We cannot accept a parallel track offset the specified distance in the specified direction.* *Note.— Intent equivalent to PANS/ATM DM 86.*	WE CANNOT ACCEPT [distance offset] [direction]	N	Ocean SPR NAT Asia-Pac FANS 1/A
DM 67h	*Asia-Pac.— Request for the earliest time at which a clearance to climb to the specified level can be expected* *Note.— Intent equivalent to PANS/ATM DM 87.*	WHEN CAN WE EXPECT CLIMB TO [altitude]	N	Ocean SPR NAT Asia-Pac
DM 67i	*Asia-Pac.— Request for the earliest time at which a clearance to descend to the specified level can be expected.* *Note.— Intent equivalent to PANS/ATM DM 88.*	WHEN CAN WE EXPECT DESCENT TO [altitude]	N	Ocean SPR NAT Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	Ocean SPR
	Free Text - Advisories (downlink)			
DM 67j	*Asia-Pac.— The pilot is offsetting due wake turbulence in accordance with RVSM procedures (offset will not exceed 2nm). The controller is not required to respond or issue a clearance.* *Note.— No equivalent in PANS/ATM.*	WAKE DEV [direction] *Direction L or R (left or right) as appropriate*	R *Note.— R per Asia-Pac. Should be N.*	Ocean SPR Asia-Pac
DM 67k	*Asia-Pac.— The pilot is advising ATC of an update a waypoint ETA.* *Note.— No equivalent in PANS/ATM.*	REVISED ETA [position] [time]	R *Note.— R per Asia-Pac. Should be N.*	Ocean SPR Asia-Pac
	Free Text – Responses (downlink)			
DM 67l	*Asia-Pac.— The pilot responds to controller free text, UM 169b REPORT GROUND SPEED.* *Note.— Intent partial to PANS/ATM DM113. The pilot notifies the controller of present ground speed.*	GS [speed] *Example - GS 490*	N	Ocean SPR Asia-Pac
DM 67m	*Asia-Pac.— The pilot responds to controller free text, UM 169c STATE PREFERRED LEVEL.* *Continental.— Used for FANS 1/A aircraft.* *Note.— Same intent as PANS/ATM DM 106.*	FL [altitude] *Example - FL 350*	N	Ocean SPR Asia-Pac
DM 67n	*Asia-Pac.— The pilot responds to controller free text, UM 169d REPORT ETA [position],* *Note.— Same intent as PANS/ATM DM 104.*	[position] [time] *Example - BILBO 0413*	N	Ocean SPR Asia-Pac
DM 67o	*Asia-Pac.— The pilot responds to controller free text, UM 169e REPORT SIGHTING AND PASSING OPPOSITE DIRECTION [traffic description] ETP [time].* *Note.— No equivalent in PANS/ATM.*	[traffic identification] SIGHTED AND PASSED *Example - SIA228 SIGHTED AND PASSED*	N	Ocean SPR Asia-Pac
DM 67p	*Asia-Pac.— The pilot responds to controller free text, UM 169e REPORT SIGHTING AND PASSING OPPOSITE DIRECTION [traffic description] ETP [time].* *Note.— No equivalent in PANS/ATM.*	[traffic identification] NOT SIGHTED	N	Ocean SPR Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	Ocean SPR
DM 67q	*Asia-Pac.— The pilot optionally responds to controller free text, UM 169n TRAFFIC IS [traffic description].* *Note.— No equivalent in PANS/ATM.*	TRAFFIC SIGHTED	N	Ocean SPR Asia-Pac
DM 67r	*Asia-Pac.— The pilot responds to controller free text, UM 169f WHEN WILL YOU MAINTAIN FL [altitude].* *Note.— No equivalent in PANS/ATM.*	FL [altitude] AT [time] *Example - FL 350 AT 2317*	N	Ocean SPR Asia-Pac
DM 67s	*Asia-Pac.— The pilot responds to controller free text, UM 169g WHEN WILL YOU MAINTAIN FL [altitude].* *Note.— No equivalent in PANS/ATM.*	FL [altitude] AT [distance] NM [direction] [position / waypoint]	N	Ocean SPR Asia-Pac
DM 67t	*Asia-Pac.— The pilot responds to controller free text, UM 169h REPORT RADIAL AND DISTANCE [to/from] [position].* *Note.— No equivalent in PANS/ATM.*	[radial] R [distance] NM [to/from] [position] *Example - 320 R 26 NM FROM MCY*	N	Ocean SPR Asia-Pac
DM 67u	*FANS 1/A.— Used as response when a message is delayed.* *Note.— No equivalent in PANS/ATM.*	UPLINK DELAYED IN NETWORK AND REJECTED - RESEND OR CONTACT BY VOICE	N	Ocean SPR FANS 1/A
DM 67v	*Continental & FANS 1/A – ATN.— Response to UM 232, STATE TOP OF DESCENT or free text UM 169aa STATE TOP OF DESCENT.* *Note.— Same intent as PANS/ATM DM 109.*	TOD [time]	N	Cont SPR FANS 1/A-ATN
DM 67ab	*Asia-Pac.— The pilot shall then check the status of the aircraft's ADS-C Emergency Mode and if the emergency mode has been activated inadvertently, the pilot shall select ADS-C Emergency Mode to "OFF" and advise ATC by voice or the following CPDLC free text downlink.* *Note.— No equivalent in PANS/ATM.*	ADS RESET	N	Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	Ocean SPR
	Free Text – Reports (downlink)			
DM 67aa	The specified ATS unit is being monitored on the specified frequency. *Urgent urgency attribute.* *FANS 1/A-ATN.— It is anticipated that airborne automation (i.e., preformatted message rather than the pilot typing the text) may be necessary for message composition and to ensure accuracy of the message content. Consequently, it is likely that not all aircraft will be equipped with such automation.* *Note.— Same intent as DM 89.*	MONITORING [unitname] [frequency] *Where* *[unitname] = [facility identification] [facility function]* *[facility identification] = 4-character ICAO code* *[facility function] = any of the ICAOfacilityfunction values of CENTER, APPROACH, etc. per the ATN B1 INTEROP Standard* *[frequency] = a VHF frequency as nnn.nnn or an HF frequency as nnnnn*	N	Oceanic SPR FANS 1/A-ATN
	Free Text – Military (downlink)			
DM 67w	*Asia-Pac.— The tanker is requesting a clearance to delay at the ARCP until the rendezvous with the receiver.* *[position] is the ARCP as filed in the tanker's flight plan.* *[time] is the time the tanker expects to pass the ARCP and commence refueling along the refueling track. It is also the end of the delay time.* *DM67L in Asia-Pac.* *Note.— No equivalent in PANS/ATM.*	TO DELAY FOR AIR REFUEL AT [position] UNTIL [time]; and	R *Note.— R per Asia-Pac. Should be N.*	Ocean SPR Asia-Pac
DM 67x	*Asia-Pac.— The tanker pilot is providing notification that the end of refueling is imminent. [xxxxx} may be either position or time.* *DM67n in Asia-Pac.* *Note.— No equivalent in PANS/ATM.*	EXPECT END OF REFUEL AT [xxxxx]	R *Note.— R per Asia-Pac. Should be N.*	Ocean SPR Asia-Pac

Ref #	Message Intent/Use	Message Element	Resp.	Ocean SPR
DM 67y	*Asia-Pac.— [XXXXX] can be either a point or a time* *DM67o in Asia-Pac.* *Note.— No equivalent in PANS/ATM.*	JOINING ALTRV [xxxxx] AT [xxxxx] Example: JOINING ALTRV CW413 AT HEMLO or JOINING ALTRV CW413 AT 1530Z	R *Note.— R per Asia-Pac. Should be N.*	Ocean SPR Asia-Pac
DM 67z	*Asia-Pac.— The tanker is accepting MARSA procedures with the receiver [receiver callsign] is the flight planned callsign of the receiver.* *DM67p in Asia-Pac.* *Note.— No equivalent in PANS/ATM.*	ACCEPT MARSA WITH [callsign(s) of other aircraft]	R *Note.— R per Asia-Pac. Should be N.*	Ocean SPR Asia-Pac

Appendix B RCP specifications (Tom)

NAT-69.— TK – This Appendix, NAT para 12.3, 12.3.1, 12.3.2, 12.3.3, 12.4, 12.4.1, 12.4.2, 12.4.3, 12.4.4, 12.4.5, 12.5, 12.5.1, 12.5.2, 12.6, 12.6.1, 12.6.2, 12.7.

FOM 59.— TK – This Appendix, FOM, para 3.4, RFC.

Editor's note 39. — TK – This appendix still needs to be validated with FOM and NAT GM for completeness.

Editor's note 40. — TK – More work may be needed on outage and restoration notifications. PARC CWG discussed various issues on Iridium service interruption announcements and warnings of possible service degradation. The existing procedures may provide a starting point for developing guidance material related to outage and restoration notification to meet the "performance-based" criteria for RCP 240. Note the criteria above is from when the outage begins to when the ANSP receives notification. It is suggested also that if ANSPs are not notified of restoration, than that would seriously impact the overall yearly availability measurement against the criteria for any 12-month period.

This appendix includes specifications for RCP 240 and RCP 400. These specifications support:

a) Safety oversight of air traffic service provisions and operations;

b) Agreements/contractual arrangements that air navigation service providers and aircraft operators make with their respective communication service providers;

c) Operational authorizations, flight crew training and qualification;

d) Design approval of aircraft data link systems; and

e) Operational-monitoring, analysis, and exchange of operational data among regions and states.

The RCP specifications are derived mainly from a safety assessment. However, in cases where it has been determined to be beneficial, the RCP specification may include criteria to support operational efficiency and orderly flow of air traffic. In these cases, the RCP specification indicates the distinction between safety and efficiency.

The specifications provide a means of compliance, in general. Additional guidance related to service provision, aircraft approval and operational authorizations can be found in Chapter 3. Guidance and requirements on post-implementation monitoring can be found at Appendix D.

The RCP specifications include allocations for data communications. The /D designator is used to indicate the RCP allocations associated with the CPDLC application.

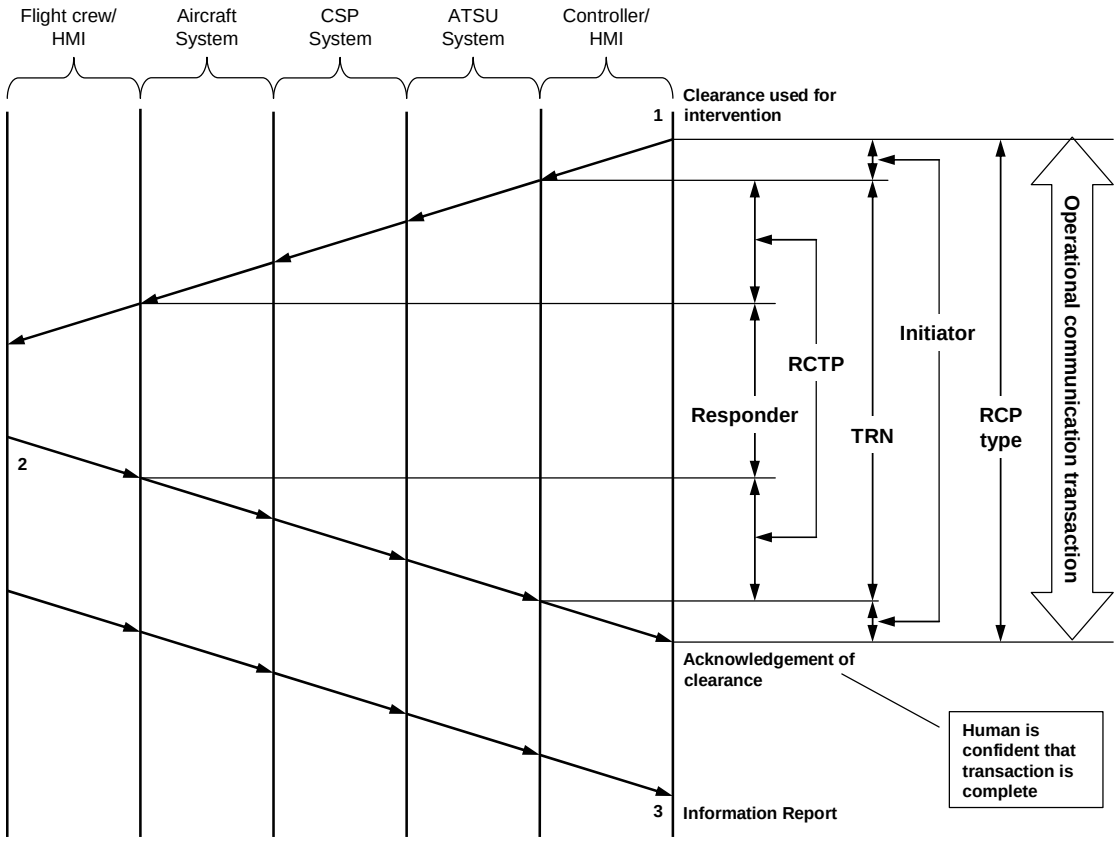
B.1 Terms and acronyms

Note.— The terms applied to the RCP specifications are taken from ICAO Doc 9869, First Edition, Manual on Required Communication Performance, dated 2008. Additional terms are provided, as appropriate, to clarify meaning and measurement points for the RCP allocations.

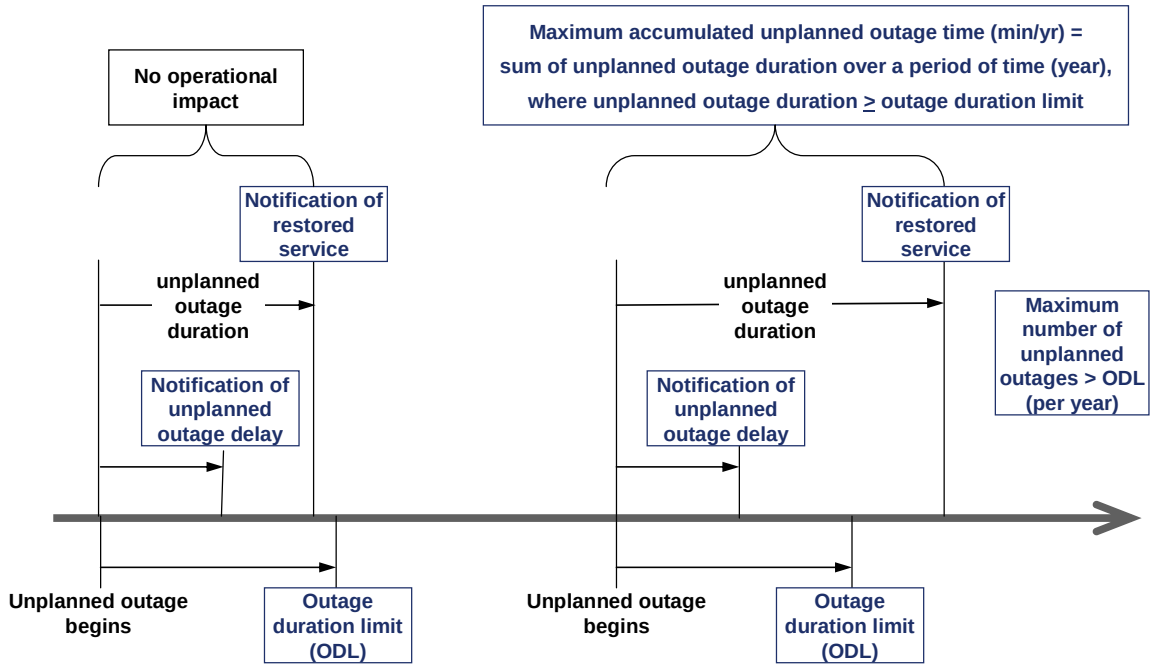
RCP specification	
Term	**Description**
Operational communication transaction	The process a human uses to initiate the transmission of an instruction, clearance, flight information, and/or request, and is completed when that human is confident that the transaction is complete.
RCP Expiration time (ET)	The maximum time for the completion of the operational communication transaction after which the initiator should revert to an alternative procedure.
RCP Nominal time (TT 95%)	The nominal time for the completion of the operational communication transaction at 95%.
RCP Continuity (C)	Probability that an operational communication transaction can be completed within the communication transaction time, ET or TT 95%.
RCP Availability (A)	Probability that an operational communication transaction can be initiated when needed.
RCP Integrity (I)	Acceptable rate of one or more undetected errors in a completed communication transaction.

/D transaction time	
Term	**Description**
Monitored operational performance (TRN)	The portion of the transaction time (used for intervention) that does not include the times for message composition or recognition of the operational response.
Required Communication Technical Performance (RCTP)	The technical portion of the transaction time (used for intervention) that does not include the times for message composition, operational response, and recognition of the operational response.
Responder performance	The operational portion of the transaction time to prepare the operational response, and includes the recognition of the instruction, and message composition, e.g., flight crew/HMI for intervention transactions.
$RCTP_{ATSU}$	The summed critical transit times for an ATC intervention message and a response message, allocated to the ATS unit system.
$RCTP_{CSP}$	The summed critical transit times for an ATC intervention message and a response message, allocated to the communication service provider system.
$RCTP_{AIR}$	The summed critical transit times for an ATC intervention message and a response message, allocated to the aircraft system.

Continuity	
Term	**Description**
C for TRN	The proportion of intervention messages and responses that can be delivered within the specified TRN for intervention.
C for RCTP	The proportion of intervention messages and responses that can be delivered within the specified RCTP for intervention.
C for $RCTP_{ATSU}$	The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{ATSU}$ for Intervention.
C for $RCTP_{CSP}$	The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{CSP}$ for Intervention.
C for $RCTP_{AIR}$	The proportion of intervention messages and responses that can be delivered within the specified $RCTP_{AIR}$ for Intervention.



Availability	
Term	**Description**
Service availability (A_{CSP})	Probability of available service on 24/7 operation.
Unplanned outage duration limit (minutes)	Time after the unplanned outage begins at which there is an operational impact. Measured from when an unplanned outage begins to when the ATS unit receives notification that the service has been restored.
Maximum number of unplanned outages	Measured for any 12-month period. Failures causing unplanned outages for multiple ATS units are only counted once.
Maximum accumulated unplanned outage time (min/yr)	Measured by accumulating ***only*** the duration times for unplanned outages greater than the unplanned outage duration limit during any 12-month period.
Unplanned outage notification delay (min)	Notification to the ATS unit of an unplanned outage. Measured from when the unplanned outage begins to when the ATS unit receives notification.
Aircraft system availability (A_{AIR})	Aircraft equipage availability is the probability of available capability on an aircraft with an average flight of 6 hours.



B.2 RCP 240 specification

<table>
<tr><th colspan="5">RCP Specification</th></tr>
<tr><td colspan="3">RCP type</td><td colspan="2">RCP 240</td></tr>
<tr><td colspan="5">Airspace specific considerations</td></tr>
<tr><td>Interoperability</td><td colspan="4">Specify interoperability criteria, e.g., FANS 1/A</td></tr>
<tr><td>ATS Function</td><td colspan="4">Specify ATS function(s), e.g., applicable separation standard</td></tr>
<tr><td>Application</td><td colspan="4">Specify controller-pilot ATC communication intervention capability, e.g., CPDLC application per ICAO Doc 4444, and RTCA DO-306/EUROCAE ED-122, Annex A</td></tr>
<tr><td colspan="5">RCP parameter values</td></tr>
<tr><td>Transaction time (sec)</td><td>Continuity (C) (probability)</td><td>Availability (A) (probability)</td><td colspan="2">Integrity (I) (acceptable rate/flight hour)</td></tr>
<tr><td>ET = 240</td><td>0.999</td><td rowspan="2">0.999
0.9999 (efficiency)</td><td colspan="2" rowspan="2">10^{-5}</td></tr>
<tr><td>TT 95% = 210</td><td>0.95</td></tr>
<tr><td colspan="5">RCP monitoring and alerting criteria</td></tr>
<tr><td>Ref</td><td colspan="4">Criteria</td></tr>
<tr><td>MA-1</td><td colspan="4">The system shall be capable of detecting failures and configuration changes that would cause the communication service to no longer meet the RCP type for the intended function.</td></tr>
<tr><td>MA-2</td><td colspan="4">When the communication service can no longer meet the RCP type for the intended function, the flight crew and/or the controller shall take appropriate action.</td></tr>
<tr><td colspan="5">Notes</td></tr>
<tr><td colspan="5"><u>Note 1</u>.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122.
<u>Note 2</u>.— The values for transaction times are to be applied to transactions that are representative of communication capability for the controller to intervene with a specific operator, aircraft type, and aircraft registration number or flight identification.
<u>Note 3</u>.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RCP type, this would be considered a change in system configuration.
<u>Note 4</u>.— DO 306/ED 122 specifies an availability value based on safety assessment of the operational effects of the loss of the service. The availability value herein is more stringent, based on an additional need to maintain orderly and efficient operations.</td></tr>
</table>

B.2.1 RCP 240/D allocations

The RCP 240/D allocations are applicable to the CPDLC application.

B.2.1.1 Air traffic service provider (ATSP)

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: ATSP**
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance Means**
Transaction Time Value	240	210	Analysis, CSP contract
RCP Time Allocations			
Initiator	30	30	Analysis, simulations, safety and human factors assessments
TRN	210	180	Monitored, CSP contract
TRN Time Allocations			
Responder	60	60	Initially, by analysis, simulations, safety human factors assessments Post-implementation, monitored, estimated
RCTP	150	120	Monitored, estimated, CSP contract
RCTP Time Allocation			
$RCTP_{ATSU}$	15	10	Pre-implementation demonstration

RCP availability criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Note.— See paragraph B.2.1.2, RCP 240/D allocation to CSP for RCP availability criteria.		

RCP integrity criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	10^{-5}	Analysis, safety requirements, development assurance level commensurate with integrity level, (compliance shown prior to operational implementation).

RCP monitoring and alerting criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Ref:	**Criteria**	**Compliance means**
MA-1a	The ground system shall be capable of detecting ground system failures and configuration changes that would cause the communication service to no longer meet the requirements for the intended function. *Note.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RCP type, this would be considered a change in system configuration.*	System design, implementation
MA-1b	When the communication service no longer meets the requirements for the intended function, the ground system shall provide indication to the controller.	System design, implementation
MA-2	When the controller receives an indication that the communication service no longer meets the requirements for the intended function (e.g., reduced longitudinal separation), the controller shall take action to resolve the situation, (e.g., apply an alternative form of separation).	System design, procedures, implementation

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**
Ref	**Related RCP Parameter**	**Safety requirement**
SR-1a	A	The ATSU shall display the indication provided by the aircraft system when a data link service request initiated by the ground system or the controller is rejected at the application layer.
SR-1b	A	The ATSU shall provide to the aircraft system an indication when it rejects a data link service request initiated by the flight crew at the application layer.
SR-2	A, C	The ATSU shall indicate to the controller a detected loss of data link service.
SR-3	A	Data link service shall be established in sufficient time to be available for operational use.

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: ATSP**

Ref	**Related RCP Parameter**	**Safety requirement**
SR-4	A, C	ATSU shall be notified of planned outage of data link service sufficiently ahead of time.
SR-5	A, C	The ATSU shall indicate to the controller when a message can not be successfully transmitted.
SR-6	C, I	The ATSU end system shall provide unambiguous and unique identification of the origin and destination with each message it transmits.
SR-7	C, I	The ATSU shall indicate in each response to which messages it refers.
SR-8	I	The ATSU shall send the route clearance information with the route clearance via data link.
SR-9	C, I	The ATSU end system shall time stamp to within one second UTC each message when it is released for onward transmission.
SR-11	C, I	Any processing performed by ATSU (data entry/ encoding/ transmitting/ decoding/ displaying) shall not affect the intent of the message.
SR-12	C, I	The ATSU end system shall reject messages not addressed to itself.
SR-13	C, I	The ATSU shall transmit messages to the designated aircraft system.
SR-14	A, C, I	The ATSU system shall indicate to the controller when a required response for a message sent by the ATSU is not received within the required time (ET_{TRN}).
SR-15	C, I	When the ATSU receives a message whose time stamp exceeds ET_{TRN}, the ATSU shall provide appropriate indication.
SR-16	C, I	The ATSU shall prevent the release of clearance without controller action.
SR-17	C, I	The ATSU shall prohibit operational processing by controller of corrupted messages.
SR-18	C, I	The ATSU shall be able to determine the message initiator.
SR-19	C, I	The ATSU shall prohibit to the controller operational processing of messages not addressed to the ATSU.
SR-20	C, I	ATSU shall only establish and maintain data link services when the aircraft identifiers in data link initiation correlates with the ATSU's corresponding aircraft identifiers in the current flight plan.
SR-21	C, I	The aircraft identifiers used for data link initiation correlation by the ATSU shall be unique and unambiguous (e.g. the Aircraft Identification and either the Registration Marking or the Aircraft Address).
SR-23	C, I	An ATSU system shall not permit data link services when there are non compatible version numbers.
SR-24	C, I	The ATSU shall respond to messages in their entirety.
SR-25	I	The ATSU end system shall be capable of detecting errors that would result in mis-delivery introduced by the communication service.

RCP related safety requirements			
Specification: RCP 240/D		**Application: CPDLC**	**Component: ATSP**
Ref	**Related RCP Parameter**	**Safety requirement**	
SR-26	I	The ATSU end system shall be capable of detecting errors that would result in corruption introduced by the communication service.	

B.2.1.2 Communication service provider (CSP)

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: CSP**
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance means**
RCTP Time Allocation			
$RCTP_{CSP}$	120	100	Contract terms

RCP availability criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: CSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP}) (probability)	0.9999	0.999	Contract terms
Unplanned outage duration limit (min)	10	10	Contract terms
Maximum number of unplanned outages	4	48	Contract terms
Maximum accumulated unplanned outage time (min/yr)	52	520	Contract terms
Unplanned outage notification delay (min)	5	5	Contract terms
Note.— DO 306/ED 122 specifies a requirement to indicate loss of the service. Unplanned outage notification delay is an additional time value associated with the requirement to indicate the loss to the ATS provider per SR-4.			

B.2.1.3 Aircraft system

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft system**
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance Means**
RCP Time Allocation			
Initiator	30	30	Human-machine interface capability, pre-implementation demonstration
TRN Time Allocation			
Responder	60	60	Human-machine interface capability, pre-implementation demonstration
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Pre-implementation demonstration

RCP availability criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft system**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Analysis, architecture, design, pre-implementation demonstration

RCP integrity criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft system**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	10^{-5}	Analysis, safety requirements, development assurance level, e.g., Level C software, commensurate with integrity level, pre-implementation demonstration.

RCP monitoring and alerting criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft system**
Ref:	**Criteria**	**Compliance means**
MA-1a	The aircraft system shall be capable of detecting aircraft system failures or loss of air/ground communication that would cause the aircraft communication capability to no longer meet the requirements for the intended function.	System design, implementation
MA-1b	When the aircraft communication capability no longer meets the requirements for the intended function, the aircraft system shall provide indication to the flight crew.	System design, implementation

RCP related safety requirements		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft system**
Ref	**Related RCP Parameter**	**Safety requirement**
SR-1a	A	The aircraft system shall provide to the ATSU an indication when it rejects a data link service request initiated by the ground system or the controller at the application layer.
SR-1b	A	The aircraft system shall display the indication provided by the ATSU when a data link service request initiated by the flight crew is rejected at the application layer.
SR-2	A, C	The aircraft system shall indicate to the flight crew a detected loss of data link service.
SR-5	A, C	The aircraft system shall indicate to the flight crew when a message can not be successfully transmitted.
SR-6	C, I	The aircraft end system shall provide unambiguous and unique identification of the origin and destination with each message it transmits.
SR-7	C, I	The aircraft system shall indicate in each response to which messages it refers.
SR-8	I	The aircraft shall execute the route clearance per the route clearance received from the ATSU via data link.
SR-9	C, I	The aircraft end system shall time stamp to within one second UTC each message when it is released for onward transmission.
SR-10	C, I	The aircraft end system shall include in each ADS-C report the time at position to within one second of the UTC time the aircraft was actually at the position provided in the report.
SR-11	C, I	Any processing performed by aircraft system (data entry/ encoding/ transmitting/ decoding/ displaying) shall not affect the intent of the message
SR-12	C, I	The aircraft end system shall reject messages not addressed to itself.
SR-13	C, I	The aircraft system shall transmit messages to the designated ATSU.

RCP related safety requirements			
Specification: RCP 240/D		**Application: CPDLC**	**Component: Aircraft system**
Ref	**Related RCP Parameter**	**Safety requirement**	
SR-15	C, I	When the aircraft system receives a message whose time stamp exceeds ET_{TRN}, the aircraft system shall provide appropriate indication.	
SR-16	C, I	The aircraft end system shall prevent the release of responses to clearances without flight crew action.	
SR-17	C, I	The aircraft system shall prohibit operational processing by flight crew of corrupted messages.	
SR-18	C, I	The aircraft system shall be able to determine the message initiator.	
SR-19	C, I	The aircraft system shall prohibit to the flight crew operational processing of messages not addressed to the aircraft.	
SR-21	C, I	The aircraft identifiers sent by the aircraft system and used for data link initiation correlation shall be unique and unambiguous (e.g. the Aircraft Identification and either the Registration Marking or the Aircraft Address).	
SR-24	C, I	The aircraft system shall respond to messages in their entirety or allow the flight crew to do it.	
SR-25	I	The aircraft end system shall be capable of detecting errors that would result in mis-delivery introduced by the communication service	
SR-26	I	The aircraft end system shall be capable of detecting errors that would result in corruption introduced by the communication service.	
SR-27	C, I	The aircraft and/or flight crew shall ensure the correct transfer into or out of the aircraft's FMS of route data received/sent via data link that will be used to define the aircraft's active flight plan.	

B.2.1.4 Aircraft operator

RCP communication transaction time and continuity criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft operator**
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance Means**
RCP Time Allocations			
Initiator	30	30	Procedures, flight crew training and qualification in accordance with safety requirements.
TRN Time Allocations			
Responder	60	60	Procedures, flight crew training and qualification in accordance with safety requirements.
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
$RCTP_{CSP}$	120	100	CSP contract

RCP availability criteria			
Specification: RCP 240/D	**Application: CPDLC**		**Component: Aircraft operator**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT

RCP integrity criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft operator**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	10^{-5}	Aircraft type design approval, establish procedures, training, and qualification to meet safety requirements

RCP monitoring and alerting criteria		
Specification: RCP 240/D	**Application: CPDLC**	**Component: Aircraft operator**

Ref:	**Criteria**	**Compliance means**
MA-2	When the flight crew determines that the aircraft communication capability no longer meets the requirements for the intended function, the flight crew shall advise the ATC unit concerned.	Procedures, flight crew training and qualification

RCP related safety requirements			
Specification: RCP 240/D		**Application: CPDLC**	**Component: Aircraft operator**
Ref	**Related RCP Parameter**	**Safety requirement**	
SR-22	C, I	The flight crew shall perform the initiation data link procedure again with any change of the flight identifier.	
SR-24	C, I	The flight crew shall respond to a message in its entirety when not responded by the aircraft system.	
SR-27	C, I	The aircraft and/or flight crew shall ensure the correct transfer into or out of the aircraft's FMS of route data received/sent via data link that will be used to define the aircraft's active flight plan.	

B.3 RCP 400 specification

<table>
<tr><th colspan="4">RCP Specification</th></tr>
<tr><td colspan="2">RCP type</td><td colspan="2">RCP 400</td></tr>
<tr><td colspan="4">Airspace specific considerations</td></tr>
<tr><td>Interoperability</td><td colspan="3">Specify interoperability criteria, e.g., FANS 1/A</td></tr>
<tr><td>ATS Function</td><td colspan="3">Specify ATS function(s), e.g., applicable separation standard</td></tr>
<tr><td>Application</td><td colspan="3">Specify controller-pilot ATC communication intervention capability, e.g., CPDLC application per ICAO Doc 4444, and RTCA DO-306/EUROCAE ED-122, Annex A</td></tr>
<tr><td colspan="4">RCP parameter values</td></tr>
<tr><td>Transaction time (sec)</td><td>Continuity (C) (probability)</td><td>Availability (A) (probability)</td><td>Integrity (I) (acceptable rate/flight hour)</td></tr>
<tr><td>ET = 400</td><td>0.999</td><td rowspan="2">0.999</td><td rowspan="2">10^{-5}</td></tr>
<tr><td>TT 95% = 350</td><td>0.95</td></tr>
<tr><td colspan="4">RCP monitoring and alerting criteria</td></tr>
<tr><td>Ref:</td><td colspan="3"><u>Criteria</u></td></tr>
<tr><td>MA-1</td><td colspan="3">The system shall be capable of detecting failures and configuration changes that would cause the communication service to no longer meet the RCP type for the intended function.</td></tr>
<tr><td>MA-2</td><td colspan="3">When the communication service can no longer meet the RCP type for the intended function, the flight crew and/or the controller shall take appropriate action.</td></tr>
<tr><td colspan="4">Notes</td></tr>
<tr><td colspan="4"><u>Note 1</u>.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122.
<u>Note 2</u>.— The values for transaction times are to be applied to transactions that are representative of communication capability for the controller to intervene with a specific operator, aircraft type, and aircraft registration number or flight identification.
<u>Note 3</u>.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RCP type, this would be considered a change in system configuration.</td></tr>
</table>

B.3.1 RCP 400/D allocations

The RCP 400/D allocations are applicable to the CPDLC application.

B.3.1.1 Air traffic service provider (ATSP)

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: ATSP**
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance Means**
Transaction Time Value	400	350	Analysis, CSP contract
RCP Time Allocations			
Initiator	30	30	Analysis, simulations, safety and human factors assessments
TRN	370	320	Monitored, CSP contract
TRN Time Allocations			
Responder	60	60	Initially, by analysis, simulations, safety human factors assessments Post-implementation, monitored, estimated
RCTP	310	260	Monitored, estimated, CSP contract
RCTP Time Allocation			
$RCTP_{ATSU}$	15	10	Pre-implementation demonstration

RCP availability criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: ATSP**
Note.— See paragraph B.3.1.2, RCP 400/D allocation to CSP for RCP availability criteria.		

RCP integrity criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: ATSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— RCP integrity criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.1.*	

RCP monitoring and alerting criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: ATSP**
Ref:	**Criteria**	**Compliance means**
All	*Note.— RCP monitoring and alerting criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.1.*	

RCP related safety requirements			
Specification: RCP 400/D	**Application: CPDLC**	**Component: ATSP**	
Ref	**Related RCP Parameter**	**Safety requirement**	
All	A, C, I	*Note.— Safety requirements related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.1.*	

B.3.1.2 Communication service provider (CSP)

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**	**Component: CSP**	
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance means**
RCTP Time Allocation			
$RCTP_{CSP}$	280	240	Contract terms

RCP availability criteria			
Specification: RCP 400/D	**Application: CPDLC**	**Component: CSP**	
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP}) (probability)	N/A	0.999	Contract terms
Unplanned outage duration limit (min)	N/A	20	Contract terms
Maximum number of unplanned outages	N/A	24	Contract terms
Maximum accumulated unplanned outage time (min/yr)	N/A	520	Contract terms
Unplanned outage notification delay (min)	N/A	10	Contract terms

B.3.1.3 Aircraft system

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft system**
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance Means**
RCP Time Allocation			
Initiator	30	30	Human-machine interface capability, pre-implementation demonstration
TRN Time Allocation			
Responder	60	60	Human-machine interface capability, pre-implementation demonstration
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Pre-implementation demonstration

RCP availability criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft system**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Analysis, architecture, design, pre-implementation demonstration

RCP integrity criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft system**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— RCP integrity criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.3.*	

RCP monitoring and alerting criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft system**
Ref:	**Criteria**	**Compliance means**
All	*Note.— RCP monitoring and alerting criteria related to RCP type 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.3.*	

RCP related safety requirements			
Specification: RCP 400/D		**Application: CPDLC**	**Component: Aircraft system**
Ref	**Related RCP Parameter**	**Safety requirement**	
All	A, C, I	*Note.— Safety requirements related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.3.*	

B.3.1.4 Aircraft operator

RCP communication transaction time and continuity criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft operator**
Transaction Time Parameter	**ET (sec), C = 99.9%**	**TT (sec), 95%**	**Compliance Means**
RCP Time Allocations			
Initiator	30	30	Procedural capability, flight crew training and qualification in accordance with safety requirements.
TRN Time Allocations			
Responder	60	60	Procedural capability, flight crew training and qualification in accordance with safety requirements.
RCTP Time Allocation			
$RCTP_{AIR}$	15	10	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
$RCTP_{CSP}$	280	240	CSP contract

RCP availability criteria			
Specification: RCP 400/D	**Application: CPDLC**		**Component: Aircraft operator**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT

RCP integrity criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft operator**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	*Note.— RCP integrity criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.4.*	

RCP monitoring and alerting criteria		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft operator**
Ref:	**Criteria**	**Compliance means**
All	*Note.— RCP monitoring and alerting criteria related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.4.*	

RCP related safety requirements		
Specification: RCP 400/D	**Application: CPDLC**	**Component: Aircraft operator**
Ref	**Related RCP Parameter**	**Safety requirement**
All	C, I	*Note.— Safety requirements related to RCP 400/D are the same as those related to RCP 240/D. See paragraph B.2.1.4.*

Appendix C Surveillance performance specifications (Tom)

NAT-70.— TK – This Appendix, NAT para 10, 10.1 through 10.3, 10.6 through 10.8, NAT para 11, 11.1 through 11.3, 11.6, 11.7, and relevant surveillance definitions and criteria provided in chapter 12.

FOM 60.— TK – This Appendix, FOM, para 3.4, RFC.

Editor's note 41. — TK – This appendix still needs to be validated with FOM and NAT GM for completeness.

The criteria provided in this appendix is intended to be consistent regardless of the type of aircraft operator, GA or air carrier. The appendix is derived mainly from NAT GM, FOM, and DO-306/ED-122 material. In particular, NAT Chapters 10, 11, and 12 were reviewed and it is believed that these chapters are adequately addressed in Appendix B and C of the GOLD, with the exception of two items in NAT GM, Chapters 10 and 11, lines 4 and 5 of the two tables:

a) "FMC/ADS-C ETAs shall reliably predict ATAs, as accurately as do HF voice ETAs. Expressing the requirement in engineering terms: The Root-Mean-Square error ('error' being 'ETA minus subsequent ATA') of FMC/ADS-C ETAs shall not exceed that of HF voice ETAs. Investigated errors in HF voice WPRs shall be discounted." TK comment. Ability to accurately estimate ETA is FMC function. What is the accuracy requirement? "…reliably predict?" Do we want to include criteria in the surveillance performance specification?

b) Fewer than 2% of FMC reports shall be duplicates. TK comment. 3% for ADS-C reports instead of 2%. Why the different criteria? For FANS 1/A in either the NAT GM or the FOM, and currently the GOLD, there are no specific criteria. A high percentage of duplicates will affect latency/continuity targets. Do we want specific criteria on this? If so, it should be performance-based and equally applicable to FANS 1/A, FANS 1/A ADS-C, and FMC WPR.

The following table provides the results of an assessment of NAT GM success criteria in Chapters 10 and 11 and correlates the criteria to GOLD references. It will eventually be removed together with this Editor's note.

Ref	FMC Criteria	GA ADS WPR	FANS 1/A (Spec) and/or GOLD Ref
1.	95% of required HF voice Waypoint Position Reports (WPR) that are received from flights that participate, shall be accompanied by FMC WPRs that meet the following requirements: (Affected ATS units will evaluate trials results and will judge acceptability for operation in the OCA for which they are responsible.	ADS-C instead of FMC WPR 94% instead of 95%. Consideration shall be given to what improvements can be expected in human and technical factors soon after the operational trial is implemented.	Appendix C, surveillance performance specification provides latency at 99.9% & 95%.
a)	Each FMC report shall be received by the ATC automation within 5 minutes of the aircraft's arrival at the waypoint, as per the reported ATA.	ADS-C instead of FMC WPR	Appendix C, provides two types of surveillance performance specifications Type 180 – 180 @ 99.9%, 90 @ 95% Type 400 – 400 @ 99.9%, 300 @ 95%
b)	Each FMC report shall contain all data elements that are required for ATC, as per ICAO Doc 4444.	ADS-C instead of FMC WPR	3.2.3.5.c)
c)	Aircraft Ident (ACID) shall be correct as per filed flight plan.	ADS-C instead of FMC WPR	3.3.1.1 3.3.1.4 3.3.2.1 4.6.1.1

Ref	FMC Criteria	GA ADS WPR	FANS 1/A (Spec) and/or GOLD Ref
d)	Reported Position, ATA, Altitude, NEXT Position, ETA, and Ensuing Position data shall be accurate in the following respects, when compared with the corresponding data in any accompanying HF voice WPR's, after accounting for any apparent errors in the HF voice data. i) Small position discrepancies (up to 2 miles lateral), which can be caused by offsets, shall be discounted. ii) Named waypoints shall be reported as such, rather than as lat/long coordinates. iii) Altitude discrepancies due to climbs or descents in progress shall be discounted. iv) One-minute ATA discrepancies, which can be caused by FMC rounding versus truncating, shall be discounted. v) Two-minute, or smaller, ETA discrepancies, which can be caused by rounding/truncating differences, and by crew methods of adjusting FMC data when making voice reports, shall be discounted.	ADS-C instead of FMC WPR Named waypoints versus lat/long not an issue.	Appendix C, paragraphs C.2 and C.3, navigation accuracy is certified and authorized per FOM and/or navigation requirements, e.g., MNPS, RNP 4 (FOM level 4 or higher), RNP 10 (FOM level 3 or higher) Clock accuracy is +/- 1 sec UTC Note: truncating to nearest minute could be problematic and should be assessed for impact on operation, and determined to be insignificant prior to being discounted. 4.3.8.9, Named waypoints rather than lat/long coordinates. Note: Some of the NAT criteria pertains to FMC and not to comm, e.g., navigation accuracy and ability to estimate time at next waypoint.
2.	50% of FMC messages shall be received within three minutes of the aircraft's arrival at the waypoint, as per the reported ATA.	ADS-C instead of FMC WPR	See item 1a).

Ref	FMC Criteria	GA ADS WPR	FANS 1/A (Spec) and/or GOLD Ref
3.	99% of FMC ATAs shall agree with HF voice ATAs with an error of not more than 1 minute. 100% of FMC ATAs shall agree with HF voice ATAs with an error of not more than 2 minutes. However, apparent ATA errors in HF voice WPR's shall be discounted.	ADS-C instead of FMC WPR 98% instead of 99%	Appendix C, C.1 and RSP related safety requirement, SR-14. Performance-based, not comparative. Measurements for exceeding times are based on ETA from previous surveillance data plus surveillance data latency values.
4.	FMC ETAs shall reliably predict ATAs, as accurately as do HF voice ETAs. Expressing the requirement in engineering terms: The Root-Mean-Square error ('error' being 'ETA minus subsequent ATA') of FMC ETAs shall not exceed that of HF voice ETAs. Investigated errors in HF voice WPRs shall be discounted.	ADS-C instead of FMC WPR	Ability to accurately estimate ETA is FMC function. What is the accuracy requirement? "…reliably predict?" Do we want to include criteria in the surveillance performance specification?
5.	Fewer than 2% of FMC reports shall be duplicates.	ADS-C instead of FMC WPR 3% instead of 2%	Why the different criteria? For FANS 1/A in either the NAT GM or the FOM, and currently the GOLD, there are no specific criteria. A high percentage of duplicates will affect latency/continuity targets. Do we want specific criteria on this? If so, it should be performance-based and equally applicable to FANS 1/A, FANS 1/A ADS-C, and FMC WPR.
6.	Extraneous FMC reports shall be sufficiently few so as to satisfy local requirements.	ADS-C instead of FMC WPR	4.3.8.1 4.6.1.4 Are these non-compulsory waypoint reports? Do we want a target? What should it be? … "… sufficiently few"
7.	Participating flights (except for those of Boeing 777 aircraft with software prior to BLOCK.01) shall provide for FMC derived air report (ARP) messages with accurate wind and temperature data, to MET facilities as appropriate for each FIR.	ADS-C instead of FMC WPR Boeing 777 aircraft not applicable	4.2.2.5.1.c) for ADS-C

Ref	FMC Criteria	GA ADS WPR	FANS 1/A (Spec) and/or GOLD Ref
8	Before a participating ANSP allows aircraft to use FMC WPR instead of HF reporting, they shall ensure that the quality of FMC WPR is adequate for purposes of ATC in their own FIR (and therefore adequate for purposes of downstream forwarding).	N/A	3.1 for all data link service provisions

This appendix includes specifications for surveillance performance. These specifications support:

a) Safety oversight of air traffic service provisions and operations;

b) Agreements/contractual arrangements that air navigation service providers and aircraft operators make with their respective communication service providers;

c) Operational authorizations, flight crew training and qualification;

d) Design approval of aircraft data link systems; and

e) Operational-monitoring, analysis, and exchange of operational data among regions and states.

The surveillance performance specifications are derived mainly from a safety assessment. However, in cases where it has been determined to be beneficial, the surveillance performance specification may include criteria to support operational efficiency and orderly flow of air traffic. In these cases, the surveillance performance specification indicates the distinction between safety and efficiency.

The specifications provide a means of compliance, in general. Additional guidance related to service provision, aircraft approval and operational authorizations can be found in Chapter 3. Guidance and requirements on post-implementation monitoring can be found at Appendix D.

The RCP specifications include allocations for data communications. The /D designator is used to indicate the surveillance performance allocations associated with the ADS-C or FMC WPR application.

C.1 Terms and acronyms

Note.— The terms applied to the surveillance performance specifications are taken from ICAO Doc 9869, First Edition, Manual on Required Communication Performance, dated 2008. Additional terms are provided, as appropriate, to clarify meaning and measurement points for the RCP allocations.

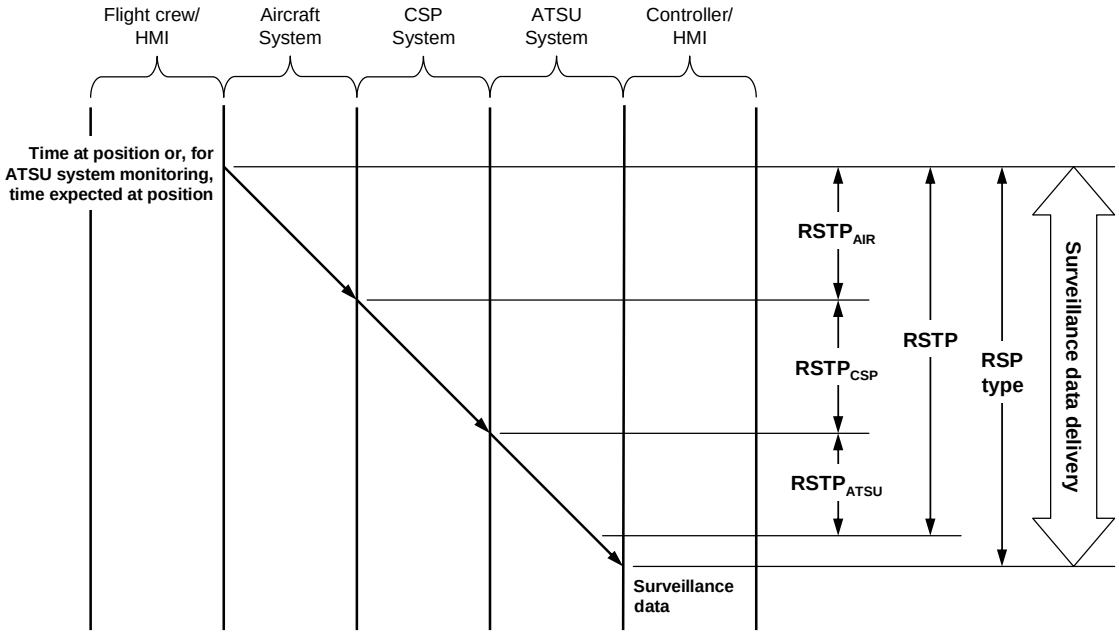
Surveillance performance specification and related terms	
Term	**Description**
ATS surveillance service	A term used to indicate a service provided directly by means of an ATS surveillance system. (ICAO)

Surveillance performance specification and related terms	
Term	**Description**
ADS-C service	A term used to indicate an ATS service that provides surveillance information by means of the ADS-C application. *Note.— ICAO Doc 4444 does not include ADS-C in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the ADS-C application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.*
FMC WPR service	A term used to indicate an ATS service that provides surveillance information by means of the FMC WPR application. *Note.— ICAO Doc 4444 does not include FMC WPR in its definition for ATS surveillance system. Therefore, an ATS surveillance service does not consider those provided by means of the FMC WPR application, unless it can be shown by comparative assessment to have a level of safety and performance equal to or better than monopulse SSR.*
ATS surveillance system	A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft. *Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.* (ICAO)
Automatic dependent surveillance — broadcast (ADS-B)	A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link. (ICAO)
Automatic dependent surveillance — contract (ADS-C)	A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports. *Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.* (ICAO)
Surveillance data	Data pertaining to the identification of aircraft and/or obstructions for route conformance monitoring and safe and efficient conduct of flight. *Note.— For ADS-C, surveillance data applies to periodic, waypoint change event, lateral deviation event, vertical deviation event reports, and CPDLC position reports. For FMC WPR, surveillance data applies to waypoint position report.*

Surveillance performance specification and related terms	
Term	**Description**
Surveillance data delivery	The process for obtaining surveillance data. *Note.— For ADS-C, the delivery is defined for the following reports:* *a) Periodic report, from the start of the periodic interval. The start of the periodic interval occurs when the periodic report is sent by the aircraft/flight crew;* *b) Waypoint change event report, from the actual time the aircraft crosses the waypoint or is abeam the waypoint;* *c) Lateral deviation event report, from the time the aircraft system detects that the event has occurred; and* *d) Vertical deviation event report, from the time the aircraft system detects that the event has occurred.*
RSP data latency	The required time for surveillance data delivery.
RSP overdue delivery time (OT)	The maximum time for the successful delivery of surveillance data after which the initiator should revert to an alternative procedure.
RSP nominal delivery time (DT 95%)	The nominal time for the successful delivery of surveillance data at 95%.
RSP continuity (C)	Probability that surveillance data can be delivered within the position RSP time parameter, ET or TT 95%.
RSP availability (A)	Probability that surveillance data can be provided when needed.
RSP integrity (I)	Acceptable level of confidence that the surveillance data is within specified tolerances. RSP integrity includes such factors as rate of one or more undetected errors in the transmission of the surveillance data, the accuracy of aircraft position and time data, data latency, update rate (i.e., reporting interval), extrapolation and/or estimation of the data.

RSP data latency criteria	
Term	**Description**
$RSTP_{ATSU}$	The overdue (OD) or nominal (DT) transit time for surveillance data from the CSP interface to the ATS unit's flight data processing system.
$RSTP_{AIR}$	The overdue (OD) or nominal (DT) transit time for surveillance data from the aircraft's avionics to the antenna.
$RSTP_{CSP}$	The overdue (OD) or nominal (DT) transit time for surveillance data allocated to the CSP.

RSP continuity criteria	
Term	**Description**
C for $RSTP_{ATSU}$	The proportion of surveillance messages that can be delivered within the specified $RSTP_{ATSU}$.
C for $RSTP_{AIR}$	The proportion of surveillance messages that can be delivered within the specified $RSTP_{AIR}$.
C for $RSTP_{CSP}$	The proportion of surveillance messages that can be delivered within the specified $RSTP_{CSP}$.



Note: The terms and acronyms used to specify the criteria for RSP availability are the same as the terms and acronyms used to specify the criteria for RCP availability. See Appendix B, paragraph B.1.

C.2 Surveillance performance type 180 specification

<table>
<tr><td colspan="6">Surveillance Performance Specification</td></tr>
<tr><td colspan="3">Surveillance performance type</td><td colspan="3">180</td></tr>
<tr><td colspan="6">Airspace specific considerations</td></tr>
<tr><td>Interoperability</td><td colspan="5">Specify interoperability criteria, e.g., FANS 1/A</td></tr>
<tr><td>ATS Function</td><td colspan="5">Specify ATS function(s), e.g., applicable separation standard</td></tr>
<tr><td>Application</td><td colspan="5">Specify the required surveillance capability. FMC WPR or, for ADS-C, specify the types of contracts required to support the ATS function, e.g., periodic contract at [nn] min, waypoint change event contract, lateral deviation event contract at [n] NM, etc.</td></tr>
<tr><td colspan="6">RSP parameter values</td></tr>
<tr><td>RSP data latency (sec)</td><td>RSP continuity (C) (probability)</td><td rowspan="3"></td><td rowspan="3">RSP availability (A) (probability)
0.999
0.9999 (efficiency)
See Note 3.</td><td>RSP integrity (I)</td><td></td></tr>
<tr><td>OT = 180</td><td>0.999</td><td>Navigation FOM</td><td>See Note 4.</td></tr>
<tr><td>DT 95% = 90</td><td>0.95</td><td>Time accuracy at position</td><td>+/- 1 sec (UTC)</td></tr>
<tr><td colspan="4"></td><td>Data integrity</td><td>10^{-5}</td></tr>
<tr><td colspan="6">RSP monitoring and alerting criteria</td></tr>
<tr><td>Ref</td><td colspan="5">Criteria</td></tr>
<tr><td>MA-1</td><td colspan="5">The system shall be capable of detecting failures and configuration changes that would cause the ADS-C or FMC WPR service to no longer meet the RSP parameter values for the intended function.</td></tr>
<tr><td>MA-2</td><td colspan="5">When the ADS-C or FMC WPR service can no longer meet the RSP parameter values for the intended function, the flight crew and/or the controller shall take appropriate action.</td></tr>
<tr><td colspan="6">Notes</td></tr>
<tr><td colspan="6">Note 1.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122.
Note 2.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RSP parameter values, this would be considered a change in system configuration.
Note 3.— DO 306/ED 122 specifies an availability value based on safety assessment of the operational effects of the loss of the service. The availability value herein is more stringent, based on an additional need to maintain orderly and efficient operations.
Note 4.— The navigation figure of merit (FOM) is specified based on the navigation criteria associated with this spec. For example, if RNP 4 is prescribed, then for ADS-C surveillance service, the FOM level would need to be 4 or higher. In all cases, when the navigation capability no longer meets the criteria specified for the operation, the flight crew is responsible for reporting the non-compliance to ATC in accordance with ICAO procedures.</td></tr>
</table>

C.2.1 Surveillance performance type 180/D allocations

The surveillance performance type 180/D allocations can be applied to the ADS-C or FMC WPR applications.

C.2.1.1 Air traffic service provider (ATSP)

RSP data latency and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: ATSP**
Data Latency Parameter	**OT (sec) @ 99.9%**	**DT (sec) @ 95%**	**Compliance Means**
Delivery Time Value	180	90	Analysis, CSP contract
RSTP Time Allocation			
$RSTP_{ATSU}$	5	3	Pre-implementation demonstration

RSP availability criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**
Note.— See paragraph C.2.1.2, Surveillance performance type 180/D allocation to CSP for RSP availability criteria.		

RSP integrity criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	10^{-5}	Analysis, safety requirements, development assurance level commensurate with integrity level, (compliance shown prior to operational implementation).

RSP monitoring and alerting criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**

Ref:	**Criteria**	**Compliance means**
MA-1a	The ground system shall be capable of detecting ground system failures and configuration changes that would cause the ADS-C or FMC WPR service to no longer meet the requirements for the intended function. *Note.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RSP type, this would be considered a change in system configuration.*	System design, implementation
MA-1b	When the ADS-C or FMC WPR service no longer meets the requirements for the intended function, the ground system shall provide indication to the controller.	System design, implementation
MA-2	When the controller receives an indication that the ADS-C or FMC WPR service no longer meets the requirements for the intended function (e.g., reduced longitudinal separation), the controller shall take action to resolve the situation, (e.g., apply an alternative form of separation).	System design, procedures, implementation

RSP related safety requirements		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**

Ref	**Related RSP Parameter**	**Safety requirement**
All	A, C, I	*Note.— Safety requirements related to RSP type 180/D are the same as those related to RCP 240/D, unless otherwise modified in this table. See Appendix B, paragraph B.2.1.1.*
SR-14	A, C, I	The ATSU system shall indicate to the controller when a required response for a message sent by the ATSU is not received within the required time (OT). *Note.— The overdue time (OT) is measured from the expected time at position based on the most recent position intent information received from the aircraft system.*
SR-15	C, I	When the ATSU receives a message whose time stamp exceeds the OT, the ATSU shall provide appropriate indication. *Note.— The overdue time (OT) is measured from the time at position in the surveillance data received in the message from the aircraft system.*

C.2.1.2 Communication service provider (CSP)

RSP data latency and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Data Latency Parameter	**OT (sec) @ 99.9%**	**DT (sec) @ 95%**	**Compliance means**
RSTP Time Allocation			
$RSTP_{CSP}$	170	84	Pre-implementation demonstration

RSP availability criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP}) (probability)	0.9999	0.999	Contract terms
Unplanned outage duration limit (min)	10	10	Contract terms
Maximum number of unplanned outages	4	48	Contract terms
Maximum accumulated unplanned outage time (min/yr)	52	520	Contract terms
Unplanned outage notification delay (min)	5	5	Contract terms
Note.— The RSP availability criteria for type 180/D are the same as the for RCP 240/D. See Appendix B, paragraph B.2.1.2.			

C.2.1.3 Aircraft system

RSP data latency and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft system**
Data Latency Parameter	**OT (sec) @ 99.9%**	**DT (sec) @ 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	5	3	Pre-implementation demonstration

RSP availability criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft system**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Analysis, architecture, design, pre-implementation demonstration
Note.— The RSP availability criteria for type 180/D are the same as the criteria for RCP 240/D. See Appendix B, paragraph B.2.1.3.			

RSP integrity criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft system**
Integrity parameter	**Integrity value**	**Compliance means**
Integrity (I)	10^{-5}	Analysis, safety requirements, development assurance level, e.g., Level C software, commensurate with integrity level, pre-implementation demonstration.

RSP monitoring and alerting criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft system**
Ref:	**Criteria**	**Compliance means**
MA-1a	The aircraft system shall be capable of detecting aircraft system failures or loss of air/ground communication that would cause the aircraft surveillance capability to no longer meet the requirements for the intended function.	System design, implementation
MA-1b	When the aircraft surveillance capability no longer meets the requirements for the intended function, the aircraft system shall provide indication to the flight crew.	System design, implementation

RSP related safety requirements		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft system**
Ref	**Related RSP Parameter**	**Safety requirement**
All	A, C, I	*Note.— Safety requirements related to RSP type 180/D are the same as those related to RCP 240/D, unless otherwise modified in this table. See Appendix B, paragraph B.2.1.3.*

C.2.1.4 Aircraft operator

RSP data latency and continuity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft operator**
Data Latency Parameter	**OT (sec), C = 99.9%**	**DT (sec), 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	5	3	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g., ORT
$RSTP_{CSP}$	170	84	CSP contract

RSP availability criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft operator**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
A_{AIR} (probability)	N/A	0.999	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g. ORT
Note.— The RSP availability criteria for type 180/D are the same as the criteria for RCP 240/D. See Appendix B, paragraph B.2.1.4			

RSP integrity criteria			
Specification: Type 180/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft operator**
Integrity parameter	**Integrity value**	**Compliance means**	
Integrity (I)	10^{-5}	Aircraft type design approval, establish procedures, training, and qualification to meet safety requirements	

RSP monitoring and alerting criteria		
Specification: Type 180/D	**Application: ADS-C, FMC WPR**	**Component: Aircraft operator**
Ref:	**Criteria**	**Compliance means**
MA-2	When the flight crew determines that the aircraft surveillance capability no longer meets the requirements for the intended function, the flight crew shall advise the ATC unit concerned.	Procedures, flight crew training and qualification

RSP related safety requirements			
Specification: Type 180/D		**Application: CPDLC**	**Component: Aircraft operator**
Ref	**Related RSP Parameter**	**Safety requirement**	
All	C, I	*Note.— Safety requirements related to RSP type 180/D are the same as those related to RCP 240/D. See Appendix B, paragraph B.2.1.4.*	

C.3 Surveillance performance type 400 specification

<table>
<tr><td colspan="6">Surveillance Performance Specification</td></tr>
<tr><td colspan="3">Surveillance performance type</td><td colspan="3">400</td></tr>
<tr><td colspan="6">Airspace specific considerations</td></tr>
<tr><td>Interoperability</td><td colspan="5">Specify interoperability criteria, e.g., FANS 1/A</td></tr>
<tr><td>ATS Function</td><td colspan="5">Specify ATS function(s), e.g., applicable separation standard</td></tr>
<tr><td>Application</td><td colspan="5">Specify the required surveillance capability. FMC WPR or, for ADS-C, specify the types of contracts required to support the ATS function, e.g., periodic contract at [nn] min, waypoint change event contract, lateral deviation event contract at [n] NM, etc.</td></tr>
<tr><td colspan="6">RSP parameter values</td></tr>
<tr><td>RSP data latency (sec)</td><td>RSP continuity (C) (probability)</td><td></td><td>RSP availability (A) (probability)</td><td colspan="2">RSP integrity (I)</td></tr>
<tr><td>OT = 400</td><td>0.999</td><td rowspan="3"></td><td rowspan="3">0.999</td><td>Navigation FOM</td><td>See Note 4.</td></tr>
<tr><td rowspan="2">DT 95% = 300</td><td rowspan="2">0.95</td><td>Time accuracy at position</td><td>+/- 1 sec (UTC)</td></tr>
<tr><td>Data integrity</td><td>10^{-5}</td></tr>
<tr><td colspan="6">RSP monitoring and alerting criteria</td></tr>
<tr><td>Ref</td><td colspan="5">Criteria</td></tr>
<tr><td>MA-1</td><td colspan="5">The system shall be capable of detecting failures and configuration changes that would cause the ADS-C or FMC WPR service to no longer meet the RSP parameter values for the intended function.</td></tr>
<tr><td>MA-2</td><td colspan="5">When the ADS-C or FMC WPR service can no longer meet the RSP parameter values for the intended function, the flight crew and/or the controller shall take appropriate action.</td></tr>
<tr><td colspan="6">Notes</td></tr>
<tr><td colspan="6"><u>Note 1</u>.— Rationale for the criteria provided in this specification can be found in ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9689, and RTCA DO-306/ED-122.
<u>Note 2</u>.— If changes are made to the system capacity limits, as specified by the airspace requirements, and the changes cause the system to perform below the RSP parameter values, this would be considered a change in system configuration.
<u>Note 3</u>.— The navigation figure of merit (FOM) is specified based on the navigation criteria associated with this spec. For example, if RNP 10 is prescribed, then for ADS-C surveillance service, the FOM level would need to be 3 or higher. In all cases, when the navigation capability no longer meets the criteria specified for the operation, the flight crew is responsible for reporting the non-compliance to ATC in accordance with ICAO procedures.</td></tr>
</table>

C.3.1 Surveillance performance type 400/D allocations

The surveillance performance type 400/D allocations can be applied to the ADS-C or FMC WPR applications.

C.3.1.1 Air traffic service provider (ATSP)

RSP data latency and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: ATSP**
Data Latency Parameter	**OT (sec), C = 99.9%**	**DT (sec), 95%**	**Compliance Means**
Delivery Time Value	400	300	Analysis, CSP contract
RSTP Time Allocation			
$RSTP_{ATSU}$	30	15	Pre-implementation demonstration

RSP availability criteria		
Specification: Type 400/D	**Application: ADS-C, FMC WPR**	**Component: ATSP**
Note.— See paragraph C.3.1.2, Surveillance performance type 400/D allocation to CSP for RSP availability criteria.		

Note.— The RSP integrity criteria, monitoring and alerting criteria, and related safety requirements for type 400/D are the same as the criteria provided for type 180/D. See paragraph C.2.1.1.

C.3.1.2 Communication service provider (CSP)

RSP data latency and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Data Latency Parameter	**OT (sec), C = 99.9%**	**DT (sec), 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{CSP}$	340	270	Pre-implementation demonstration

RSP availability criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: CSP**
Availability parameter	**Efficiency**	**Safety**	**Compliance means**
Service availability (A_{CSP}) (probability)	N/A	0.999	Contract terms
Unplanned outage duration limit (min)	N/A	20	Contract terms
Maximum number of unplanned outages	N/A	24	Contract terms
Maximum accumulated unplanned outage time (min/yr)	N/A	520	Contract terms
Unplanned outage notification delay (min)	N/A	10	Contract terms
Note.— The RSP availability criteria for type 400/D are the same as the for RCP 400/D. See Appendix B, paragraph B.3.1.2.			

C.3.1.3 Aircraft system

RSP data latency and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft system**
Data Latency Parameter	**OT (sec), C = 99.9%**	**DT (sec), 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	30	15	Pre-implementation demonstration

Note.— The RSP availability, integrity and monitoring and alerting criteria, and related safety requirements for type 400/D are the same as the criteria and related safety requirements provided for type 180/D. See paragraph C.2.1.3.

C.3.1.4 Aircraft operator

RSP data latency and continuity criteria			
Specification: Type 400/D	**Application: ADS-C, FMC WPR**		**Component: Aircraft operator**
Data Latency Parameter	**OT (sec), C = 99.9%**	**DT (sec), 95%**	**Compliance Means**
RSTP Time Allocation			
$RSTP_{AIR}$	30	15	Aircraft type design approval, maintenance, properly configured user-modifiable software, e.g., ORT
$RSTP_{CSP}$	340	270	CSP contract

Note.— The RSP availability, integrity and monitoring and alerting criteria, and related safety requirements for type 400/D are the same as the criteria and related safety requirements provided for type 180/D. See paragraph C.2.1.4.

Appendix D Post-implementation monitoring and analysis

Editor's note 42. — TK – This Appendix will include data collection requirements intended for ANSP and CSP data collection (system managers and technicians), problem reporting procedures (flight crews, dispatchers, controllers, or others involved in system operation), analysis and data presentation formats (ANSPs and Regiona/Global Monitoring Agencies), problem resolution procedures (All that are impacted by the problem resolution), etc. It would include information taken from FOM v5, for example, paragraph 8.8 and RFCs to incorporate performance monitoring requirements against DO 306/ED-122 requirements, and the NAT GM v17, section 13.

The ICAO Global Plan calls for the implementation of a performance based system and ICAO Annex 11 requires that data link system performance is monitored to verify that an acceptable level of safety continues to be met.

Monitoring of FANS1/A data communications in terms of RCP and ADS latency is an important part of the performance based system described in the ICAO global plan. To successfully achieve this performance monitoring on a global scale will require the use of a common data set. It is only through this common data set that RCP and ADS latency performance data can be aggregated from an ANSP level through to a regional CRA level and then to Global level. This aggregation of performance data is in accordance with the guidelines provided in ICAO Doc 9883 Manual on Global Performance of the Air Navigation System.

While individual ANSP will develop the FANS1/A data collection mechanisms, monitoring tools, and internal reporting requirements best suiting their own environment, all ANSP shall collect and maintain a database of FANS1/A performance data that can be aggregated for an assessment of CPDLC RCP and ADS surveillance latency on a regional and global basis using the data formats specified in this appendix.

This appendix contains the following guidance material:

a) ANSP data collection and analysis - The main aim of this section will be to define a common data reporting format using csv. Guidance material is included on how to obtain the required data points from the FANS1/A ACARS messages and on the calculation of actual communication performance (ACP), actual communication technical performance (ACTP), pilot operational response time (PORT), etc., and how they are calculated. Examples of the type of analysis that can be made at an ANSP level are also included. Issues regarding filtering are discussed including guidance on how to manage this.

b) CSP data collection and analysis

c) Problem reporting and resolution

d) Regional/Global analysis

D.1 ANSP data collection and analysis

Data link performance requirements for the application of reduced separation standards, as defined in ICAO Doc4444, are contained in the RTCA DO-306/EUROCAE ED 122 Oceanic SPR standard. These requirements are specified in terms of Required Communications Performance (RCP) and surveillance latency.

D.1.1 ANSP data collection for CPDLC application

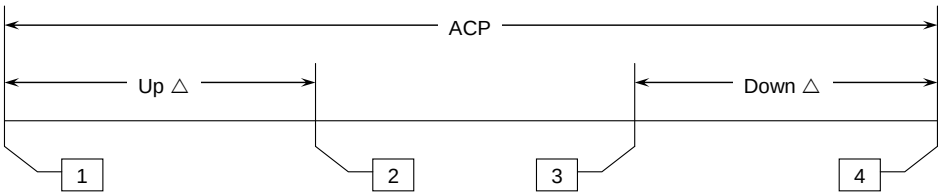
Data should be collected for the CPDLC.

D.1.1.1 Measuring CPDLC Communication Performance

CPDLC analysis is based on the calculation of Actual Communication Performance (ACP) used to monitor RCP time allocations for communication transaction (TRN), Actual Communications Technical Performance (ACTP) used to monitor Required Communication Technical Performance (RCTP) time allocations, and Pilot Operational Response Time (PORT) used to monitor the flight deck responder element of the transaction.

The analysis uses the measurement of transit and response times to all CPDLC uplinks that receive a single WILCO or UNABLE response. The logic behind is that the critical communications requirement is provided by intervention messages when applying reduced separation standards. Incorporating other message types such as free text queries or information requests will skew the observed data because of the longer response times from the flight deck.

To calculate ACP the difference between the times that the uplink message is originated at the Air Traffic Service Provider (ATSP) to the time that the corresponding response downlink is received at the ATSP is used. To calculate ACTP the difference between the downlink's aircraft time stamp and the received time is added to half the round trip time determined by the difference between the uplink time when the message is sent from the ATSP and the receipt of the MAS response for the uplink at the ATSP ((uplink transmission time – MAS receipt)/2 + downlink time). PORT latency is calculated by the difference between ACP and ACTP. Figure D- 1 illustrates these measurements.



1. Uplink Sent. This is the date/time that the CPDLC clearance was sent to the aircraft.
2. MAS Received. This is the date/time that the MAS for the CPDLC clearance was received.
3. WILCO/UNABLE Sent. This is the date/time that the WILCO or UNABLE reply is transmitted.
4. WILCO/UNABLE Received. This is the date/time that the WILCO or UNABLE reply for the CPDLC clearance was received.

The measurements (in seconds) are calculated as follows:

$$ACP = (WILCO\_UNABLE\_Received) - (Uplink\_Sent) \quad \rightarrow \textbf{TRN}$$

$$ACTP \cong \left(\left(\frac{Up\Delta}{2}\right) + (Down\Delta)\right) \quad \rightarrow \textbf{RCTP}$$

$$PORT \cong ACP - ACTP \quad \rightarrow \textbf{Responder}$$

Figure D- 1. CPDLC Transaction Calculations

The values for ACTP and PORT are only approximations. Uplink transit times are estimated by taking half the time for the MAS response round trip. This assumption is flawed in a small percentage of cases because we know it is possible for the MAS to be received at the ATSP some time after the operational response is received or the timestamp on the operational response is earlier than the MAS receipt time. This will happen if the CSP does not hear the network ACK from the aircraft which is sent on uplink receipt and resends the uplink at a later time. The CSP receives the network ACK to this second uplink and sends the MAS to the ATSP. In the meantime the aircraft has already responded with the operational response. ATSP will see this issue reflected in their data with crew response times with negative or extremely small values. The time sequence diagram below in Figure D- 2 illustrates this.

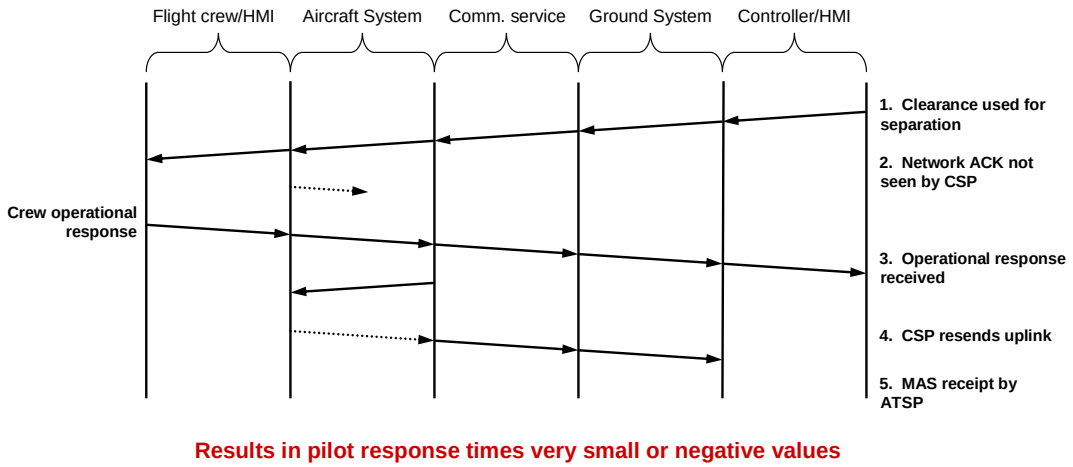


Figure D- 2 Issue with estimating uplink transit time as half MAS roundtrip

D.1.1.2 Recording the data points for each CPDLC transaction

The following data points are recommended as the minimum set that should be extracted from ANSP data link system recordings to enable RCP analysis and provide sufficient information for problem analysis. This does not preclude individual ANSP from extracting additional data points for their own analysis. To obtain these data points ANSP should note that they will require additional database information to enable the Aircraft Type and Airline to be obtained by correlation to the Tail Number extracted from the data link recordings. All of the other data points are extracted from either the ACARS header or the CPDLC application message.

Table D- 1 CPDLC data collection points

Ref	Label	Description and/or remarks
1	ANSP	The four letter ICAO designator of the FIR, e.g., NZZO.
2	Tail number	The aircraft tail number in ICAO Doc 4444 Format (no hyphens, packing dots, etc.), e.g., N104UA. *Note.— Extracted from ACARS header.*
3	Aircraft type designator	The ICAO type designator, e.g., B744. *Note.— Extracted from ANSP database using Tail Number as key.*
4	Airline designator	The IATA designator for the airline, e.g., UAL. *Note.— Extracted from ANSP database using Tail Number as key.*
5	Date	In YYYYMMDD format, e.g., 20081114. *Note.— Extracted from ANSP system data recording time stamp.*

Ref	Label	Description and/or remarks
6	MAS RGS	Designator of the RGS that MAS downlink was received from, e.g., POR1. *Note.— This is a 3 or 4 letter designator extracted from the ACARS header DT line.*
7	OPS RGS	Designator of the RGS that the operational response was received from, e.g., AKL1. *Note.— This is a 3 or 4 letter designator extracted from the ACARS header DT line.*
8	Uplink time	The timestamp on the uplink CPDLC message sent by the ANSP in HH:MM:SS format, e.g., 03:43:25. *Note.— Extracted from ANSP system data recording time stamp.*
9	MAS receipt time	The ANSP timestamp on receipt of the MAS in HH:MM:SS format, e.g., 03:43:55. *Note.— Extracted from ANSP system data recording time stamp.*
10	MAS round trip time	In seconds (#9-#8), e.g., 10.
11	Aircraft FMS time stamp	In the operational response messages in HH:MM:SS, e.g., 03:44:15. *Note.— Extracted from the ATCmessageHeader timestamp in the decoded operational response message. See RTCA DO-258AEUROCAE ED-100A section 4.6.3.3.*
12	ANSP timestamp on the receipt of the operational response	In HH:MM:SS, e.g., 03:44:45. *Note.— Extracted from ANSP system data recording time stamp.*
13	Operational message round trip time	From sending uplink (#8) to receipt of operational response (#9) in seconds, e.g., 80.
14	Downlink response transit time	In seconds (#12-#11), e.g., 30.
15	Uplink message elements	All uplink message element numbers preceded by U encapsulated between quotation marks with a space between each element, e.g., “U118 U80” *Note.— Extracted from the decoded operational uplink that initiated the transaction.*
16	Downlink message elements	All downlink message elements encapsulated between quotation marks with a space between each element if required, e.g., “D0” *Note.— Extracted from the decoded operational downlink.*
17	ACTP	Actual communication technical performance in seconds, e.g., 35. *Note.— Truncated to whole seconds.*
18	ACP	Actual communications performance in seconds measured as the difference between time uplink sent (#8) to operational response received (#12), e.g., 80.

Ref	Label	Description and/or remarks
19	PORT	Pilot Operational Response Time = ACP (#18) - ACTP(#17), e.g., 45. *Note.— Implementers should allow for negative values where the operational response is received before the MAS as per Figure D- 2 above.*
20	Transaction completion indicator	"S" for successful, "F" for failed. The transaction is considered successful if TRN <= 1800 and items 1-19 can be determined. If a transaction fails, all of the data that can be determined should be included in the record.

D.1.1.3 Data record for each CPDLC transaction

To enable regional analysis and aggregation of data CPDLC transaction data as described above is sent to the regional CRA at agreed intervals (usually monthly) as a comma delimited text file. The format for each record will at minimum contain the 20 data points specified in the previous paragraph. Using the example in the previous paragraph the data record for the transaction described above in comma delimited text file format is:

NZZO,N104UA,B744,UAL,20081114,POR1,AKL1,03:43:25, 03:43:55,10,03:44:15,03:44:45,80,30,"U118 U80","D0",35,80,45,S

Guidance on the type of analysis carried out at a regional level is provided later in paragraph D.4.

D.1.2 ANSP data collection for ADS-C application

Data should be collected for the ADS-C.

D.1.2.1 Measuring ADS-C Surveillance performance

The analysis of ADS-C performance is based on the measurement of the latency of the ADS periodic and event reports between the aircraft and the ANSP ground system. This is measured as the difference between the time extracted from the decoded Basic ADS Group timestamp when the message originated from the FMS and the time the message is received at the ANSP.

D.1.2.2 Recording the ADS-C data points for each ADS-C downlink.

The following data points are recommended as the minimum set that should be extracted from ANSP data link system recordings to enable an analysis of ADS-C latency and provide sufficient information for problem analysis. This does not preclude individual ANSP from extracting additional data points for their own analysis. To obtain all of these data points ANSP should note that they will require additional database information to enable the Aircraft Type and Airline to be obtained by correlation to the Tail Number extracted from the data link recordings. All of the other data points are extracted from either the ACARS header or the ADS application message.

Table D-2 ADS-C data collection points

Ref	Label	Description and/or remarks
1	ANSP	The four letter ICAO designator for the FIR of the reporting ANSP, e.g., NZZO.
2	Tail Number	The aircraft tail number in ICAO Doc 4444 Format (no hyphens, packing dots etc), e.g., N104UA. Note: Extracted from ACARS header.
3	Aircraft Type Designator	The ICAO type designator, e.g., B744. Note: extracted from ANSP database using Tail Number as key.
4	Airline Designator	The IATA designator for the airline, e.g., UAL. Note: extracted from ANSP database using Tail Number as key.
5	Date	In YYYYMMDD format, e.g., 20081114. Note: Extracted from ANSP system data recording time stamp.
6	RGS	Designator of the RGS that ADS downlink was received from, e.g., POR1. Note: This is a 3 or 4 letter designator extracted from the ACARS header DT line.
7	Report Type	The type of ADS report, e.g., PER. Note: Extracted from the Basic ADS group report tag where tag value 7=PER, 9=EMG, 10=LDE, 18=VRE, 19=ARE, 20=WCE.
8	Latitude	The current latitude decoded from the Basic ADS group. The format is "+" for North or "-" for South followed by a decimal number of degrees, e.g., -33.456732.
9	Longitude	The current longitude decoded from the Basic ADS group. The format is "+" for East or "-" for West followed by a decimal number of degrees, e.g., +173.276554.
10	Aircraft Time	The time the ADS message was sent from the aircraft in HH:MM:SS, e.g., 03:44:15. Note: Decoded from the Basic ADS group timestamp extracted as seconds since the most recent hour. See RTCA DO-258A/EUROCAE ED-100A, section 4.5.1.4.
11	Received Time	The ANSP timestamp on the receipt of the ADS Message in HH:MM:SS, e.g., 03:44:45. Note: Extracted from ANSP system data recording time stamp.
12	Transit Time	The transit time of the ADS downlink in seconds calculated as the difference between #10 Aircraft Time and #11 Received Time, e.g., 30.

D.1.2.3 Data record for each ADS-C downlink

To enable regional analysis and aggregation of data ADS-C data recorded by an ANSP is sent to the regional CRA at agreed intervals (usually monthly) as a comma delimited text file. The format for each record shall at minimum contain the 12 data points specified in the previous paragraph. Using the example in the previous paragraph the data record for the downlink described above in comma delimited text file format is:

NZZO,N104UA,B744,UAL,20081114,POR1,PER,-33.456732,+173.276554,03:44:15, 03:44:45,30

Guidance on the type of analysis carried out at a regional level is provided later in paragraph D.4.

D.1.3 ANSP Data Analysis

ANSP should at minimum perform a monthly analysis of CPDLC RCP and ADS-C latency data to provide adequate system performance monitoring. This monitoring is aimed at both verifying system performance against the standards; and continuous performance improvement by detecting where specific aircraft or fleets are not meeting the performance standards so that remedial actions can be initiated to improve performance.

It is recommended that a graphical analysis of the performance data is completed and the following sections illustrate the type of analysis that can carried out at an ANSP level on the actual performance of the CPDLC and ADS applications via the different communications media.

D.1.3.1 CPDLC analysis

Editor's note 43. — PR - Under Development. The main aim of the CPDLC and ADS analysis sections will be to provide examples of the type of analysis that can be made at an ANSP level.

D.1.3.2 ADS analysis

Editor's note 44. — PR - Under Development.

D.1.3.3 Data Filtering

Editor's note 45. — PR - Under Development. The main aim of the data filtering section will be to discuss issues regarding filtering including guidance on how to manage this. Main issue is filtering delayed reports occurring during known periods of CSP outage.

D.2 CSP data collection and analysis

Editor's note 46. — PR - Under Development. I do see a place for this and will coordinate with CSP's to get their thoughts. Identification of bad tails and advice of these to the regional CRA is one area where this might be useful. We may run into confidentiality issues – but will see what falls out.

D.3 Problem reporting and resolution

Editor's note 47. — PR - Under Development. From existing FOM/NAT material. FOM 3.6 and NAT 13.6 and ASIA/PAC guidance Material. Develop a problem reporting form that can be adapted for online use. Should fit the concept of a regional problem databases and their aggregation into a readily accessible global database in this section. This is a significant shortfall in current monitoring. Suggest we rationalize existing regional guidance material into this section to avoid duplication. The NAT material was developed from the ASIA/PAC end-to-end monitoring document which is not in the FOM.

D.4 Regional/global analysis

Editor's note 48. — PR - Under Development. Section will provide guidance on the specific types of monitoring that should be done at a regional level and global level? Include importance of inter-regional communication in order to aggregate to a global performance. So open for discussion is how/where to best achieve this?

Appendix E Regional/State-specific information (Tom)

NAT-71.— TK – This appendix, NAT para 01.5, 01.5.1, 01.5.2, 01.5.3, 01.5.4, 01.5.5, 01.5.6, 02.7.2, 02.9

FOM 61.— TK – This appendix, FOM para 1, 1.2, 8.2, 8.3, 8.3.1, 8.5, 8.8, 8.8.1 through 8.8.6

Editor's note 49. — TK - Includes Regional and/or State information, such as AFN Addresses/ATSU designators, service and operational capability coverage area and times available, trial information. This section will also serve as a place to identify regional differences as the GOLD matures, and hopefully, for those differences that have an impact on flight deck procedures, can be resolved in the main body of the document.

E.1 Regional and/or State information

The following table lists the flight information regions (FIRs) where data link service is provided and indicates AFN address, ATSU ACARS Address, coordinating group, CPDLC Contact or Monitor message requirements and position reporting requirements.

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	CPDLC Contact or Monitor message requirements	Position reporting requirements
Gander	O	O	O	CZQX		NAT FIG		
Shanwick	O	O	O	EGGX		NAT FIG		
Reykjavik	O	O	O	BIRD		NAT FIG		
Santa Maria	O	O	O	LPPO		NAT FIG		
Bodø	N	O	O	ENOB		NAT FIG		
New York	O	O	N	KZWY		NAT FIG		
Accral								
Algeria								

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	CPDLC Contact or Monitor message requirements	Position reporting requirements
Anchorage Oceanic	O	O		PAZA	ANCXFXA	IPACG FIT	CONTACT PAZA CENTER [frequency]	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Antananarivo (Madagascar)				FMMM				
Atlantico								
Auckland Oceanic	O	O	O	NZZO	AKLCDYA	ISPACG FIT	MONITOR NZZO CENTER [frequency]	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Bahrain								
Brisbane	O	O		YBBB	BNECAYA	ISPACG FIT	MONITOR BRISBANE CENTER [frequency]	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Canarias								
Casablanca								
Colombo	T	T						CPDLC position report at each waypoint. *Currently trialing ADS-C and CPDLC. Primary communication via voice. Full HF reporting still required.*
Dakar Oceanic								
Egypt								
Emirates								

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	CPDLC Contact or Monitor message requirements	Position reporting requirements
Fukuoka	O	O		RJJJ	FUKJJYA	IPACG FIT	CONTACT TOKYO CENTER [frequency]	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Honiara				YBBB	BNECAYA			
India								
Indonesia								
Iraq								
Johannesburg Oceanic	O	O		FAJO	JNBCAYA			Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Jordan								
Kuwait								
Lebanon								
Libya								
Lisbon								
Luanda								
Malaysia								
Mauritius	O	O		FIMM				Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Melbourne	O	O		YMMM	MELCAYA	ISPACG FIT	MONITOR MELBOURNE CENTER [frequency]	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Morocco								
Myanmar								

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	CPDLC Contact or Monitor message requirements	Position reporting requirements
Nadi	O	O		NFFF	NANCDYA	ISPACG FIT	MONITOR NFFF CENTER [frequency]	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Nauru				YBBB	BNECAYA		MONITOR BRISBANE CENTER [frequency]	
Oakland	O	O		KZAK	OAKODYA	IPACG FIT ISPACG FIT	CONTACT KSFO CENTER [frequency] *KSFO (San Francisco Radio) will provide all primary and secondary HF frequencies, and HF transfer points along the route of flight.*	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.
Oman								
Palestinian Gaza								
Qatar								
Sal								
Saudi Arabia								
Seychelles				FSSS				
Singapore								
Sudan								
Syria								
Tahiti	O	O		NTTT	PPTCDYA	ISPACG FIT	CONTACT NTTT CENTER [frequency] *A SELCAL check is required.*	Initial CPDLC position report at FIR boundary, then ADS-C reporting only.

Flight Information Region (FIR)	CPDLC	ADS-C	FMC WPR	AFN address	ATSU ACARS Address	Coord Group	CPDLC Contact or Monitor message requirements	Position reporting requirements
Thailand								
Tunisia								
Yemen								

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E.2 Regional and/or State differences

Editor's note 50. — TK - This section of the Appendix D is reserved for Regional and/or State differences still to be determined.

Appendix F Operator/aircraft specific information (Gordon)

NAT-72.— NAT GM – No equivalent

FOM 62.— TK – This appendix, FOM para 8.6

Editor's note 51. — TK – Needs review for completeness. Some text has been identified in source documents that may require additions. See NAT 2.3.2, 5.21, 6.3.2., Editor's note 2. —., Item 3.,Editor's note 9. —, Editor's note 25. —, and Editor's note 35. —

F.1 Verifying registration number

A330-A340
On Airbus aircraft, the pilot could not initially change the registration number provided by the avionics. This will be possible in the second version of ATSU, and this change will then be reflected in the FN_CON message.
B747-400 (up to Load 14)
On the B747-400 aircraft, the pilot cannot change the registration number in the FN_CON message. This number is provided by the avionics.
B747-400 (Load 15)/B777 / B757/B767 / B717 / MD90 / MD10 / MD11
These aircraft do not have an ***essential*** data source for this datum, which means that the pilot must verify that the registration number is correct.

F.2 CPDLC connection requests

A330-A340
B747-400 / B777 / B757-B767 / B717 / MD90 / MD10 / MD11
The only CONNECTION REQUEST message processed normally by FANS-1 is the first CONNECTION REQUEST following an AFN logon (i.e., an AFN logon initiated when no CPDLC connection exists). If the CPDLC connection in the avionics is not terminated, and a new AFN logon transmitted, before sending the new CONNECTION REQUEST message any subsequent CONNECTION REQUEST messages received from that ATSU are processed, however they have no effect on the "active" connection (i.e. the avionics is not informed of an ATS system shutdown and will therefore consider that the original connection is still active). The avionics will not accept a connection if the AFN logon is initiated manually by the pilot while another connection was active, even if the active connection is terminated before the connection from the new ATSU is received

F.3 Flight crew display:- response and acknowledgement

A330-A340
In response to an uplink message that requires a closure response (WILCO, ROGER, AFFIRM, UNABLE, NEGATIVE), the pilot is presented with prompts corresponding to the closure responses required by DO-219 for the specific uplink message. EG prompts presented upon receipt of an uplink clearance are WILCO, UNABLE, and STANDBY.
B747-400 / B777 / B757-B767 / B717 / MD90 / MD10 / MD11
In response to an uplink message that requires a response element (WILCO, ROGER, AFFIRM, UNABLE or NEGATIVE), the pilot is presented with two prompts (Accept and Reject). If the correct response to the uplink message is affirmative (WILCO, ROGER, or AFFIRM), then the pilot will select the Accept prompt. If the correct response to the uplink message is negative (UNABLE or NEGATIVE), then the pilot will select the Reject prompt. When the pilot selects either the Accept or the Reject prompt, the FANS-1 automatically transmits the correct response (WILCO, ROGER, AFFIRM, UNABLE, or NEGATIVE) for the corresponding message. On the FANS-1 equipped aircraft, the pilot cannot add any other element to a positive response.

F.4 FMS processing of waypoints

A330-A340
The FMS cannot distinguish between ATC mandatory waypoints and waypoints inserted by the pilot. However, the pilot can over-write any avionics-determined default data contained in reports and confirm messages.
B747-400
The FMCs on Boeing aircraft do not distinguish between ATC mandatory waypoints and FMC sequenced waypoints for position reports. Additionally, the FANS-1 of the B747-400 aircraft does not permit the pilot to overwrite the FMC-determined default "reported waypoint" position in downlink DM 45 - REPORTED WAYPOINT. However, the FANS-1 of the B747-400 aircraft does allow the pilot to overwrite the FMC-determined default time (in particular, in response to uplink UM 138 -CONFIRM TIME OVER REPORTED WAYPOINT). Non-use of uplink UM 139 for B747-400 aircraft The uplink message UM 139 - Confirm reported waypoint should not be sent to B747-400 aircraft.
B777 / B757-B767 / B717 / MD90 / MD10 / MD11
The FMCs on Boeing aircraft do not distinguish between ATC mandatory waypoints and FMC sequenced waypoints for position reports. However, the FANS-1 of these aircraft will allow the pilot to overwrite the FMC-determined default "reported waypoint" position and time (Downlink element DM 45).

F.5 Multiple request messages

A330-A340
There is no network acknowledgement timer on Airbus aircraft for the establishment of a connection. Once CPDLC is established, there is a timer which is currently set at 2 minutes.
B747-400
If the network acknowledgement to a downlink message is not received by the B747-400 aircraft's ACARS MU within a time period set in the Navigation Database or Operational Program Configuration (OPC) file, the FANS-1 closes the message and an alert is triggered to the pilot. This alert may prompt the pilot to re-send the message. The timer value was 2 minutes up to Load 14, but will be set to 5 minutes with the introduction of Load 15. If a second message is identical to the first, but with a different identification number, and both messages have been received and responded to by the controller the avionics will only recognize the reference number of the second message. The first message is considered by the avionics to have been unsuccessful. In reply to the controller's response to the first message, the avionics will send an INVALID REFERENCE NUMBER ERROR. The controller's response to the second message will be processed normally. In this case, if the controller ignores the first message, the connections to both ATS systems will not be lost when an End Service message is received on board the aircraft.
B757-B767 / B717 / MD90 / MD10 / MD11
When the network acknowledgement timer expires, it just "unlocks" the request pages, so that the pilot will be able to send another one. The time at which the network acknowledgement timer expires can be set in the Operational Program Configuration (OPC) file in the FMS. Currently, the value is set to 5 minutes.
B777
This network acknowledgement timer does not apply to the B777.

F.6 Waypoint sequencing

A330-A340
Waypoint sequencing will only occur when the aircraft is within 7 NM of the flight plan track (as modified by any parallel offset that may have been entered). Therefore ADS-C waypoint change event reports and armed REPORT PASSING messages will not be transmitted automatically when the aircraft is outside these limits.
B747-400 / B757-B767 / B777 / MD90
Waypoint sequencing will only occur when the aircraft is within 21 NM of the flight plan track (as modified by any parallel offset that may have been entered). Therefore ADS-C waypoint change event reports and armed REPORT PASSING messages will not be transmitted automatically when the aircraft is outside these limits.

B717 / MD10 / MD11
Waypoint sequencing will only occur when the aircraft is within 7 NM of the flight plan track (as modified by any parallel offset that may have been entered). Therefore ADS-C waypoint change event reports and armed REPORT PASSING messages will not be transmitted automatically when the aircraft is outside these limits.

F.7 Network acknowledgement timer

B747-400
The B747-400 FMC has a network acknowledgement timer as described in section 6.6.2A.i. of the Reference 1 ATS SR&O. If the network acknowledgement to a downlink message is not received before the timer expires, the flight crew is alerted and may assume that the message has not been sent. Once back "IN COMM" the ACARS MU will transmit any "queued" messages.

F.8 Open uplinks at time of transfer of communications

B747-400 (Load 15)
If there are OPEN uplinks in the Boeing B747-400 FMC's ATC LOG when the Current Data Authority initiates transfer of communication to the Next Data Authority, the FMC will allow transfer to the Next Data Authority (i.e. The FMC will not disconnect the next data authority). This allows a smooth transfer to the next Flight Information Region if there are open uplinks at the time of transfer.

F.9 Offset using the FMS

When a pilot is flying an FMS offset, the Airbus and Boeing parameters previously mentioned (7 NM and 21 NM respectively) are not an issue as all flight plan waypoints will be sequenced by the FMS without taking into account the offset distance being flown. However, when an offset is executed using the FMS, Boeing aircraft and Airbus aircraft will transmit intent and predicted route information as follows:
A330-A340
The Intent and Predicted Route Group information is projected along the offset route.

B747-400 / B777 / B757-B767 / B717 / MD90 / MD10 / MD11
The Predicted Route Group when flying an FMS offset is always along the offset route. The projection of intent information currently depends on the aircraft type, and the version of software is installed as defined below: B747-400 - Load 14 and before, towards the next FMS waypoint. Load 15 and after, along the offset path. B757/B767 - Pegasus 99 and before, towards the next FMS waypoint. Pegasus 2000 and after, along the offset path. B777 - Block Point 98, towards the next FMS waypoint. Block Point 99 and after, along the offset path. MD90 - 920 FMS, towards the next FMS waypoint. 921 FMS and after, along the offset path. MD10 / MD11 / B717 - Always along the offset path.

F.10 Duplicate uplink messages

B747-400 (Load 15)
If the Boeing B747-400 FMC receives an uplink message that is an exact duplicate of a previously received uplink message, the FMC will discard the duplicate message. This prevents the display of the INVALID ATC UPLINK scratch pad message which would otherwise be displayed when a duplicate uplink is received Note.— Duplicate messages are an unavoidable characteristic of the data link environment.